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**Latvia University of Life Sciences and  
Technologies**

**Faculty of Economics and Social  
Development**

**19<sup>th</sup> International Scientific Conference**

**ECONOMIC SCIENCE FOR RURAL  
DEVELOPMENT 2018**

**9-11 May 2018, Jelgava,  
Latvia**

# **ECONOMIC SCIENCE FOR RURAL DEVELOPMENT**

Proceedings of the  
International Scientific Conference

**No 47** Rural Development and Entrepreneurship  
Production and Co-operation in Agriculture

No 47

Jelgava

2018

**ISSN 1691-3078**

**ISSN 2255-9930 on line**

**ISBN 978-9984-48-292-7 (E-book)**

**Abstracted / Indexed: Web of Science, AGRIS, CAB Abstracts, EBSCOHost Academic Search Complete databases and Google Scholar**

<http://www.esaf.ltu.lv/lv/proceedings-economic-science-for-rural-development>

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## Time schedule of the conference

**Preparation of the proceedings and organization:** January 2018 – May 2018

**Conference:** 9-11 May 2018

Researchers from the following higher education institutions, research institutions, and professional organizations presented their scientific papers at the conference:

Academy of Agribusiness in Lomza	Poland
Alberta College	Latvia
Almaty University of Power Engineering and Telecommunications	Kazakhstan
Avesco Ltd	Latvia
Banking University of Ho Chi Minh City	Vietnam
College of Agriculture in Krizevci	Croatia
College of Law	Latvia
Cracow University of Economics	Poland
Czech University of Life Sciences Prague	Czech Republic
Estonian University of Life Sciences	Estonia
Gdynia Maritime University	Poland
Institute of Agricultural Resources and Economics	Latvia
Institute of Soil Science and Plant Cultivation State Research Institute	Poland
Institute of Technology and Life Sciences	Poland
ISTOM, College of International Agro-Development	France
Jan Kochanowski University in Kielce	Poland
Jelgava Municipality	Latvia
Kuban State University	Russia
Kujawsko-Pomorski Agricultural Advisory Centre in Minikowo	Poland
Latvia University of Life Sciences and Technologies	Latvia
Latvian Academy of Culture	Latvia
Latvian Academy of Sciences	Latvia
Latvian Association of Journalists	Latvia
Latvian Trade Union of Education and Science Employees (LIZDA)	Latvia
National Research Institute of Animal Production	Poland
Nicolaus Copernicus University in Torun	Poland
Pennsylvania State University	USA
Polish Academy of Sciences	Poland
Pope John Paul II State School of Higher Education in Biala Podlaska	Poland
Poznan University of Economics and Business	Poland
Poznan University of Life Sciences	Poland
Riga City Council	Latvia
Riga Technical University	Latvia
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Saeima Analytical Service	Latvia
Samara State Agricultural Academy	Russia
Samara State University of Economics	Russia
Skonto Plan Ltd	Latvia
Slovak University of Agriculture in Nitra	Slovakia
State University of Applied Sciences in Elblag	Poland
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University of Gdansk	Poland
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University of Szczecin	Poland
University of Warmia and Mazury in Olsztyn	Poland
University of Zielona Gora	Poland
UTP University of Science and Technology	Poland
Vidzeme University of Applied Sciences	Latvia
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Every article included into the Proceedings was subjected to a scientific, including international review.

All reviewers were anonymous for the authors of the articles.

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The Editorial Board is responsible for, among other, preventing publication malpractice. Unethical behaviour is unacceptable and the authors who submit articles to the Conference Proceedings affirm that the content of a manuscript is original. Furthermore, the authors' submission also implies that the material of the article was not published in any other publication; it is not and will not be presented for publication to any other publication; it does not contain statements which do not correspond to reality, or material which may infringe upon the intellectual property rights of another person or legal entity, and upon the conditions and requirements of sponsors or providers of financial support; all references used in the article are indicated and, to the extent the article incorporates text passages, figures, data or other material from the works of others, the undersigned has obtained any necessary permits as well as the authors undertake to indemnify and hold harmless the publisher of the proceedings and third parties from any damage or expense that may arise in the event of a breach of any of the guarantees.

Editors, authors, and reviewers, within the International Scientific Conference "**Economic Science for Rural Development**" are to be fully committed to good publication practice and accept the responsibility for fulfilling the following duties and responsibilities, as set by the *COPE Code of Conduct and Best Practice Guidelines for Journal Editors of the Committee on Publication Ethics (COPE)*.

It is necessary to agree upon standards of expected ethical behaviour for all parties involved in the act of publishing: the author, the editor, the peer reviewer, and the publisher.

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Every submitted manuscript has been reviewed by one reviewer from the author's native country or university, while the other reviewer came from another country or university. The third reviewer was chosen in the case of conflicting reviews. All reviewers were anonymous for 9 the authors of the articles, and the reviewers presented blind reviews. Every author received the reviewers' objections or recommendations. After receiving the improved (final) version of the manuscript and the author's comments, the Editorial Board of the conference evaluated each article.

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When an author discovers a significant error or inaccuracy in his/her own published work, it is the author's obligation to promptly notify the editor or publisher and cooperate with the editor to retract or correct the paper.

***Editorial Board***

## Foreword

The international scientific conference "Economic Science for Rural Development" is organized annually by the Faculty of Economics and Social Development of Latvia University of Agriculture.

The proceedings of the conference are published since 2000.

The scientific papers presented in the conference held on 9-11 May 2018 are published in 3 thematic volumes:

**No 47** Rural Development and Entrepreneurship  
Production and Co-operation in Agriculture

**No 48** Integrated and Sustainable Regional Development  
Marketing and Sustainable Consumption

**No 49** Bioeconomy  
Finance and Taxes  
Home Economics  
New Dimensions in the Development of Society

The proceedings contain scientific papers representing not only the science of economics in the diversity of its sub-branches, but also other social sciences (sociology, political science), thus confirming inter-disciplinary development of the contemporary social science.

This year for the first time the conference includes the section on a new emerging kind of economy-bioeconomy. The aim of bioeconomy is to use renewable biological resources in a more sustainable manner. Bioeconomy can also sustain a wide range of public goods, including biodiversity. It can increase competitiveness, enhance Europe's self-reliance and provide jobs and business opportunities.

The Conference Committee and Editorial Board are open to comments and recommendations concerning the preparation of future conference proceedings and organisation of the conference.

## Acknowledgements

The Conference Committee and editorial Board are open to comments and recommendations for the development of future conference proceedings and organisation of international scientific conferences.

We would like to thank all the authors, reviewers, members of the Programme Committee and the Editorial Board as well as supporting staff for their contribution organising the conference.

On behalf of the conference organisers

**Anita Auzina**

Associate professor of Faculty of Economics and Social Development  
Latvia University of Life Sciences and Technologies

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## **RURAL DEVELOPMENT AND ENTREPRENEURSHIP**



## **NORMATIVE ASPECTS OF RURAL DEVELOPMENT STRATEGY AND POLICY IN THE EUROPEAN UNION**

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**Abstract.** The objective of the work is to define and evaluate the normative approach in the programming and implementation of rural development in the European Union countries. Main focus is to determine the objectives and methods of implementation and achieving these objectives in various ideological documents, strategies, programmes and development policies. The present work was created on the basis of documents and publications by community bodies and institutions as well as open literature on this subject. The study presents ways of defining rural areas, strategies and development programmes in Europe (Lisbon Strategy, Europe 2020 Strategy), tasks of major community policies towards rural areas (common agricultural policy, cohesion policy), Cork ideological declarations, multifunctional development concepts and smart development. Innovative approaches include the concept of smart city, smart village, smart specializations of regions and the urban-rural partnerships.

**Key words:** rural development, Cork declarations, rural policies, smart villages.

**JEL code:** O2

### **Introduction**

The condition and development of rural areas is the result of socio-economic processes using local resources, external conditions and the scope of support resulting from the development policy. The rural development policy is built with the assessment of the current level and developmental capabilities. What proves necessary in making decisions and interventions in the pre-existing condition and socio-economic system, a positive approach (diagnosis, assessment of condition), as well as a normative approach including assessment of developmental opportunities and the concept and method of reaching the set objectives. The objective of the work is to define and evaluate the impact of normative approach in the programming and implementation of rural development in the European Union countries. Main focus is to define the normative definition of objectives, and methods of their implementation and achievement, in various ideological and conceptual documents and programmes as well as official development strategies. The normative character has a way of defining rural areas. However, the normative approach manifests itself mainly in formulated documents describing development concepts, as well as in strategies and policies that decide on the mobilization of economic and financial resources. The present analysis was carried out on the basis of documents and publications of the European Union bodies and institutions as well as the rich literature of the investigated subject. The study takes into account the strategic European development programmes (Lisbon Strategy, Europe 2020), the objectives of the main policies, including problems of rural development (common agricultural policy, cohesion policy), as well as ideological concepts referring to rural development (Cork declarations, multifunctional development, intelligent development, rural urban partnership), along with the new, innovative concept of smart villages.

### **Defining rural areas**

The villages and rural areas have a spatial and territorial dimension, the scope and meaning of which for each of these concepts are different. Spatial approach stems from the assumption that rural space has features that make it differ from other spaces, and in this case from urban spaces. The territorial approach refers to space, specific local or regional systems based on, among others, the administrative division. There are no precisely defined definitions and perceptions of these

concepts. However, it can be safely said that the concept of a village is narrower than the concept of rural areas. The village is primarily a settlement unit and remains in the dichotomy with the concept of the city. These two basic forms of settlement differ in many features, basic ones being morphological, demographic, socio-occupational, economic or cultural. The variety of these functions is not limited only to the area of housing, because these functions relate to the whole territory, which is integrally associated with the respective territorial settlement unit, where various production and service processes are organized. The village and the city perform different functions in their respective local and regional systems. Individual territorial systems compete for resources and development factors. Despite numerous attempts and efforts of both theoreticians and practitioners, no universal definition of the countryside and rural areas was developed so far. Definitions and criteria for delimitation are adapted to the purpose of the study and the nature of the problem or type of policy being carried out. The problem is not only to define the scope of rural areas but also their internal diversity, in other words the degree of rurality.

Among the many ways of perceiving, defining and classifying rural areas we should distinguish two main trends, an intuitive current and an objective current (Rakowska, 2013 p. 8). In the intuitive trend, there is a subjective perception of the village and it is understood as something obvious outside of the city, resulting from the dichotomous, eternal division of territories inhabited to the countryside and the city. The manner of defining this trend is understandable for everyone as a morphological, economic, social and cultural picture different from the picture of the city. The subjective trend may be a sufficient basis for sociological research, and often for the administrative separation of the village from the city. The objective trend is based on selected, more measurable criteria, according to the purpose and nature of the research. Despite many attempts to distinguish the concept of a village from a city with the help of numerous criteria, this two-part division is difficult because the city gradually penetrates into rural areas, resulting in a certain urban-rural continuity structure. Although the bipolar division of the country turns out to be outdated and inadequate to the content, it still has practical significance for the administrative division of local systems, as well as for the policy of financial support from national budgets and EU funds. This raises the need to set common criteria, both for research purposes and for the purpose of shaping the strategy and implementation of administrative tasks, as well as for conducting local and regional development policies and sectoral support policies.

### **European policies towards rural areas**

Rural areas became the subject of interest of the Common Agricultural Policy (CAP), in which its second pillar, devoted mainly to the development of rural areas, was distinguished. This interest in rural areas within the framework of the CAP, which appeared in the 1970s, was strengthened mainly by the McShare reform, carried out in the first half of the nineties.

Prior to the McShare reform, the CAP was affecting rural areas through market instruments of the 1st Pillar. As a result of the reform there was an increased interest in structural problems, not only in agriculture, but also in its rural environment. The reform aimed at maintaining the population in rural areas, preserving the natural environment, protecting the traditional rural landscape and the model of family farming. The programmes of afforestation of agricultural land, and early retirement of farmers by granting them structural pensions, have become an important tool of this new policy. The market policy of the CAP 1st Pillar continued to absorb the majority of the funds allocated to support agriculture, and the actions towards rural areas were limited. At the

beginning of the 21st century, there was some limitation of the role of market policy for the benefit of its structural counterpart. Agenda 2000, which was another reform of the CAP preparing the Community for the future enlargement to Central and Eastern Europe, defined the concept of a European agricultural model, in which farmers in accordance with social expectations should produce healthy and safe food with use of environmentally friendly production methods. At that time, the need to develop various forms of non-agricultural economic activity in the countryside was indicated, which gave rise to the concept of multifunctionality of agriculture and rural areas. It was pointed out that the shrinking importance of agriculture in the economic sphere (de-agrarisation of the village) should be balanced by the increase of its non-productive role, in the spheres of culture, landscape and other public goods. Taking the concept of sustainable development into account, an obligation to create integrated rural development plans was introduced, which should determine the impact of future agricultural activities on the economic, social and environmental situation of each country (European Commission, 2006 p. 4).

A continuation of the CAP system changes, initiated in 1992 and introduced by Agenda 2000, the so-called Fischler reform, adopted in 2003 in Luxembourg, deepened the changes in the sphere of agricultural support under 1st Pillar of the CAP and strengthened the regulations covered by the 2nd Pillar II and concerning rural development. It can be said that a new rural development policy has emerged, which emphasizes innovation in agriculture and sustainable development of agriculture, forestry and other sectors functioning mainly in rural areas. The new common agricultural policy, implemented since 2005 after the fifth enlargement of the European Union, drew attention not only to the promotion of the sustainable agriculture system, the quality of food and detachment of direct payments from the size and structure of production, but also to animal welfare, preservation of cultural values of villages, traditional plant varieties and animal breeds, and other elements of material culture in rural areas.

The 2008 review of the assumptions of the CAP instruments, known as "Health Check", was aimed at identifying ways to simplify and improve the efficiency of the direct payment system, and include farmers from Central and Eastern Europe therein. Health Check confirmed the need to further foster the process of shifting funds from market policy to rural development needs. New areas of interest are climate change, renewable energy production, water deficit prevention and risk insurance issues.

The policy of the European Union towards rural areas planned for the years 2007-2013 retains the continuity of previously implemented programmes. Each Member State has prepared its national strategic plan, constituting a reference framework for EU rural development programmes. Three thematic axes have been distinguished in these programmes: the axis on competitiveness and the environment, the axis on land management and the axis encompassing economic diversification and quality of life. An axis under the name Leader was also introduced. The third axis covering - economic diversification, quality of life and the Leader axis contained instruments concerning rural development policy. This last axis became the main tool for rural development policy in later years. Each of the axes contains a specific number of partial actions. The objective of the economic axis is to support modernization, innovation and efficiency of agricultural production, the environmental axis is intended to improve the condition of natural environment in rural areas. The activities of the social axis were focused on the diversification of rural economy, while in the framework of the LEADER approach, attempts have been made to seek new methods of economic and social activation in the countryside.

The 2007-2013 strengthening of rural development policy was supported by the establishment of the European Agricultural Fund for Rural Development, which simplified the rules for providing assistance and increased the coherence of the support instruments used. Member States have also obtained a considerable degree of freedom in shaping the structure of objectives and expenses. One should also pay attention to the necessity of greater involvement of own resources of beneficiaries and to the increase of the activity and participation of rural residents in the implementation of socio-economic programmes. The second pillar of the CAP is more decentralized and is based on the principles of partnership. The partnership exists at the level of relations between EU bodies and Member States, and includes direct cooperation between EU bodies with regional and local authorities, between public authorities and economic and social organizations representing civil society. The principle of subsidiarity, which motivates European integration, is reflected in this cooperation and partnership.

Although effective integrated rural development programmes and consolidated sources of financing have not been developed so far, a character consistent with the essence of sustainable development has been given to the rural development policy, which takes equal account of the economic, social and environmental aspects. The aim of sustainable development of rural areas is also to maintain proper proportions between ad hoc tasks, such as increasing the competitiveness of a given territorial system, and in particular increasing employment opportunities, and long-term tasks such as shaping the social, economic and environmental integrity of the area.

The Rural Development Programme for 2014-2020, adopted in 2013, is basically a continuation of the support programme from the previous financial perspective. The changes mainly concern the organization and implementation of individual instruments as well as the system for monitoring and evaluating the implemented activities. The currently implemented programme was integrated in the overall development policy system, as outlined by the "Europe 2020 - Strategy for smart and integrated inclusive development". The main objectives of the 2014-2020 RDP are to improve the competitiveness of agriculture, balance natural resource management and climate action, and sustainable territorial development of rural areas. The programme implements the following six priorities of the EU rural development policy:

- 1) Facilitation of knowledge transfer and innovation in agriculture, forestry and in rural areas;
- 2) Improving the competitiveness of all types of farming;
- 3) Improving the organization of the food chain and promoting risk management;
- 4) Restoring, protecting and strengthening ecosystems dependent on agriculture and forestry;
- 5) Active resource management and transition to a low-carbon and climate-resilient economy in the agricultural and forestry sectors;
- 6) Increasing social inclusion and reducing poverty.

### **Declarations relating to the basics of rural development**

The conferences devoted to the agricultural perspective of Europe organized in Cork, Ireland have a strong impact on the shape of the concept of rural development policy. The first Cork declaration announced in November 1996 indicated the need to create integrated rural development policy; the second one of August 2016 defined the outline of the policy of shaping better living conditions in rural areas. The 1st, 1996 Cork Conference entitled "Rural Europe - Future Prospects" determined the basic directions and principles for development of rural areas in Europe, which were included in the form of a declaration, according to which rural development

should be sustainable and balanced, with territorial orientation. It is believed that rural areas and their inhabitants are a real, valuable resource of the European Union with competitive capabilities. Taking the important role of agriculture and farmers in respect to natural environment into account, it was noticed that the contribution of agriculture and forestry sectors in rural economy was reduced, while the importance of non-agricultural sectors of the countryside economy increased. The development of rural areas should consist of economic diversification, run by small and medium enterprises, mainly of the services sector. Diversification of economy, but also rural and cultural landscapes, as well as the development of new functions should secure a higher standard of living for the rural population, and protection of natural resources and biodiversity.

The new model of rural development under the name of LEADER included 10 items in the form of postulates. They involved: preferences for rural development; integrated approach towards development; diversification; applying the principle of sustainable development; principles of subsidiarity, simplification, programming, financing, management as well as research and evaluation. The 1996 Cork declaration was to make European politicians aware that the rise of public belief to start a new rural development policy, the increase of the attractiveness of rural areas, and creating more significant centres for life and work for people of all ages, as well as the functioning of new professions are required. The proposed new model of rural policy differed from the CAP model that was implemented at that time. The economic and social diversification was to be made possible with aid focused on investments and services-related economic activities, development of education and training systems, improvement of the information and communication system. The needs for simplification of assistance procedures, concentration of resources, and proportionality in relation to the developmental backwardness, were all noticed. The principle of subsidiarity meant the aspiration to decentralise activities and strengthen the role of local communities in programming and development management. Simultaneously, the declaration emphasised the importance of agriculture for the overall level of rural development, the necessity of its contribution in the achievement of all economic, social and environmental objectives. Duties such as protection of environment and biodiversity, and the preservation of landscape and cultural values of villages, as well as the increase of the standard of living of rural communities were also imposed on agriculture. The outlined agricultural development model became multifunctional. The 1996 Cork Declaration indicated the need to strike a balance between production objectives related to the development of agriculture and ensuring food security, and the protection of environmental resources as well as the development of non-agricultural economic activities and social functions of rural areas. The declaration became the foundation for shaping rural policy under Agenda 2000, which prepared the Community for its fifth enlargement to Central and Eastern Europe. In this period, the CAP adopted the most important assumption of the Cork Declaration of multifunctional, sustainable development based on the use of endogenous potential of rural areas, as well as external funding and support instruments.

In addition to the well-known and universal concept of sustainable development, on which all Community policies are based, including the CAP, the concept of multifunctional rural development is significant and capacious. The main assumption of this concept is the gradual departure from the domination of agriculture in the structure of the rural economy by development of additional, non-agricultural forms of economic activities and various functions of social services. Thus, on one hand, this concept assumes the support for the agriculture modernization process, and on the other the acceleration of development of non-agricultural activities, which results in the general

diversification of the rural economy. The expansion of this way of thinking in the 1970s initiated the post-productivist stage of development, characterized by the growing significance of diverse functions and activities in the services sector (Woods, 2005 p. 14). W. Stola included the following to the main functions of rural areas (Stola, 1999 p. 169):

- residential functions - the village is a place of residence not only for farmers, but also for people not related to agriculture, who undertake professional activities outside their place of residence,
- production functions – production of high-quality and safe food and agricultural raw materials,
- service functions – improving the quality of residents' life and constituting a source of income for people employed outside agriculture,
- recreational functions – based on the use of natural and cultural resources for spending free time and recreation,
- tourist functions - implemented mainly in the form of agrotourism and eco-tourism,
- cultural functions – physical and intangible resources of local culture related to work, life, traditions and rural rites,
- environmental functions – protection of biodiversity and natural resources,
- aesthetic functions – arising from the beauty of the landscape and cultural monuments.

Multifunctionality of rural areas and agriculture was focused on improving economic effects (new jobs, higher income), which also bring beneficial social effects (greater attractiveness of rural life, inhibition of population outflow). The development of non-agricultural functions should be correlated with the local resources and endogenous potential as well as bottom-up character. Multifunctionality applies to entire rural areas as well as agriculture itself and the respective farms. The multifunctional effects may emerge in the form of commodities and non-market products, often of a conjugate character, which provides social benefits, including public goods (Adamowicz, 2004 pp. 29-30).

The practical implementation of the concept of multifunctional rural development requires its integration with the current policy, in this case the common agricultural policy and cohesion policy, as well as the inclusion of this concept in the spatial development system and environmental protection. Multifunctional rural development should be a process that occurs on many levels. Including spatial, social and economic changes that enable residents to obtain income from professional activities and improve the quality of their life (Stanny, 2012 p. 150). This development should be connected with principles of market economy and competitiveness, which does not mean that the need to support through rural policy is rejected. As a complex process, it requires proper programming and spreading over time. The concept of multifunctional development is constantly being supplemented and enriched, while maintaining its essence. This should be treated as the aspiration of the scientific and political environment shaping the development of agriculture and rural areas, as expressed in the 2016 second Cork Declaration. 2nd Cork Declaration on "A Better Life in Rural Areas" consciously referred to the first, but it also emphasized new elements, such as innovation, integration and indications relating to agricultural policy as well as rural policy.

The authors of the declaration expressed their conviction that Europe's rural resources will be able to meet current and future challenges in supplying European Union citizens with quality food, keeping the rural economy in a closed cycle, expanding the bioeconomy, using resources more efficiently, overcoming the difficulties resulting from climate change, and reduction of dependence on non-renewable energy sources. The authors expect a wider base for the rural economy in

increasing digitization, knowledge resources, innovations and bottom-up entrepreneurship. Agriculture and forestry, while still remaining important sectors of the rural economy, will be able to engage in emerging new value chains and rural areas will be recognized by young people as an attractive place to live and work. Determined by the need to utilize local potential and bottom-up development initiatives better, they also point to strengthening of the strategic focus on the selection of objectives and instruments for rural development policy. Innovative, integrated and inclusive policy for rural development and agriculture should be oriented on the following priorities.

- 1) Promoting rural well-being - resulting from the potential of the village to provide innovation and favourable solutions to current and future challenges in the sphere of economics, food security, climate change, resource management, social exclusion, and migration problems.
- 2) Strengthening of rural value chains and cooperation networks in the sphere of new rural business areas. This should provide new opportunities for agriculture, forestry and related enterprises in the context of circular, green and energy efficient economy.
- 3) Investing in strengthening rural life and vitality, which means focusing on investing in creating added value for the society. Investments in the countryside, both private and public, in infrastructure and development potential, should be directed towards common objectives such as job creation and green and inclusive economic growth.
- 4) The preservation of the rural environment, especially regarding the proper management of land resources, provision of public goods and strengthening of its natural and cultural heritage.
- 5) The management of natural resources such as water, soil and biodiversity so as to meet the growing demand for food, fodder, fibres and other biological materials. This requires the use of sustainable and cross-sectoral management, involving mainly the agricultural and forestry production.
- 6) Encouraging actions to prevent and mitigate adverse climate change. These activities are related to the sequestration of carbon in rural areas and the management of low-emission economy.
- 7) Embrace the knowledge-based economy and innovations. It is about access to the right technologies, effective management methods, and achieving economic, social and environmental benefits, both through education and consulting.
- 8) Strengthening rural self-government and the efficiency of local administration. This sphere of strengthening rural potential should be based on the use of the LEADER programme, the European Partnership for Agriculture and local grassroots initiatives by providing technical assistance, training, cooperation and networking.
- 9) Advanced delivery policy and simplification of production processes. This also applies to the procedures and rules for the implementation of the common agricultural policy, and the use of smart procedures and tools for local and regional administration. An important role should be played by management with use of electronic tools.
- 10) Improving efficiency and responsibility. Public support for agriculture and rural areas must be subject to monitoring and reliable evaluation. This assessment should relate to the benefits of the actions taken, the efficiency of the use of the funds, and the overall assessment in the light of the assumed objectives.

Participants of the conference and the makers of the Cork 2 declaration draw the attention of creators of rural development policy to the need of strengthening of public awareness of the potential of rural areas, for their general development and the challenges they face.

## **Innovative and smart development concepts**

In its pursuit of maintaining and increasing its position in global competition European Union adopted the 2000 Lisbon Strategy, that aimed at making economic development more dynamic, creating a knowledge-based economy, guaranteeing the growth of competitiveness and employment levels, ensuring social cohesion and caring for sustainable development and natural environment. The implementation of this strategy failed to bring the expected results, which was the reason for its update after just several years and the correction of its provisions. The list of strategic goals was narrowed down to two, directed at achieving sustainable economic growth and sustainable employment growth. A number of financial and legal-institutional instruments as well as activities in the form of operational programmes financed from Community funds were used to achieve these objectives. The global financial crisis of 2007 nullified the achieved effects and hindered further implementation of the Lisbon Strategy, while at the same time revealing the structural weaknesses of the European economy. Due to the need for changes the European Council adopted, in June 2010, its new strategy for smart, sustainable and inclusive, the EUROPA 2020 strategy.

When preparing the strategy, the European Commission proposed to implement, till 2020, the five objectives incorporated into the national development strategies, including; activities in the areas of employment, research and innovation, climate change and energy, education and the fight against poverty. Three interlinked priorities were established in the Europe 2020 strategy itself:

- smart growth - development of the economy based on knowledge and innovations;
- sustainable growth - signifying the development of an economy using available resources effectively, a greener and competitive economy;
- inclusive growth - encouraging greater employment, ensuring social and territorial cohesion.

Specific parameters and the criteria for the respective parameters were established, all of which are also applicable to agriculture and rural areas. Within each of these three priorities, a number of objectives were established, and these were then grouped in seven separate flagship initiatives:

- "Innovation Union", to simplify the framework conditions and access to the research and innovation financing required to produce new goods and services, which create employment and economic growth;
- "Youth on the move from school to work", serving the improvement of education systems preparing for the profession and facilitating youth's access to the labour market;
- "A Digital Agenda for Europe", to accelerate the dissemination of broadband Internet to exploit the benefits of computerization in enterprises and households;
- "Resource efficient Europe", aimed at decoupling growth from the use of traditional resources and facilitating the transition to a low-carbon economy, the wider use of renewable energy sources, modernizing the transport sector, promoting greater energy efficiency;
- "Industrial policy for the globalization era", facilitating and improving the business environment for small and medium enterprises and strengthening the competitiveness base in the conditions of globalization;
- "An Agenda for new skills and jobs", aimed at modernizing labour markets and equipping people with incentives for lifelong learning and better matching labour demand and supply through increased employee mobility;
- "A European platform against poverty", reinforcing social and territorial cohesion, facilitating access to work and living in dignity.



Three of these flagship initiatives refer directly to the priority for smart growth. Smart growth means strengthening knowledge and innovation as the driving forces for future development. This requires improving education, strengthening research, promoting innovation, and knowledge transfer across the Union, making full use of information and communication technologies, and ensuring that innovative ideas can be transformed into new products and services that will contribute to economic growth, quality improvement and meet the various challenges of modern times. The activities of this priority can be implemented at the Community, national and regional levels.

The flagship initiative 'Youth on the move from school to work' aimed to increase the attractiveness of European higher education institutions, and to raise the general level of education and vocational training, which are necessary to increase youth mobility, and to facilitate its entry into the labour market. The flagship initiative 'A digital agenda for Europe' agenda aimed at disseminating modern information technologies by 2013 and providing access to an even faster Internet by 2020. As part of the Europe 2020 Strategy, a 'European Innovation Partnership' document was developed in 2012 to strengthen sustainability and productivity in agriculture. It was included in the European rural development policy and in the Horizon 2020 European research programme.

New ideas have emerged in Europe, in the last decade, aimed at saving resources through appropriate spatial planning, organization of transport flows, reduction of costs resulting from the sprawl of cities and others (Stawasz, Sikora-Fernandez 2015 pp. 11-13). It is about concepts, such as the "smart city" or the "smart housing estate". The concept of smart specialization of the region found its practical implementation within the framework of the Europe 2020 Strategy. Among the newest one, the concept of "intelligent village" should be mentioned.

With regard to smart cities, attention is pointed to the use of innovations and information technologies to build interactivity and efficiency of urban infrastructure. In building smart cities, the need to invest in human capital and social capital, communication infrastructure, strengthening economic sustainable development, rational use of resources and participation of citizens in development programmes were all pointed out. The following six elements were distinguished in the intelligent city model: environment, people, quality of life, management, mobility, economy and research, innovation, creativity, high productivity and efficiency. N. Caminos, as one of many authors, defines a smart city as a territory with high potential for learning and innovation, equipped with the creativity of its residents, with institutions creating knowledge, communication infrastructure and effective management (Caminos 2008 pp. ).

As part of the "Smart Growth" priority of the Europe 2020 Strategy, the concept of smart specializations for countries and regions was developed. This concept was incorporated in other strategies and included in the financing framework of the 2014-2020 financial perspective (Adamowicz, 2016 pp. 5-15). The concept of smart specializations of regions took shape in 2008, and in 2010-2014 it was developed and included in the Europe 2020 strategy (Kardas, 2014 pp. 211-135).

The idea of smart specialization is based on the assumption that EU Member States, or any other region, cannot independently achieve satisfactory results in all areas of the economy, especially in the sphere of new technologies and innovations (Pilarska, 2014 pp. 59-82). Smart specializations provide opportunities to achieve economic growth in all regions or countries, both those better, and those less developed. This conception has two sides. The first requires

concentration on selected areas, where the existing potential is to be fully exploited, and the second requires concentration on specific domains in order to coordinate specific and original areas of competence in the region (Foray et al., 2011).

The vision of rural areas, as outlined in the 2016 second Cork Declaration "Better life in rural areas" acknowledged the ongoing differences between the city and the countryside, especially in the field of digitization, transport, communication, stage of service development and others. The Cork 2 Declaration became the basis for reflection on the future of villages in EU Member States. An attempt to create a vision of sustainable development of rural areas resulted in the conception of "smart villages". The conception is now becoming an integral part of the development strategies of regions and territories. Strengthening the integration between the city and the countryside forms the crucial factor for the effectiveness of this concept. It is also crucial to integrate the various activities already implemented into a coherent program. The intention is to build something more solid than simple stunting, to provide a transparent interpretation for politicians, entrepreneurs and other stakeholders in order to determine the needs and development opportunities of individual territorial systems. The conception of smart villages includes both rural settlements and surrounding rural areas. It includes rural communities and existing resources in terms of creating new development possibilities. Traditional as well as the new connections of this conception are supported by digitization, information technologies, innovations and better use of knowledge for developing benefits for entrepreneurs and people. The proposed conception does not have the character of a single model combining infrastructure investment, development of entrepreneurship, human capital and capital building inherent in local communities. Concluding, the implementation of the idea of "smart village" brings awareness to computerization, access to healthcare and other basic services, innovative environmental solutions, management of agricultural waste in the closed cycle, promotion of local products with use of information technology, implementation and use of smart specializations in agriculture, food economy and tourist and cultural activities. The conception can be implemented under the common agricultural policy, cohesion policy, science policy, transport policy and social policy.

In many countries, the regional governments play a major role in the process of managing Community funding. Lower administrative levels have rather an auxiliary function in the process of managing European funds. And it is exactly at this local level, that the specific factors and barriers to rural development are located, and the non-agricultural functions develop. However, rural areas itself are unable to create functionally related territories with development potential. The development policy covering rural areas remaining in symbiosis with the cities located among them offers more comprehensive options. The rural-urban partnership requires closer coordination and cooperative integration of the agricultural policy and regional policy.

The urban-rural partnership might be an important factor to strengthen the territorial cohesion. This conception was reflected in the 2020 Territorial Agenda of EU, and in the 2013 OECD report entitled "Rural-urban partnership: an integrated approach to economic development" (OECD, Rural - Urban ..., 2015). At the first stage this report highlights the need to define the functional regions of spatial structure, in which relations, interdependencies and interactions between the city and the countryside occur

The European Cohesion Policy, modified in 2014, emphasises the integration of activities and the use of structural funds and agricultural funds in territorial systems. Multipronged territorial potentials should be adjusted to the size and character of the territorial system. These aspects

might go beyond formal administrative boundaries. For this to happen, it is necessary to have real interest and involvement of both local government authorities and various partners, including interest groups.

An outline overview of various strategies, ideological conceptions and rural development programmes shows that this issue is still alive and important, not only for rural residents, but also for the whole society as well as regional and national economies. The constant occurring of new conceptions reflects to the dynamics of change in rural areas, and the importance of these areas for European Union countries, as well as strengthening of their position in the world.

## Bibliography

1. Adamowicz, M. (2004). Wielofunkcyjne gospodarstwa rolne jako podmiot w rozwoju wsi i rolnictwa (Multifunctional farms as an entity in the development of the village and agriculture). In: Wiejskie gospodarstwa domowe w obliczu problemów transformacji, integracji i globalizacji (Rural households in the face of problems of transformation, integration and globalization). Warszawa: Wyd. SGGW.
2. Adamowicz, M. (2016). Smart Specialization as a Way of Strengthening the Innovation Potential of Regions, *Acta Scientiarum Polonorum Oeconomia* 15 (4).
3. Caminos, N. (2008). *Intelligent Cities and Globalisation of Innovation Networks*. London and New York: Routledge.
4. *EU Action for Smart Villages* (2017). European Commission.
5. Foray, D., David, P., Hall, B. H. (2011). Smart Specialisation: From Academic Idea to Political Instrument, the Surprising Career of a Concept and the Difficulties Involved.
6. Kardas, M. (2014). Inteligentna specjalizacja – nowa koncepcja polityki innowacyjnej (Intelligent specialization - a new concept of innovation policy), *Optimum, Studia Ekonomiczne*, 2 (50).
7. Polityka Unii Europejskiej w zakresie rozwoju obszarów wiejskich na lata 2007-2013 (European Union policy in the field of rural development for 2007-2013) (2006). Luksemburg: Komisja Europejska.
8. *Rural Urban Partnerships: An Integrated Approach to Economic Development* (2013). OECD.
9. Pilarska, Cz. (2014). Koncepcja smart specialisation w polityce ekonomicznej Unii Europejskiej (The concept of smart specialization in the economic policy of the European Union), *Studia Europejskie*, 4.
10. Rakowska, J. (2013). Klasyfikacje obszarów – kryteria, definicje, metody delimitacji. Studium metodyczno-statystyczne (Classifications of areas - criteria, definitions, methods of delimitation. Methodological and statistical study), Warszawa.
11. Sołek, K. (2017). Oddziaływanie funduszy europejskich na proces rozwoju społeczno-gospodarczego obszarów wiejskich województwa podkarpackiego. Rozprawa doktorska. (Influence of European funds on the process of socio-economic development of rural areas of the Podkarpackie Voivodeship. Dissertation). Warszawa: SGGW.
12. Stanny, M. (2012). Społeczno-ekonomiczne zrównoważenie obszarów wiejskich (Socio-economic sustainability of rural areas). In: Raport o stanie wsi. Polska Wieś (Report on the state of the village. Polish Countryside). Warszawa: Wyd. Naukowe Scholar.

## LOCAL INSTITUTIONS AS A DETERMINANT OF RURAL DEVELOPMENT IN POLAND – A CASE STUDY OF GREATER POLAND VOIVODESHIP

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**Abstract.** The main aim of the study was to verify relations between the level of socioeconomic development and the quality of local government institutions. The spatial range of the study comprised Greater Poland as an administrative region, i.e. Greater Poland Voivodeship. Rural and rural-urban communes were the subjects of the study. The research spanned the period of 2016. The empirical research material was acquired from a questionnaire survey (2011) and Local Data Bank. The research procedure consisted of the following steps: 1. measurement of the socioeconomic development and quality of institutions; 2. determination of relations between the level of development and quality of institutions. Development was measured by means of the synthetic trait. The relation was investigated by means of analysis of variance (ANOVA). The research results showed that institutions were the determinant strengthening development (the high quality of institutions coincided with high socioeconomic development). The quality of institutions was significantly diversified according to the level of development.

**Key words:** local development, institutions, rural areas, Greater Poland Voivodeship.

**JEL code:** O43, Q15

### Introduction

New institutional economics (NIE) has bridged a significant gap in neoclassical economics. The NIE programme assumes that the institutional structure of economics and society is a determinant of market processes. Therefore, institutions should be the main of research object. According to the thesis that institutions have significance, the NIE attempts to economically explain the existence, development and changes of institutions (Hockuba Z., 2001, p. 11).

The criticism of excessive growth of countries and ineffective solutions to problems open the way to reflection on searching for efficient and effective institutional bases of the state (Wilkin J., 2013). It was a key priority to build the market rather than state institutions in the countries which were undergoing system transformations in the early 1990s (Hardt L., 2013). It was assumed that institutions would develop spontaneously as consequence of the market mechanism. Poland's accession to the EU in 2004 was a formal test of the new institutional order, which was established as a result of the system transformation (Wilkin J., 2013, p. 20). Rodrik D. (2003, p. 12) stresses that good institutions can be introduced but it often requires experimentation, readiness to abandon orthodox solutions and paying attention to local conditions. The main aim of the study was to verify relations between the level of socioeconomic development and the quality of local government institutions. According to Wilkin J. (2013), good institutions stimulate actions favouring the possibility to satisfy individual and collective needs, trigger initiative and innovativeness, improve the effectiveness and efficiency of actions taken by individuals and group entities. Good institutions should fulfil specific functions; for example, they should help to transfer information, define and secure proprietary rights and contracts as well as improve competitiveness (Milaszewicz D., 2011).

### Research method

The spatial range of the study encompasses Greater Poland, understood as an administrative region, i.e. Greater Poland Voivodeship. Rural communes and rural-urban communes in Greater Poland Voivodeship will be the research subject encompassing 117 rural communes and 90 rural-urban communes. The empirical material was obtained from the following sources: the Local Data

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Bank of the Central Statistical Office, data from a survey questionnaire (2011). Measurements referred to 2016. The research procedure consisted of the following steps: 1. measurement of the socioeconomic development and quality of institutions; 2. determination of relations between the level of development and quality of institutions.

The object of the study was the development of rural areas in Greater Poland Voivodeship, which was identified by comparison of the synthetic features of the following factors: location rent, technical infrastructure, social infrastructure, human capital, social capital and local finance (Table 1).

Table 1

**Indicators for socioeconomic development of rural areas  
 in Greater Poland Voivodeship**

<b>Factor</b>	<b>Indicator</b>
<b>Location rent</b>	The soil quality indicator (points) The indicator of economic activity (points) The restrictions in preservation areas (points) The indicator of road junction location (points) The indicator of town location (points) Areas of special nature value under legal protection (in % of total area) Forest cover in %
<b>Social infrastructure</b>	Nursery schools per 100 km <sup>2</sup> Primary schools per 100 km <sup>2</sup> Lower secondary schools per 100 km <sup>2</sup> Public libraries per 1000 population Out-patient departments per 1000 population Number of population per pharmacy
<b>Technical infrastructure</b>	Water –line distribution network in km/100 km <sup>2</sup> Sewerage distribution network in km/100 km <sup>2</sup> Relations between connections leading water supply/sewage Gas-line distribution network in km/100 km <sup>2</sup> Expenditures on public roads in total expenditures amounted (in %)
<b>Human capital</b>	Population per 1 km <sup>2</sup> Relation children-oldest Live births per 1000 women in 15-49 years Natural increase per 1000 population Migration per 1000 population Females per 100 males (25-29 years) Tertiary education (in %)
<b>Social capital</b>	Entities of the national economy in the REGON register per 1000 population Associations and other social organizations per 1000 population Voter turnout (in %) Expenditures on culture per capita (zł) Expenditures on physical culture and sports per capita(zł)
<b>Local finance</b>	Total income zloty per capita (zł) EU funds zloty per capita (zł) Investment expenditures in total expenditures amounted (in %) Own income in total income amounted (in %)

Note: \* Destimulant. Other indicators are stimulants. See more about indicators Bartkowiak N., Poczta W., 2012; Bartkowiak-Bakun N., 2015.

Source: author's elaboration

The construction of the synthetic feature was made according to the methodology suggested by Wysocki & Lira (2005). The selection of simple features was made according to the formal, substantive and statistical criteria, which are the determinants of development. The data were checked for their completeness, measurability and availability. The variability coefficient and

Pearson's correlation coefficient were used as the basis for assessment of statistical premises. The former was enable elimination of the variables with low information value from the set, whereas the latter was used to assess the strength of correlation between the variables. The analysis also comprised the diagonal elements of inverse matrix to correlation matrix R in order to check the correctness of the condition numbers of the matrices.

The next step was to involve normalisation of the values of simple features (unitization is proposed), which consists in unification of the character and making the feature values comparable by removing their nominals and unification of the lines of values.

Table 2

**The measure of assessment of local government institutions**

Criterion	Traits characterising quality of local institutions	Weight	Rating	Weighted value
<b>International cooperation</b>	Number of partner communes	0.3		
	Area of cooperation	0.4		
	Frequency of cooperation	0.3		
	Weight of total rating of local authorities' activity	0.15		
<b>Domestic cooperation</b>	Subjects of cooperation	0.3		
	Joining a union or association	0.1		
	Subject of joint tasks	0.6		
	Weight of total rating of local authorities' activity	0.2		
<b>Entrepreneurship</b>	Organisational unit and training	0.5		
	Institutions supporting entrepreneurship	0.5		
	Weight of total rating of local authorities' activity	0.1		
<b>Non-governmental organisations</b>	Organisational unit	0.5		
	Declaration of cooperation	0.5		
	Weight of total rating of local authorities' activity	0.1		
<b>External sources of finance</b>	Application activity	0.4		
	Joint initiatives	0.6		
	Weight of total rating of local authorities' activity	0.3		

*Source: author's elaboration based on Rosner A., 1997; Heffner K., 2002; Klodzinski M., 2006; Rosner A., Stanny M., 2007; Stanny M., 2010; Skorupska 2005, Bartkowiak N., Poczta W., 2012,*

Institutions are evaluated according to their functions, implementation of distributive issues and creation of stimuli decreasing precariousness and strengthening the market (Aron J., 2000, p. 106). However, the main goal is to evaluate existing institutions and answer the question about the characteristics of 'good' institutions, which is equivalent to assessment of their quality.

The quality of institutions was assessed in the following areas: international cooperation, cooperation with other entities, conditions for the development of entrepreneurship and acquisition of external funds. The data were acquired from a questionnaire survey conducted among the staff employed at local government institutions in all communes of Greater Poland Voivodeship in 2011. Table 2 includes elements of assessment of the institutions and the method of construction of the measure.

In order to verify the hypotheses with statistically significant equal averages, due to the selected criterion of the division of communes (development level), the analysis of ANOVA variance was extended with applying the Tukey post-hoc test.

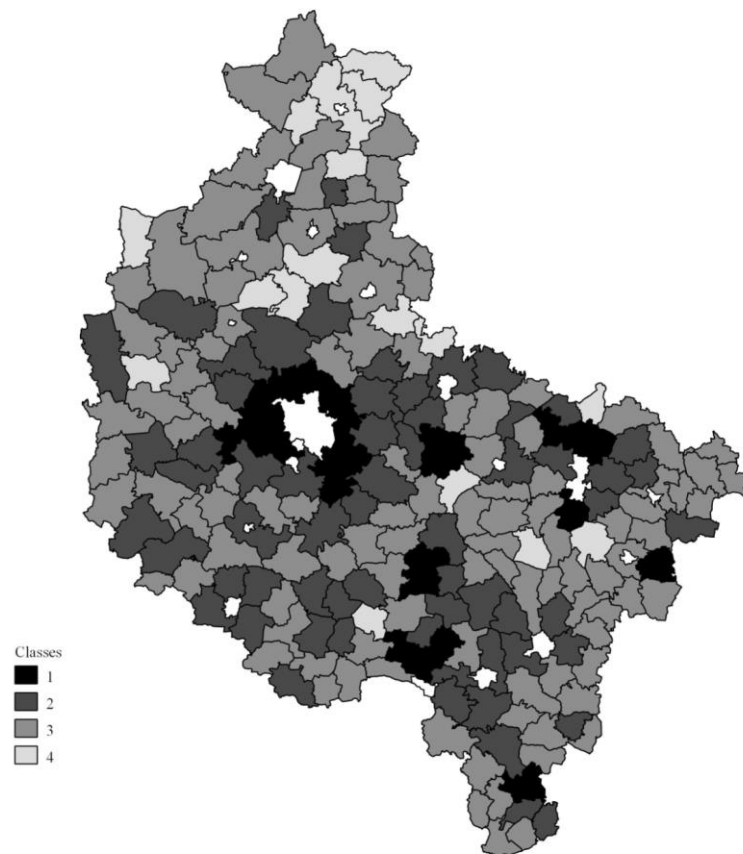
## **Research results and discussion**

### **1. Characterisation of rural areas in Greater Poland Voivodeship**

The measurement of the socioeconomic development enabled classification of rural areas in Greater Poland. They were divided into four classes differing in the level of development. Figure 1 shows the spatial diversification of the grouping. Class 1 consists of 21 communes (10 %) characterised by high level of development. As the spatial distribution shows, these communes are situated in the zone of influence of the city of Poznan. The other individual communes in this class are located in the south of the region. The components of analysis achieved the highest values in this group – some of them were much greater than average. This class was characterised by a very good location rent and good condition of local finance. The communes were characterised by high financial independence (high share of own income). This situation enabled investments in the technical and social infrastructure, which translated into very good living and development conditions for the commune inhabitants. These areas were characterised by high values of the entrepreneurship indicator and positive population balance. These areas are attractive for business and as places of residence.

The second group consists of 66 communes (32 %) characterised by upper intermediate level of development. The areas are located in the second ring surrounding Poznan, south of this city, stretching along part of the trunk road 11. Apart from that, this class included relatively large numbers of communes located around the subregional towns of Leszno and Konin. In comparison with class 1, these communes were characterised by worse financial situation, especially lesser financial independence, lower income and lower investment potential. This situation resulted in the average level of infrastructure. The biggest differences were noted in the inhabitants' access to sewage and gas networks, nursery schools and health service. As far as the human and social capital are concerned, the values in this class were similar to those in class 1. These areas need further investments so that their infrastructure will meet the inhabitants' expectations.

In nearly a half of rural areas in Greater Poland (99 communes, 48 % of the total number) the level of development was lower than average. The areas are relatively equally distributed around the region, but most of them are located in the north and east. Apart from the human capital, the values of all the other components were below the average level. The primary condition of the level of development in these communes is their location rent. These areas are characterised by worse conditions for the development of agriculture and low spatial accessibility. They are less populated. The natural barriers, such as forests and lakes, result in worse infrastructure in these areas. The costs of their development are higher than average. The condition of local finance, low income and low financial independence are considerable limitations to investments and changes in the situation of these communes. They have a chance for development if the local authorities acquire external funds. This might trigger the endogenic resources of these communes.



**Source:** author's elaboration

Fig. 1 **Spatial diversification of socioeconomic development of rural areas in Greater Poland Voivodeship**

Class 4 consists of 21 communes (10 %) characterised by low level of development. The communes are located far away from Poznan, on the outskirts of the region, with few of them located inside the region. These are problem areas due to the deficit in their infrastructure (especially sewage and gas networks), low spatial accessibility and poor quality of roads. Additionally, these areas do not have their own investment capacity due to the poor condition of local finance. Thus, the infrastructural gap is growing due to the accumulation of negative feedbacks. For this reason, these areas should remain within the zone of influence of the regional and rural policies to overcome their peripheral character and trigger their local potential. The active influence of regional authorities on these entities will enable implementation of the sustainable development policy and it may prevent further marginalisation or exclusion of these areas.

## 2. The quality of institutions in rural areas

The quality of institutions was measured in order to identify their significance to the socioeconomic development of rural areas. As was assumed, the research concentrated on formal institutions (local authorities and commune councils) in selected areas, especially on the good institution attribute, which is manifested by the capacity to generate development stimuli. Table 3 shows the values of components of the quality of institutions in relation to the socioeconomic development classes.

The analysis of variance (ANOVA) was used to investigate the quality of institutions according to the level of socioeconomic development. The analysis proved the significance of differences between the mean values in each three of the five areas under analysis. There were no significant



differences between the mean values referring to the development classes in the areas of international cooperation and cooperation with non-governmental organisations. The lack of significant differences in these areas resulted from the communes' lesser interest in this activity when Poland joined the European Union. In fact, many formal partnerships do not function in practice. As far as the area related with the triggering of grassroots resources, such as non-governmental organisations, is concerned, it is difficult to analyse it with measurable indicators. However, on the other hand, commune authorities are gaining skills in effective delegation of their tasks to non-governmental organisations. As far as the other three areas with significant differences between the classes are concerned, there were high values in the class of well-developed communes. The aspect of domestic cooperation with other entities is very often decisive to the access to information, knowledge and the possibility to lobby for one's own initiatives (projects). By contrast, this aspect is a weak point of poorly developed communes. The quality of institutions categorised as the area of initiation of entrepreneurial attitudes and cooperation with entrepreneurs also reached the highest values in the communes characterised by the high level of development. If we consider the possibility to make investments financed from one's own resources, it is the acquisition of funds from the European Union as well as the effective activity of institutions in this area that are of key importance. Budget limitations and the investment prefinancing system are the limiting factors in the communes characterised by the lower intermediate and low level of development. In consequence, the entities which do not have funds to secure their own contribution and the investment are excluded from the process or their possibilities of development are considerably limited.

Table 3

**The quality of institutions in relation to the socioeconomic development classes**

Classes	International cooperation	Domestic cooperation	Entrepreneurship	Non-governmental organisations	External sources of finance
1	0.51	0.65	0.57	0.25	0.42
2	0.52	0.44	0.42	0.29	0.50
3	0.51	0.35	0.48	0.26	0.41
4	0.49	0.38	0.57	0.29	0.44
<b>Average</b>	<b>0.51</b>	<b>0.42</b>	<b>0.50</b>	<b>0.27</b>	<b>0.44</b>

Source: author's calculations based on data from a survey questionnaire (2011)

Table 4

**The analysis of variance concerning the quality of institutions in the areas analysed in terms of the level of socioeconomic development**

Specification	F	p
<b>International cooperation</b>	0.058	0.982
<b>Domestic cooperation</b>	5.038	0.002
<b>Entrepreneurship</b>	5.905	0.001
<b>Non-governmental organisations</b>	0.572	0.634
<b>External sources of finance</b>	2.793	0.041

Source: author's calculations based on Statistica

The post hoc tests proved that the null hypothesis about the equality of mean values in individual classes should be rejected due to the considerable deviations of the values of indicators

in class 1 (international cooperation, entrepreneurship) and in class 3 (external sources of financing). The results of the analysis of variance are shown in Table 4.

The quality (and its individual areas) of institutions as a determinant of rural development should be considered together with other conditions, which affect the state of institutions with different impact and direction. It is noteworthy that the results showed that the quality of institutions was characterised by high individuality. The communes with good institutions neighboured the poorest ones. It is necessary to continue the research to understand the mechanisms of local development, especially in institutions.

### **3. Discussion**

Economists generally accept the thesis that institutional changes have considerable influence on economic growth and other effects of management. In spite of this fact, so far the mechanism of relations between them has not been thoroughly investigated or described (Wilkin J., 2016; Wojtyna A., 2007). The results of the international research project conducted by Rodrik et al. (2003) proved that the quality of institutions was key to the understanding of the causes of a particular country's successful development. On the other hand, public institutions play an important role in stimulation of economic growth and their appropriate selection may help to overcome unfavourable geographical conditions (Rodrik D., 2003; Wilkin J., 2016, pp. 129-130). The research chiefly concentrates on analysing the influence of institutions on the economic growth rate and explaining differences in this rate on the international scale and in long-term perspective (Kondratowicz A., 2014). The most important studies on the subject are: Keefer P., Knack S., 1995; Barro R. J., 2000; Sala-i-Martin X., 1997; Scully G., 1988; Lawson R., 2006; Justesen M., 2008; Aixala J., Fabro G., 2009; Hall J., Sobel R., Crowley G., 2010; Azman-Saini W., Baharumshah A., Law S., 2010.

The research task will bridge the gap in reference literature. It may enrich the methodology of research on institutions, which is an important element postulated by representatives of new institutional economics. Simultaneously, the author will search for the determinants of the quality of institutions, which will be a cognitive contribution to the attempt to identify the mechanisms leading from higher quality institutions to higher level of development.

### **Conclusions, proposals, recommendations**

The development of rural areas Greater Poland Voivodeship is significantly diversified. This diversity is mostly caused by endogenous factors (location rent), which affect other aspects of development. The areas characterised by high level of development are located within the zone of influence of the regional city as well as subregional centres. This fact proves that cities are significant to rural development, especially their nearest surroundings.

At the other end of the distribution there are areas facing the risk of marginalisation or exclusion from development. The share of these communes amounted to 10 %. There were numerous negative feedbacks – the peripheral location coincided with poor conditions for agricultural development, poor demographic situation and infrastructure. The infrastructural gap cannot be bridged by grassroots initiatives due to the poor condition of local finance.

The quality of local institutions is significantly diversified. There are good institutions in the areas characterised by high level of development. The quality of institutions decreased along with the level of development. The dependence relation was not sufficiently identified in the research.

Therefore, it should be continued to find the mechanisms leading from the better quality of institutions to higher development.

To sum up, the rural policy should be not only territorially oriented but it should also strengthen local institutions in the least developed areas.

## Bibliography

1. Aixala, J. and Fabro, G. (2009). Economic Freedom, Civil Liberties, Political Rights and Growth: a Causality Analysis. *Spanish Economic Review*, 11(3): 165-178.
2. Aron, J. (2000). Growth and Institutions: A Review of the Evidence, *The World Bank Research Observer*, 15 (1). 1203-1228.
3. Azman-Saini, W., Baharumshah, A., Law, S. (2010). Foreign Direct Investment, Economic Freedom and Economic Growth: International Evidence. *Economic Modelling*, 27(5): 1079-1089.
4. Barro, R. J. (2000). Rule of Law, Democracy, and Economic Performance. In 2000 Index of Economic Freedom (Washington, D.C.: The Heritage Foundation).
5. Bartkowiak N., Poczta W. (2012). Czynniki rozwoju obszarów wiejskich w Wielkopolsce, Wydawnictwo UP w Poznaniu, Poznan.
6. Hall, J., Sobel, R., Crowley, G. (2010). Institutions, Capital, and Growth. *Southern Economic Journal*, 77(2): 385-405.
7. Hard, L. (2013). Optymalność instytucji w perspektywie implementacji zasad dobrego rządzenia. W: *Jakość rządzenia w Polsce. Jak ją badać, monitorować i poprawiać?* Wydawnictwo Naukowe SCHOLAR, Warszawa.
8. Heffner, K. (2002). Czynniki osadnicze wpływające na potencjał rozwojowy obszarów wiejskich [w:] *Wiejskie obszary kumulacji barier rozwojowych*, A. Rosner (red.). Polska Akademia Nauk Instytut Rozwoju Wsi i Rolnictwa, Warszawa.
9. Hockuba, Z. (2001). Nowa ekonomia instytucjonalna-czy zdominuje nasze myślenie w rozpoczynającym się stuleciu?: VII Kongres Ekonomistów Polskich, Czy Ekonomia Nadaje z Wyjaśnieniem Rzeczywistości / Sesja I. Z. 2, PTE, Warszawa.
10. *Jakość rządzenia w Polsce. Jak ją badać, monitorować i poprawiać?*, Wilkin, J. (ed), 2013, Wydawnictwo Naukowe Scholar, Warszawa.
11. Justesen, M. (2008). The Effect of Economic Freedom on Growth Revisited: New Evidence on Causality from a Panel of Countries 1970-1999. *European Journal of Political Economy*, 24(3): 642-660.
12. Keefer, P., Knack, S. (1995). Institutions and Economic Performance: Cross-Country Tests Using Alternative Institutional Measures. *Economics and Politics*, 7: 207-227.
13. Klodzinski, M. (2006). Aktywizacja społeczno-gospodarcza gmin wiejskich i małych miast, IRWiR PAN, Warszawa.
14. Kondratowicz, A. (2014). Wolność gospodarcza a teoria zmiany instytucjonalnej, IX kongres Ekonomistów, [http://blog.narotama.ac.id/wpcontent/uploads/2014/11/WOLNO %C5 %9A %C4 %86-GOSPODARCZA-A-TEORIA-ZMIANY-INSTYTUCJONALNEJ.pdf](http://blog.narotama.ac.id/wpcontent/uploads/2014/11/WOLNO%20GOSPODARCZA-A-TEORIA-ZMIANY-INSTYTUCJONALNEJ.pdf)
15. Lawson, R. (2006). On Testing the Connection between Economic Freedom and Growth. *Econ Journal Watch* 3(3): 398-406.
16. Milaszewicz, D. (2011). Jakość instytucji a wzrost gospodarczy. *Studia i Prace WNEiZ nr 19/2011*, Szczecin.
17. Rodrik, D. (2003). "What do We Learn from Country Narratives?" en D. Rodrik (ed), *In Search of Prosperity. Analytic Narratives on Economic Growth*, Princeton, Princeton University Press.
18. Rosner A., Stanny M., (2007): Zróżnicowanie poziomu rozwoju obszarów wiejskich w Polsce według komponentu społecznego [in:] *Zróżnicowanie poziomu rozwoju społeczno-gospodarczego obszarów wiejskich a zróżnicowanie dynamiki przemian*, A. Rosner (ed), Instytut Rozwoju Wsi i Rolnictwa PAN, Warszawa.
19. Rosner, A. (1997). Niektóre specyficzne składniki „zasobu” gminy [w:] *Ekonomiczne i społeczne uwarunkowania i możliwości wielofunkcyjnego rozwoju wsi w Polsce*, en. M. Klodzinski, A. Rosner (ed), Wydawnictwo SGGW, Warszawa.
20. Sala-i-Martin, X. (1997). I Just Ran Two Million Regressions. *American Economic Review* 87(2): 178-183.
21. Scully, G. (1988). The Institutional Framework and Economic Development. *Journal of Political Economy*
22. Skorupska, A. (2005): *Współpraca międzynarodowa samorządu gminnego na podstawie badań* [in:] *Współpraca międzynarodowa samorządu gminnego* A. Skorupska (ed), Polski Instytut Spraw Międzynarodowych, Warszawa.
23. Stanny, M. (2010): *Ludność i jej aktywność zawodowa – tendencje zmian na obszarach wiejskich* [in:] *Przestrzenne, społeczno-ekonomiczne zróżnicowanie obszarów wiejskich w Polsce*, M. Stanny i M. Drygas (ed). Instytut Rozwoju Wsi i Rolnictwa Polskiej Akademii Nauk, Warszawa.
24. Wilkin, J. (2016): *Instytucjonalne i kulturowe podstawy gospodarowania. Humanistyczna perspektywa ekonomii*. Wydawnictwo Naukowe Scholar, Warszawa.
25. Wojtyła, A. (2007). Teoretyczny wymiar zależności między zmianami instytucjonalnymi, polityka ekonomiczna a wzrostem gospodarczym. *Gospodarka Narodowa*, 5-6: 1- 23.
26. Wysocki, F., Lira, J. (2005). *Statystyka opisowa*. Wydawnictwo Akademii Rolniczej w Poznaniu, Poznan.

## STUDENTS' OPINIONS ON DETERMINANTS OF ENTREPRENEURS' SUCCESS OR FAILURE

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**Abstract.** Nowadays when the knowledge-based economy is being built, running a business plays a significant role. A society, in which entrepreneurial activities are taken up, is the base for creating a modern and competitive economy. Forming an entrepreneurial society causes a situation in which setting up and running one's own company concerns a considerable part of citizens and each social group. The article is to present students' views on entrepreneurial attitudes and factors which, according to the students, determine entrepreneurs' successes or failures. Students' opinions were gathered by means of the method of diagnostic survey with the use of the technique of a standardized questionnaire. The research proved that nearly 60 % of respondents considered themselves as enterprising. A brilliant idea, the knowledge of the market and the ability to plan were indicated as factors which determine entrepreneurs' success in running one's own company. A bad idea, a lack of appropriate knowledge and too little experience were mentioned most often as factors which result in a failure.

**Key words:** entrepreneurship, success, entrepreneur, student, Poland.

**JEL code:** R11

### Introduction

Entrepreneurship is a social-economic category which is a significant element in any political conditions, both within a country and internationally. It is also essential at each stage of civilization and economic development of a society.

In Poland, entrepreneurship started to show up alongside with the construction of the market economy, when the previous principles of a welfare state stopped functioning. Having such characteristics as creativity, resourcefulness, courage or savvy became desirable and more valued, not only in business but also in other spheres of human life and activity. Entrepreneurship in the economy, at a state, regional, or global level, is of the utmost importance to social and economic progress. It is also a sophisticated process of organized activity based on many people's cooperation and accomplishment of their initiatives (Bienkowska W., 2013).

In the source literature, entrepreneurship is presented from different perspectives, mainly as an economic term, but it is also considered from the social and cultural point of view. Nowadays entrepreneurship is one of the essential production factors next to labour, capital and land (Krajewski K., 2013). Quite frequently, entrepreneurship is understood as a human's behaviour which is related to their personality; on some other occasions, it is treated as a process. That is why defining entrepreneurship is slightly difficult: it can be considered in different ways.

Entrepreneurship is tackled by representatives of numerous scientific fields, inter alia, economics, sociology or psychology. They focus on slightly different aspects of this phenomenon. In many research approaches, especially those related to economics, entrepreneurship is associated with business activity. It is also frequently meant as setting up and running a company, analysed by means of economic benefits which can be gained thanks to taking up entrepreneurial activities in business entities, in local communities, in regions or in the national economy. Psychologists associate the term of entrepreneurship with a set of an individual's characteristics and they analyse internal mechanisms, called personality mechanisms, which form these characteristics and direct entrepreneurial behaviours. On the other hand, sociologists analyse mechanisms which contribute to promulgating innovations in a particular society, the role that local

leaders play in the process of diffusion and the influence that entrepreneurial activities have on local communities (Sikorska-Wolak I., 2008).

Entrepreneurship is a sophisticated process, the origins and development of which depend on numerous different factors. It results from various determinants which are related to both internal abilities of particular people (entrepreneurs) and external conditions which determine the development pace of newly established businesses (Moczydlowska J., Pacewicz I., 2007).

At present, a state's economic system includes small, medium-sized and large enterprises, which significantly differ in carrying out entrepreneurial activities. Each of them will aim in a different direction and pursue a different goal. For example, micro and small enterprises will mainly operate in services and trade, while large ones will work in industry, innovation development or even intra-organizational activity development (Gwiazda P., 2002).

Considering either success or failure in the operation of a business, one should talk about a large scale of gradability. This means that for some entrepreneurs a particular activity can be a success, but in case of others, it will be perceived as a failure. Success in business is often seen, paradoxically, as a lack of failures in economic activity. J. Skalik indicates five essential factors which influence success in a company. They are innovation activity, ability and quality of management, responsibility – both social and individual one, ability to attract talented employees and investing in their development, quality of products and services. These factors appear mainly in companies of large scale and range (Skalik J., 2002). Success in small businesses can be perceived in a slightly different way, which is indicated by B. Piasecki. This author states that for many so called small entrepreneurs, gaining profits does not have to be the most important motive for acting. It can be more significant to reach such a level of income that it will be possible to keep the business and get satisfaction from possessing it (Piasecki B., 2002). That is why mutual relations of processes and economic phenomena that can influence entrepreneurs and contribute to greater variety of products and services rendered by those entrepreneurs seem to be important (Golasa P., 2013).

## **Material and methodology**

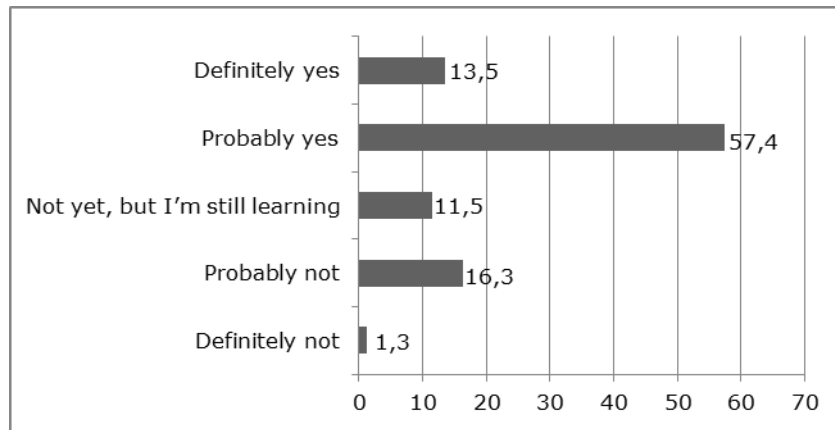
The study was mainly oriented to find out students' views on entrepreneurship and factors which, according to the students, determine entrepreneurs' successes or failures. The research was done in 2016-2017 among students of Warsaw University of Life Sciences. Students' opinions were gathered by means of the method of diagnostic survey with the use of the technique of a standardized questionnaire, which was the source of information necessary to accomplish the goal. The study covered 1197 students, but after verifying the correctness of questionnaires which had been filled in, 1189 respondents were qualified for the analysis. Respondents were selected randomly.

## **Research results and discussion**

The growing competition and technological advancement are the reasons why the future will be in the hands of entrepreneurs who are open to changes and perceive them as a requisite for survival and development. Such perception of changes requires providing proper conditions which will boost entrepreneurship while using and developing the existing knowledge (Siuta-Stolarska B., Siuta-Brodzinska M., 2011).

Because of the research goal, the respondents were asked if they considered themselves enterprising. More than a half of the students considered themselves rather as enterprising

(57.4 %), while only 1.3 % of the respondents thought they definitely were not enterprising. The others marked partial responses. The detailed data are presented in Figure 1.



Source: the author's research outcomes

Fig. 1. Students' self-assessment as regards entrepreneurial behaviours (in %)

Table 1 presents students' self-assessment as regards entrepreneurial behaviours, depending on gender.

Table 1

**Students' self-assessment as regards entrepreneurial behaviours, depending on gender**

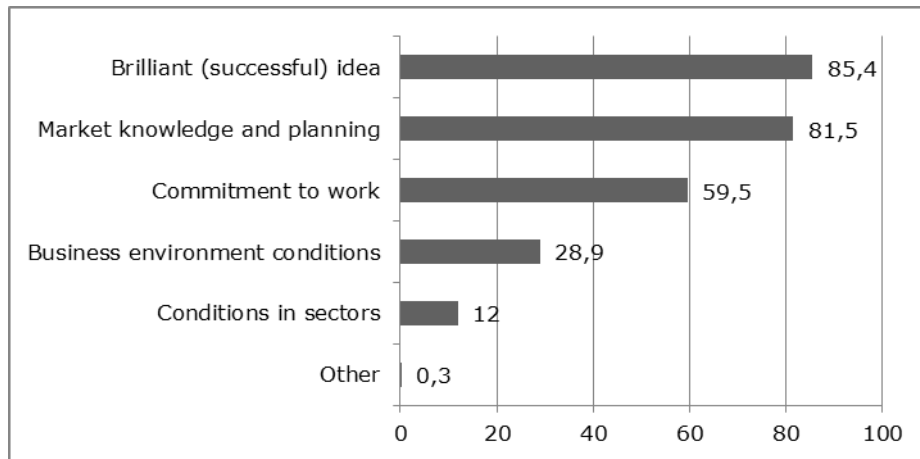
List of items	Gender N = 1189			
	Women N = 763		Men N = 426	
	Number	%	Number	%
<b>Definitely yes</b>	82	10.7	79	18.5
<b>Probably yes</b>	433	56.8	249	58.5
<b>Not yet – but I am gathering experience all the time</b>	91	11.9	46	10.8
<b>Probably not</b>	144	18.9	50	11.7
<b>Definitely not</b>	13	1.7	2	0.5
<b>Total</b>	763	100	426	100

Source: the author's research outcomes

Both women and men indicated that they considered themselves as rather enterprising. Such perception of oneself can translate into willingness or a real attempt to set up and run their own business in the future.

In the present conditions, numerous factors determine successes and failures of entrepreneurs, and the people who lead a company are required to possess an ability to manage changes, which are considered to be a constant element of running a business (Moczydlowska J., Pacewicz I., 2007).

The respondents in the study were asked to mention the source of success in their opinion (Figure 2), and kinds of failures (Figure 3) in entrepreneurs' activities.



\*A respondent was allowed to indicate more than one answer  
 N = 1189

Source: the author's research outcomes.

Fig. 2. Factors determining entrepreneurs' success (in %)\*

The vast majority of respondents indicated that the factors which can determine company's success are: brilliant (successful) idea for a business (85.4 %), the knowledge of the market and the ability to plan (81.5 %). It may seem that entrepreneurs' commitment to work should be given a higher position because this is often they who manage, decide and hold the responsibility, and first of all they create a company. The respondents, however, decided that entrepreneurs' commitment to work is significant only in 60 %. The respondents decided that conditions in particular economic sectors (12.0 %) and conditions in business environment (28.9 %) are the least important factors influencing entrepreneurs' successes.

As regards factors determining entrepreneurs' success depending on gender, the outcomes are presented in Table 2.

Table 2

**Factors determining entrepreneurs' success, depending on gender**

List of items*	Gender N = 1189			
	Women N = 763		Men N = 426	
	Number	%	Number	%
<b>Brilliant (successful) idea</b>	667	87.4	348	81.7
<b>Market knowledge and planning</b>	641	84.0	328	77.0
<b>Commitment to work</b>	440	57.7	267	62.7
<b>Business environment conditions</b>	228	29.9	116	27.2
<b>Conditions in sectors</b>	81	10.6	62	14.6
<b>Other</b>	6	0.8	10	2.3

\*A respondent was allowed to indicate more than one answer

Source: the author's research outcomes.

The study does not reveal any big differences between women and men in terms of perceiving the factors of entrepreneurs' success. Both groups indicated brilliant (successful) idea and market knowledge and planning as two most important determinants. Men mentioned commitment to work as a source of success slightly more often (62.7) than women (57.7). Conditions in sectors took the last position in both groups.



In terms of potential reasons for entrepreneurs' failures in their business, the respondents indicated a bad (unsuccessful) idea as the most important one – 60.3 %. This means that there should be a necessity to reflect on an idea before a business is started so that the idea will not cause trouble and later a complete failure. More than 50 % of the respondents indicated a lack of appropriate knowledge – 51.2 %, and too little experience in running a business and too low competences – 50.6 %. The respondents indicated a volatile business environment as the factor which had the least importance to entrepreneurs' failures – 16.2 %.

The analysis of factors which can have an influence on failures in business depending on gender did not show any big differences in the respondents' answers, either. The detailed data are presented in Table 3.

Table 3

**Factors determining entrepreneurs' failures, depending on gender**

List of items*	Gender N = 1189			
	Women N = 763		Men N = 426	
	Number	%	Number	%
<b>Bad (unsuccessful) idea</b>	452	59.2	265	62.2
<b>Lack of appropriate knowledge</b>	406	53.2	203	47.7
<b>Too little experience and low competences</b>	404	52.9	198	46.5
<b>Too high costs of running a business</b>	265	34.7	156	36.6
<b>Bad market situation</b>	206	27.0	124	29.1
<b>Lack of commitment to work</b>	198	26.0	117	27.5
<b>Too much bureaucracy</b>	139	18.2	101	23.7
<b>Volatile business environment</b>	138	18.1	55	12.9
<b>Other</b>	2	0.3	1	0.2

\*A respondent was allowed to indicate more than one answer  
 Source: the author's research outcomes

Both men and women mentioned in the first place a bad (unsuccessful) idea as a factor which can have an influence on a failure in entrepreneurial activity. Women indicated slightly more often than men: a lack of appropriate knowledge, too little experience and low competences, and volatile business environment. The following factors were indicated by men slightly more frequently than



women: too high costs of running a business, bad market situation, a lack of commitment to work and too much bureaucracy.

### Summary and conclusions

Based on the empirical studies, the following conclusions can be articulated.

- 1) Nearly 60 % of the respondents assessed themselves as enterprising, which may indicate that running one's own business is considered as a potential career path.
- 2) The analysis of the sources of entrepreneurs' successes and failures in running a business shows that the respondents, in spite of their young age, are aware of how entrepreneurship is important in the market. In the moment of taking a decision on setting up a business, a brilliant idea, appropriate planning of activity and market knowledge are extremely significant.

It can be concluded that entrepreneurship relates to business and to other forms of human activity where creativity, initiative, and innovativeness – simply entrepreneurship – are necessary. It is becoming "a way of life" of all the actors in the market economy, both households and business units. Such a situation is caused by the market, which is a natural creator of entrepreneurial behaviours in the market economy (Bienkowska-Golasa W., 2015).

Speaking of entrepreneurship and people who create it (entrepreneurs), one needs to realize their significance. They manifest in various forms and occur in different periods of life. They change, develop and as a whole, they build wealth: new values create innovations, new jobs as well as the growth of a particular managing entity. Regardless of how new initiatives arise, entrepreneurship is becoming an important economic category (Janasz W., 2004).

### Bibliography

1. Bienkowska, W. 2013. Activities of Local Authorities in Promoting Entrepreneurship in Poland. In: Economic Science for Rural Development. Jelgava, Issue: 32, p. 27.
2. Bienkowska-Golasa W. 2015. Entrepreneurship and Trends in Development of Rural Communes in Poland. In: Economic Science for Rural Development. Jelgava, Issue: 39, p. 108.
3. Golasa, p. 2013. Taxes and Social Insurance Contributions Charges of Farms in Poland in the Years 2004-2008. In: Economic Science for Rural Development. Production and Cooperation in Agriculture / Finance and Taxes. Proceedings of the International Scientific Conference, Issue: 30, pp. 242-247.
4. Gwiazda, p. 2002. Metody przedsiębiorczego zarządzania [Methods of Entrepreneurial Management]. In Rudolf, S. (ed.): Przedsiębiorczość i twórcze myślenie w biznesie [Entrepreneurship and Creative Thinking in Business]. Łódź: Publishing Company of The Department of Economics of the University of Łódź, p. 325.
5. Janasz W. 2004. Przedsiębiorczość w świetle uwarunkowań działalności gospodarczej [Entrepreneurship in the Context of Business Activity Determinants]. In Janasz, W. (ed.), Innowacje w rozwoju przedsiębiorczości w procesie transformacji [Innovations in Entrepreneurship Development in the Process of Transformation]. Warsaw: Difin sp. z o.o., pp. 17-18
6. Krajewski, K. 2013. Zarządzanie rozwojem przedsiębiorczości lokalnej przez gminę [Local Entrepreneurship Development Managed by a Gmina]. Warsaw: Instytut Przedsiębiorczości i Samorządności [Institute for Entrepreneurship and Home Rule], p. 29.
7. Moczydłowska, J., Pacewicz, I. 2007. Przedsiębiorczość [Entrepreneurship]. Rzeszów: Wydawnictwo Oświatowe FOSZE, p. 29.
8. Piasecki, B. 2002. Mała firma w teoriach ekonomicznych [Small Business in Economic Theories]. In Piasecki, B. (ed.): Ekonomia i zarządzanie małą firmą [Small Business Economics and Management]. Warsaw – Łódź: Wydawnictwo Naukowe PWN, p. 36.
9. Sikorska – Wołak, I. 2008. Wieloaspektowość przedsiębiorczości i jej postrzeganie przez mieszkańców wsi [Multi-Faceted Character of Entrepreneurship and How it is Perceived by Inhabitants of Rural Areas]. In Krzyżanowska K. (ed.), Doradztwo w działalności przedsiębiorczej [Consultancy in Entrepreneurial Activity]. Warsaw: Wydawnictwo SGGW, p. 11.
10. Siuta-Stolarska, B., Siuta-Brodzińska, M. 2011. Rola przedsiębiorczości w zarządzaniu [Role of Entrepreneurship in Management]. Wrocław: Zeszyty Naukowe WSOWL [WSOWL Scientific Publications], no. 4(162), p. 398.
11. Skalik, J. 2002. Bariery osiągania sukcesu przez firmy rodzinne [Barriers in Achieving Success by Family Businesses]. In Jaremczuk, K., Połuszny, J. (eds): Uwarunkowania sukcesu przedsiębiorstwa [Determinants of Business Success]. Przemysł: Wyższa Szkoła Administracji i Zarządzania w Przemysłu [ULPA], p. 19-20.

## GLOBALIZATION IN TOURISM

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**Abstract.** The globalization process, which causes the interdependence of world economies, is identified mainly in the economic and social area. Analysing statistical data on tourism, it can be stated that globalization positively influences the shaping and development of the tourism economy. The process itself, taking into account the capital links of the tourism services markets, is sensitive to crisis situations. It was important to present the tourist traffic in the globalization process. The article is of review and conceptual nature. The purpose of the article was to identify the phenomenon of globalization in tourism. The research was conducted using a review of national and foreign literature on the subject as well as descriptive and comparative analysis.

**Key words:** globalization, tourism economy, tourism, tourist traffic.

**JEL code:** Q18

### Introduction

As an important branch of many contemporary national economies, tourism is considered to be a significant tool of economic development. It functions as a factor stimulating both local and regional socioeconomic development on a micro- and macroeconomic scale. The development of entrepreneurship through the amount of taxes paid stimulates the development of individual regions and the entire country. Tax revenues make it possible to make the necessary investments in tourism. This, in turn, increases the attractiveness of the given country. Due to the demand for tourist services, which grows each year, the development of this sector globally impacts the level of entrepreneurship, investments, and innovations. A change in the direction of development and the economy-stimulating function contributes to the emergence of new tourist destinations, attractive for tourist traffic. There is no doubt that globalisation is most closely connected with the economic sphere. It also clearly involves the civilisation, cultural, and political aspects. The process applies in particular to the issues of safety, culture, trade, and tourism. The globalisation of the tourist market has actually been progressing since the early 1950s, along with the development of transnational corporations which have branches in most countries and satisfy a considerable proportion of the global tourist demand (Kachniewska M., 2007). It is therefore important to present the tourist traffic in the process of globalisation.

### Material and methods

The data from 2006-2016 (statistic) and WTO report were used to assess the impact of globalization on tourism in North America, Asia Pacific, Middle East and Europe. The article is a review of a conceptual nature. The aim of the article is to identify the phenomenon of globalisation in tourist traffic. Research was carried out using a review of domestic and foreign source literature, as well as a descriptive and comparative analysis.

### Globalisation – term overview

The history of the globalisation process is just as rich as the history of international relations. First mentions of the issue appeared towards the end of the 17th century (Cheater A. P., 1995: 124). They gained significance in the 1980s and 1990s. Since that time, the phenomenon has been the subject of numerous studies. Research on the topic is of great interest to various researchers, economists in particular, but also political scientists and sociologists and representatives of other fields. Globalisation theoreticians include H. M. McLuhan, who promoted

the global village theory, Q. Wright, author of the concept of common culture, and W. Coplin promoting the idea of universal culture.

It is difficult to pinpoint a single definition of globalisation, as over the years, the term has been used to describe numerous processes. Source literature usually cites Marshall McLuhan of McGill University, who – recognising a huge influence of new communication technologies on social and cultural life – called the world a “global village” for the first time in 1964 (Seidel F. P.). The notion of globalisation is closely connected with the global economy, in which production factors, as well as products and services, circulate around the world (Thurow L. C.).

Globalisation leads to the formation of trade blocks, global companies, and global economy. The world thus becomes a single system, and the global market accessible to all. Economic globalisation offers many possibilities to countries around the world. Thanks to these possibilities, many countries have advanced from global margins to highly developed countries and may serve as a good example to other countries that are just starting to conquer the market.

Globalisation leads to the formation of trade blocks, global companies, and global economy. The world thus becomes a single system, and the global market accessible to all (Deszczynski P., 2009). Economic globalisation offers many possibilities to countries around the world. Thanks to these possibilities, many countries have advanced from global margins to highly developed countries and may serve as a good example to other countries that are just starting to conquer the market (Veselica V., 2007).

According to A. McGrew (McGrew A., 1992), globalisation consists of a multitude of interconnections and a mutuality of influences between countries and societies making up the current global system. Globalisation is therefore marked by two dimensions: scope and intensity. It is characterised by the expansion of an enterprise beyond the borders of the country of its headquarters, international capital flows, and the broadening of the scope of the business activity conducted and services offered (Rosinska-Bukowska M., 2009).

Globalisation is therefore a dynamic process, which is why its degree and course may change in various fields, may concern both commodity markets and service markets, manufacturing, industry, technology, and knowledge, as well as consumption and mass culture patterns.

Wahab S. and Cooper C. (2001: 4) give a description of globalisation as it is understood in current times, one that coincides with many popular interpretations: Therefore, globalisation is an all-embracing term that denotes a world which, due to many politico-economic, technological and informational advancements and developments is on its way to becoming borderless and an interdependent whole. Any occurrence anywhere in the world would, in one way or the other, exert an impact somewhere else. National differences are gradually fading and being submerged in a homogeneous mass or a single socioeconomic order.

The issue of the paradoxical nature of the contemporary globalisation processes is raised very often. For globalisation triggers phenomena and processes which – as it seems – are mutually opposed or at least head in different directions (Masloch P., 2005). Globalisation is therefore a set of processes of multidimensional nature, it integrates entities on an international scale, both socially and economically. It is influenced by numerous factors; in the economic sphere, it is closely connected with the scientific and technical revolution. It is considered as an inevitable fate of the world (Bauman Z., 2008). According to Robertson, the theory of globalisation is an analytical pattern, which may serve as basis for reflection on describing phenomena of supranational significance. Globalisation is a process of economic, social, cultural, and political activity crossing

national boundaries (Robertson R., 1992). Globalisation is analysed in many aspects: an economic and geographical one, the aspect of universal values, and the aspects of the global cultural industry and political industry, poverty, and intercultural conflicts. The globalisation of the local environment results in the globalisation of competition and the implementation of global strategies. Since the mid-1980s, the dynamics of global trade have considerably exceeded the increase of the gross world product. These dynamics are higher with reference to trade within geographical regions than between them. Globalisation goes beyond a typically economic phenomenon, it is rather a megatrend which leads to the internationalisation of social, cultural, and political relations. It is a clear, dynamic, and heterogeneous process, which will change the world into a global village (Ostrowska B., 2011).

The process of the globalisation of economies was, however, stopped by a number of dramatic political and economic events in the period between World War I and the end of World War II, and the next dozen or so years of economic recovery of individual countries. Currently, we are therefore dealing with another, second stage of globalisation, the stage of dynamic development thanks to unprecedented scientific and technical progress and the development of economies and the international market (Zorska A., 1998). Globalisation processes impact the shape of tourist traffic in tourist regions.

## **Results and discussion**

The term globalisation is a means of describing a process: it does not offer any explanations. World-system theory analyses and offers an explanation of the historical and social development of a process and a system – a system that may itself be described as an example of globalisation. Tourism is regarded as part of the process of globalisation.

The following factors have a considerable influence on globalisation in tourism:

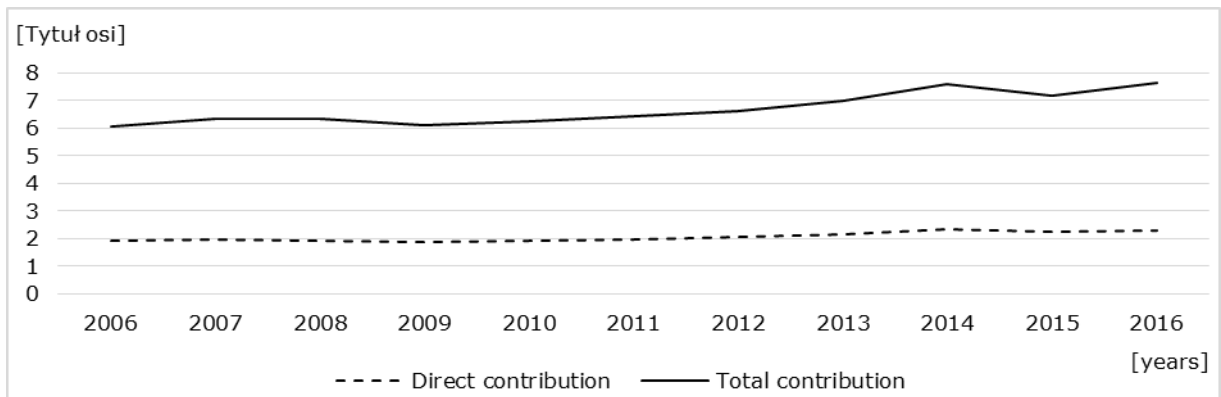
- unlimited access to information,
- development and constant modernisation of means of transport,
- free markets and the related foreign trade, expansion of hotel chains into international markets,
- significant demand for tourist services,
- international competition.

On a global scale, tourism is treated as a priority sector on account of the economic benefits. In 2016, tourism generated 12 % of the gross world product. In the economy, tourism mostly serves the macroeconomic functions and may stimulate socioeconomic development of tourist reception areas, and consequently of the country's economy by: – creating added value, thanks to which it contributes to the growth of the gross domestic product, – increasing foreign exchange revenues obtained from handling tourist traffic, – stimulating the development of entrepreneurship and infrastructure, – creating new jobs and increasing the income of the population of tourist regions, – increasing the income of companies offering services to tourists and favouring entrepreneurship and innovation, – shaping budget revenues of the local authorities. The GDP of the given country largely depends on the level of income from the sales of tourist services. This results from the fact that business entities participating in the handling of tourist traffic form a service chain made up of the following links: hotels, restaurants, travel agencies, transport companies.

The tourist sector is improving its results in spite of the growing problems related to safety in many regions of the world. The geographical distribution of tourist traffic and receipts from tourism

is not homogeneous. Despite the internationalisation of tourist demand, on each continent, internal markets and the markets of the neighbouring countries remain the most important regions for international tourism for the given continent.

The direct economic contribution of travel and tourism amounted to approximately 2.31 trillion U.S. dollars in 2016. The direct travel & tourism contribution includes the commodities accommodation, transportation, entertainment and attractions of these industries: accommodation services, food and beverage services, retail trade, transportation services and cultural, sports and recreational services. The figures for total impact also include indirect and induced contributions (Figure 1).



Source: author's elaboration based on <https://www.statista.com> (date of access 01/12/2017)

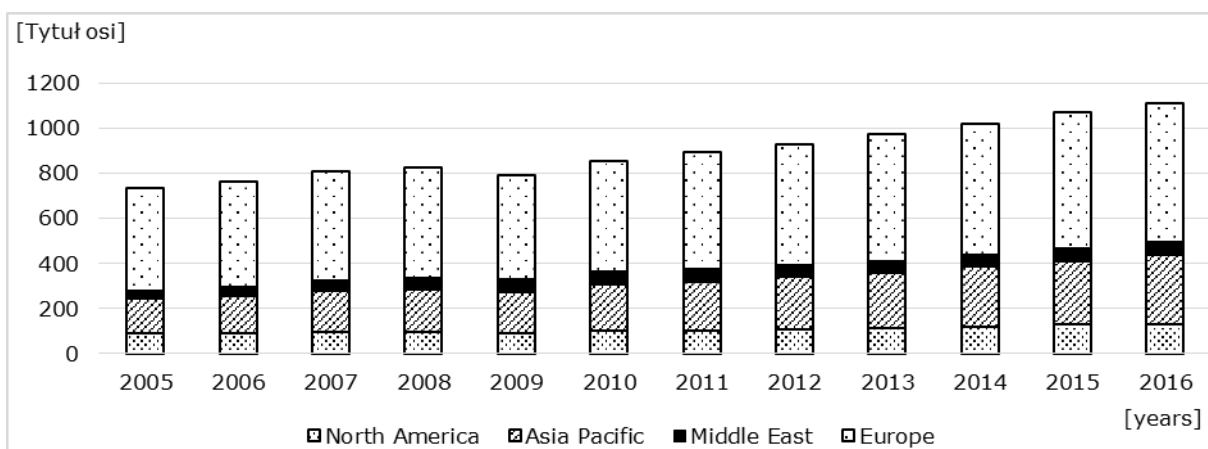
Fig. 1. **The direct and total economic impact of travel and tourism on the global economy from 2006-2016**

The GDP of the given country largely depends on the level of income from the sales of tourist services. This results from the fact that business entities participating in the handling of tourist traffic form a service chain made up of the following links: hotels, restaurants, travel agencies, transport companies. The entities contributing to the part of the GDP obtained from tourism to the greatest extent are usually hotels and transport companies. Additionally, the intensity of tourist traffic depends on the political and economic situation both of the given country and across the world. This trend was clearly visible after the 9/11 attacks or during the 2007 economic crisis, when a significant decrease in the global level of tourist travel could be observed. Travel and tourism's total contribution to global GDP reached 7.58 trillion U.S. dollars in 2014 - 3.85 trillion of this figure came from leisure spending.

The number of international inbound tourists across the world increases each year within a decade. It is expected that by 2020, the number of inbound tourists will have reached about 1.36 billion and may exceed 1.8 billion by 2030. In 2016, North America was visited by more than 130.5 million international tourists, while in the Middle East, the number of tourists oscillated in the region of 53.6 million. The increase in inbound tourist traffic is largely related to the growing exchange between the developed regions of the world. The process of globalisation in tourism clearly shows that traditional tourist areas are losing its share in the market in favour of the more and more rapidly developing competitors (WTO, 2017).

In recent years, the travel and tourism industry has contributed around seven trillion U.S. dollars to the global economy annually, nearing eight trillion in 2016. A highly profitable and valuable industry to the global economy, travel and tourism makes a direct economic impact of more than two trillion U.S. dollars each year. North America makes the largest contribution in this area, closely followed by the European Union and North East Asia. Due to their less developed

tourism industries, regions such as North and Sub Saharan Africa make a much smaller impact. However, according to the World Travel and Tourism Council (WTTC), some of the fastest-emerging tourism destinations can be found in Africa, including Namibia, Zambia and Angola. This is perhaps due to the realization of the benefits travel and tourism can provide for a country's economy, or maybe because of the growing popularity of less-travelled destinations among global tourists. This is not to say travellers are not still visiting well-established tourism destinations in their millions – the number of overseas visitors to the United States, for example, is still increasing each year and is expected to exceed 40 million by 2018. Travel and tourism's total contribution to global GDP reached 7.58 trillion U.S. dollars in 2014 - 3.85 trillion of this figure came from leisure spending. In that year, there were 973.8 million international tourist arrivals worldwide, over half of these visiting Europe. This number had increased by around 250 million since 2005 and was forecasted to almost double to 1.81 billion by 2030 (WTTC, 2017).



Source: author's elaboration based on <https://www.statista.com> (date of access 01/12/2017)

Fig. 2. The number of international tourist arrivals worldwide in the period 2005-2016 by regions

The economic expression of the significance of tourism in the contemporary world are the receipts from international tourism and their dynamic increase both on a global scale and in the individual tourist regions. Tourism, including international tourism, contributes to the economic development above all thanks to the fact that it triggers the so-called multiplier effect, described by J. M. Keynes. An inherent characteristic of the tourist sector is the transfer of funds from the tourists' place of residence to their destinations. Arriving at tourist reception areas, tourists put certain funds into circulation, which can then be accumulated or expended further. Funds coming from tourists are exchanged for goods and services and then, redistributed, circulate in the economy, creating a financial effect at all the stages of financial turnover. Along with the development of large companies, price competition grows, which puts small and medium-sized enterprises in an unfavourable situation. Globalisation processes lead to global standardisation of the quality and comfort of tourist services.

The index was part of "The Travel & Tourism Competitiveness Report 2015: Growth through Shocks." The report assessed worldwide economies on their travel and tourism development efforts and the impact of this on job creation.

### Applications, proposals, recommendations

In the new system, the size and level of the global development of tourism, investment policy, and infrastructure development and planning is dictated directly by the development of international tourist traffic. Tourist corporations play an important role in promoting tourist

destinations and encourage their development. Striving to improve the offering, they generate the added value of tourist demand. This creates a certain kind of a value chain which functions as a single system of interconnected content, aimed at achieving added value in tourism. Because the excess supply in the global tourist market causes increased requirements and expectations, only large corporations are able to provide comprehensive and diverse services for various segments of tourist demand. Hence, an important factor in shaping the contemporary tourist offering is the individualisation of travelling motives and styles, connected with the tourists' increased requirements and expectations as to the quality of tourist services. Global trends in tourism reflect the tourists' changing preferences and needs. An increase in the frequency of international trips during the year is clearly visible, and the growing number of flights creates favourable conditions for this phenomenon.

As a contemporary trend, globalisation has a deep impact on the general development of the global economy. All the economic trends influence the development of domestic or international tourism. In its essence, tourism is an international movement which contributes to the understanding of customs, religions, and social systems. It constitutes the strongest and the most flexible economic power in the global economy. At the same time, it is a significant export product with large employment opportunities.

Tourism is a contemporary phenomenon of globalisation, which appeared and developed at a certain stage of development of human society. Its influence combines economics, ecology, social factors, religious relations, cultures, and other scientific categories in the field of human activity (Smeral E., 1996: 395). We may not forget that the main effects resulting from the impact of globalisation processes on tourism are first of all a sharp rise in potential tourist demand for various destinations (and it needs to be pointed out that consumers who want new experience are not only attracted to destinations nearby, but the whole world becomes a potential destination). Secondly competition among tourist destinations has become extremely strong, and more destinations compete in the market basing their competitiveness on the requirements of the potential customers. Then small and medium-sized enterprises must fight for survival on the tourist market which is being conquered by large globalised corporations. Thirdly emphasis on introduction of innovation, specialisation and higher quality of products and services; increased need for extra capital to finance the necessary investments for future goals and achievements in order to stay competitive on the market. And finally fourth problems of developed tourist destinations arising from relationships with suppliers who are often not heterogeneous and do not apply quality standards.

## **Bibliography**

### **Books**

1. Bauman, Z. (2000). *Globalizacja i co z tego dla ludzi wynika (Globalization and what's for it for people)*, Warszawa, p. 5
2. McGrew, A. (1992). *Conceptualizing Global Politics*, [w:] *Global Politics*, pod red. A. McGrew, Polity Press. Cambridge, p. 28.
3. Robertson R. (1992). *Globalization*. Sage, Newbury Park, London, New Delhi, p. 24.
4. Seidel, F.P. (2001). *The Practice of Public Relations*, Prentice Hall, New Jersey, p. 24.
5. Zorska, A. (1998). *Ku globalizacji. Przemiany w korporacjach transnarodowych i w gospodarce światowej (Towards globalization. Transformation in Transnational Corporations and In The Global Economy)*, Wydaw. Naukowe PWN, Warszawa, p. 15.
6. Veselica, V. (2007). *Globalization and new economy*.

## Articles

7. Cheater, A.P. (1995). Globalisation and the new technologies of knowing: Anthropological calculus or chaos? In M. Strathern (ed.) *Shifting Contexts: Transformations in Anthropological Knowledge*. London: Routledge.
- p. Deszczyński, *Konceptualizacja pojęcia globalizacji (Conceptualisation of Globalisation Definitione)* *Zeszyty Naukowe Wyższej Szkoły Bankowej w Poznaniu* Nr 23/2009, p. 9.
8. Kachniewska, M. (2007). *Franchising jako narzędzie budowy łańcucha wartości przedsiębiorstw hotelarskich na europejskim rynku turystycznym (Franchising as a Tool for Building the Value Chain of Hotel Enterprises on the European Tourism Market)*, Wspólna Europa. Tworzenie wartości przedsiębiorstwa na rynku Unii Europejskiej, Szkoła Główna Handlowa w Warszawie, Warszawa, p. 103.
9. Masloch, p. (2005). Globalizacja i jej wpływ na rozwój współczesnej cywilizacji (Globalisation and its influence on development of contemporary civilization). *Przedsiębiorczość a współczesne wyzwania cywilizacyjne. Przedsiębiorczość – edukacja*, nr 1, Kraków (file:///C:/Users/user/Downloads/710-2155-1-PB2.pdf, data dostępu: 06.12.2017)
10. Wahab, S., Cooper, C. (2001). Tourism, globalisation and the competitive advantage of nations. In S. Wahab and C. Cooper (eds) *Tourism in the Age of Globalisation*. London: Routledge.
11. Rosińska-Bukowska, M. (2009). *Rola korporacji transnarodowych w procesach globalizacji. Kreowanie globalnej przestrzeni biznesowej*, maszynopis.
12. Thurow, L.C. (1999). *Przyszłość kapitalizmu (The future of capitalism)*, Wyd. Dolnośląskie, Wrocław, s. 157 – 220.
13. Smeral, E. (1996). Globalization and changes in the competitiveness of tourism destinations, 46th Congress Globalisation and Tourism. Rotura: *Publication of the International Association of Scientific Experts in Tourism*.

## Internet sources

14. Międzynarodowy ruch turystyczny – szacunki UNWTO (*International tourist traffic - UNWTO estimates*).
15. Ministerstwo Sportu i Turystyki <https://www.msit.gov.pl/pl/aktualnosci/6068,Miedzynarodowy-ruch-turystyczny-szacunki-UNWTO.html> (dostęp: 20.02.2018).
16. Ostrowska B. (2018). Globalizacja światowej gospodarki a trendy we współczesnej turystyce (Globalization of the global economy and trends in modern tourism) [https://repozytorium.ka.edu.pl/bitstream/handle/11315/1748/Ostrowska\\_Barbara\\_Globalizacja\\_swiatowej\\_gospodarki\\_2011.pdf?sequence=1](https://repozytorium.ka.edu.pl/bitstream/handle/11315/1748/Ostrowska_Barbara_Globalizacja_swiatowej_gospodarki_2011.pdf?sequence=1) (date of access: 20.02.2018).
17. World Travel and Tourism Council TRAVEL & TOURISM GLOBAL ECONOMIC IMPACT & ISSUES 2017 (date of access: 20.02.2018)
18. [www.statista.com](http://www.statista.com) (date of access: 01/12/2017)
19. The Travel & Tourism Competitiveness Report 2015: Growth through Shocks. [http://www3.weforum.org/docs/TT15/WEF\\_Global\\_Travel&Tourism\\_Report\\_2015.pdf](http://www3.weforum.org/docs/TT15/WEF_Global_Travel&Tourism_Report_2015.pdf) (date of access: 01/12/2017)



## **SOCIAL CAPITAL AND SOCIAL SUPPORT - PERCEPTION BY START-UPS IN RIGA CITY**

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**Abstract.** Social capital and social support is a non-material resource for start-up development now-a-days. This study relates to the call to investigate which social capital and support dimensions are contributing the most to the start-up perception. Research proved that Riga start-ups perceive high levels of social support from family, friends. It supports the entrepreneurial personality trait - high levels of perceived social support. Riga start-ups evaluate highly perceived social capital in all three dimensions – structural, cognitive and relational. Main findings proved - statistically significant correlations exist between perceived social support and two dimensions of social capital - cognitive and relational. Results of this study will be applied in managing Riga's Startup grant programme "Take-off" as well as other startup support instruments in Riga and regional municipalities. Further research might be carried out for in-depth evaluating of social capital and possible applications of that as well as territorial extension of research. Data from the start-up programme "Take-off" results could be compared with regional/ rural nascent entrepreneurs' support programmes, for instance, rural cities' business starting grants' utilization and the impact of social capital and support during this process.

**Key words:** social capital, social support; start-ups.

**JEL code:** A12. D23. M13

### **Introduction**

European Commission claims that small and medium sized enterprises (SMEs) are the backbone of the Europe's economy that is a key to ensure economic growth, innovation and job creation (EC, 2017). Social capital has been recognised as a driver of economic growth, resulting in greater economic efficiency (Putnam, 2000). Riga is the main city of entrepreneurial activities in Latvia (LURSOFT, 2017). Support of Riga SMEs and start-ups is defined in a long-term development document principles of Riga city. At the same time, number of newly registered enterprises is reducing and the number of liquidated enterprises is rising. Even more so - 2017 was the second time in a row when the number of liquidated enterprises exceeded the number of newly registered enterprises (CSB, 2017). The aim of this study is to explore how Riga Start-ups perceive social capital and social support in the entrepreneurship development.

The paper is structured as follows. The first part presents the theoretical foundations and definitions of social capital, social support and social capital dimension. Further the variables of the research and research questions are presented. The second part describes the methodology, design of the research instrument (questionnaire) and finally presents the results and discussion leading to managerial implications.

The research limitation is the research sample size representing the grant programme "Take-off" receivers of those start-ups legally registered in Riga city territory. Nevertheless, this article highlights the recent results on social capital and support role in the nascent entrepreneurship development that could be transferred to rural economy development researches and support programmes.

### **Social capital and Social support**

Social capital has been defined as "the features of a social organization that facilitate coordination and cooperation for mutual benefit" (Putnam, 2002). Research in this area has identified three forms of social capital – 1) relational social capital (strength of the relationship), 2)

cognitive social capital (shared beliefs of the relationship partners), and 3) structural social capital (the number of ties between relationship partners) (OECD, 2013).

Structural social capital is defined as a sum of assets deriving from the structure of networks that are created among the members of a community, organization or society, having as cornerstone an efficient cooperation. The structural dimension can also be present at individual level and it's expressed as his or her ability to create bridges with the other actors within a common system of reference, principles, norms and values.

Cognitive social capital is defined as the cumulus of assets providing shared and common meanings, interpretations, behaviours, attitudes, beliefs, norms and values among actors, such as legitimacy. Safety, reciprocity. Based on this definition, we can appoint as measurement instruments for cognitive capital the availability and commitment to collaborate in new projects, free knowledge exchange and diffusion among partners, committed support to manage different social issues.

Relational social capital is composed of all those assets deriving from the nature, quality and strength of relations that are built based on the same set of norms, values and principles through the cognitive dimension. Out of all the components of the relational dimension, trust is the most significant one, as it represents the pillar for any long-term success and it positively impacts all the actors involved in the entrepreneurial activity. Relational social capital is important for entrepreneurship because personal experience and the quality of past interactions can determine whom the entrepreneur is likely to approach and successfully engage with (Paunescu & Badea, 2014).

Social support refers to the apperceived or practical instrument or expressive resources supplied by communities, social network, and close partners. House (1981) offers the operational definition of social support. In his opinion, social support includes individual apperceived important instrument or expressive resources supplied by others and network structure, namely 1) emotion and concern; 2) instrument support; 3) information support; 4) praise or feedback support.

According to Melvin Smith (2006) hypothesis that entrepreneurship is mutually beneficial process, authors would like to research whether social capital and support enhance the entrepreneurship development.

In other words, authors would like to propose that social capital and social support received by start-ups could be the biggest asset of entrepreneurs apart from financial capital and intellectual capital.

### **Start-ups in Riga City**

There were 42869 companies established and 17814 companies liquidated in Riga city during 2012 -2016. During this period, in total 30050 companies were established and 19344 companies were liquidated in Latvia. Which may lead to the conclusion that the survival rate for Riga city companies is 70.64 %; whereas in Latvia – 60.84 %. Unfortunately, there is tendency of decrease in number of newly established companies as well as increase of liquidated companies (LURSOFT, 2017).

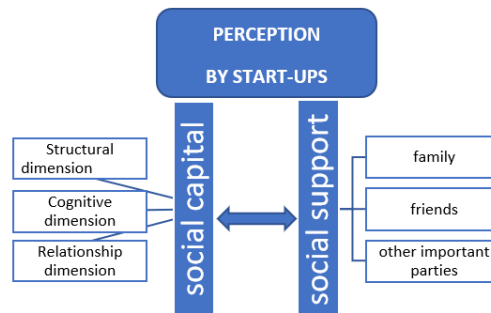
Riga city Sustainable Development Strategy until 2030 foresees that city is developed by three pillars, and one of them is entrepreneurship development in Riga city with the support of municipality (Council, 2014). One of entrepreneurship support instruments is grant programme "Take-off" supporting the best entrepreneurial activities by 12 000 EUR grant per company. Social

capital and social support dimensions are also included in this particular grant programme evaluation criteria. Thus, the research object is the start-up companies legally registered in Riga city and Riga region receiving "Take-off" grants (total 33 companies during years 2013-2017). The respondents were owners and Board Members of the companies.

The model presented in Fig. 1 shows the associations between the variables which, according to the literature, impact the start-up perception of social capital and social support. The following research questions are formulated:

RQ1: what sort of social capital does Riga start-ups perceive?

RQ2: what are the sources of social support perceived by Riga start-ups?



Source: created by the authors

Fig. 1. Variables influencing the perception of social capital and social support by start-ups

## Methods

To answer the research questions, the quantitative study was performed. To collect the data, the questionnaire was developed with three scales related to the social capital (64 statements) and 3 scales related to social support (14 statements), 78 statements in total.

Social support scale related statements are based on Zimet et al. 1998. Social capital related statements were based on the UK Office for National Statistics, 2014.

In total, there were 22 statements reflecting Social capital scale "Structural dimension". 13 statements reflecting Social capital scale "Cognitive dimension". 29 statements reflecting Social capital scale "Relationship dimension" were used. In total, 5 statements reflecting Social support scale "Family". 5 statements reflecting Social support scale "Friends" and 4 statements reflecting Social support scale "Other important parties" were used.

All statements were measured in 6-point Likert scale where coding 1 is allocated to "completely do not agree" and coding 6 is assigned to "completely agree".

The final sample size was 31 company owners, aged 24-46, 26 respondents having higher education, 7 females and 24 males.

*Depended variable* of this study is the **perception** of social capital and social support by start-ups owners. The respondents were asked to evaluate the social capital and social support related statements.

## Research results and discussion

The data was analysed using SPSS 21 statistical package. First, the internal consistency reliability of all scales was checked by means of Cronbach's alpha coefficients. Almost all scales showed satisfactory to good internal consistency reliability. 26 out of 90 statements were excluded from social capital related statements. Social support related statements showed good internal consistency. Thus, no statements were excluded.

Table 1

**Cronbach's Alpha. mean values and standard deviations of dimensions**

Scale	N of statements	Cronbach's Alpha	mean values	standard deviations
<b>SOCIAL CAPITAL</b>				
<b>Structural dimension:</b>	22	0.769	SPSS 95.1290 XLS 4.5300	13.03007
<b>Sources</b>	2	0.397	SPSS 9.6774 XLS 4.8387	2.07183
<b>Social ties</b>	4	0.551	SPSS 19.5806 XLS 4.8952	3.40367
<b>Scale</b>	2	0.907	SPSS 9.4516 XLS 4.7258	3.06419
<b>Diversity</b>	7	0.621	SPSS 28.8065 XLS 4.8011	5.05582
<b>Frequency of contacts</b>	2	0.580	SPSS 10.1935 XLS 5.0968	2.24231
<b>Frequency of support</b>	2	0.514	SPSS 8.7097 XLS 4.3548	2.54550
<b>Cognitive dimension:</b>	13	0.659	SPSS 60.0968 XLS 4.6228	8.94187
<b>Support perception</b>	5	0.686	SPSS 25.1613 XLS 5.0323	4.00081
<b>Received support</b>	4	0.503	SPSS 19.3226 XLS 4.8306	2.61262
<b>Involvement in politics</b>	4	0.619	SPSS 15.6129 XLS 3.9032	4.60201
<b>Relationship dimension:</b>	29	0.745	SPSS 135.0000 XLS 4.6552	15.39697
<b>Emotional significance of relationship</b>	5	0.551	SPSS 24.9677 XLS 4.9935	4.20701
<b>Civic engagement</b>	6	0.701	SPSS 23.3871 XLS 3.8978	7.93590
<b>Interest in politics</b>	4	0.664	SPSS 18.8387 XLS 4.7097	4.60505
<b>Trust in the public institutions</b>	2	0.552	SPSS 7.7742 XLS 3.8871	2.49946
<b>Trust in people</b>	6	0.652	SPSS 27.4839 XLS 4.5806	4.2874
<b>Cooperation social value</b>	6	0.645	SPSS 32.8484 XLS 5.4247	3.89734
<b>Total</b>	<b>64</b>		<b>SPSS 96.7416 XLS 4.6068</b>	<b>10.68675</b>
<b>SOCIAL SUPPORT</b>				
<b>Family</b>	5	0.881	SPSS 25.3226 XLS 5.0645	5.12762
<b>Friends</b>	5	0.901	SPSS 25.8387 XLS 5.1677	4.56871
<b>Other significant parties</b>	4	0.906	SPSS 20.2258 XLS 4.0452	5.05114
<b>Total</b>	<b>14</b>	<b>0.892</b>	<b>SPSS 96.7416 XLS 4.5791</b>	<b>3.75635</b>

Source: authors' calculations based on research data

To answer research questions and to find out which dimensions are better associated with the perception of start-ups. Pearson correlation analysis between the aspects of 1) social support and social capital structural dimension; 2) social support and social capital cognitive dimension; 3)

social support and social capital relationship dimension is used and results are presented in the Tables below.

Table 2

**Pearson correlation coefficients**

		Sources	Social ties	Scale	Frequency of contacts	Frequency of contacts	Support frequency	Involvement in organizations	Structural dimension
<b>Family</b>	Pearson correlation	-.068	-.024	.069	-.198	.342	.232	.136	.073
	Significance	.715	.896	.713	.285	.059	.209	.466	.698
	N	31	31	31	31	31	31	31	31
<b>Friends</b>	Pearson correlation	.008	.225	.389*	.120	.586**	.403*	.157	.431*
	Significance	.964	.224	.031	.521	.001	.025	.399	.016
	N	31	31	31	31	31	31	31	31
<b>Other significant parties</b>	Pearson correlation	-.104	.529**	.069	.211	.267	.047	.132	.320
	Significance	.577	.002	.714	.255	.147	.803	.478	.080
	N	31	31	31	31	31	31	31	31
<b>Social support</b>	Pearson correlation	-.074	.317	.220	.053	.513**	.290	.184	.351
	Significance	.691	.082	.235	.778	.003	.114	.320	.053
	N	31	31	31	31	31	31	31	31

Source: authors' calculations based on research data

Table 3

**Pearson correlation analysis between the aspects of social support and social capital structural dimension**

		Support perception	Received support	Involvement in politics	Cognitive dimension
<b>Family</b>	Pearson correlation	.369*	.119	.544**	.480**
	Significance	.041	.524	.002	.006
	N	31	31	31	31
<b>Friends</b>	Pearson correlation	.680**	.326	.538**	.676**
	Significance	.000	.074	.002	.000
	N	31	31	31	31
<b>Other significant parties</b>	Pearson correlation	.181	.176	.288	.281
	Significance	.329	.343	.116	.126
	N	31	31	31	31
<b>Social support</b>	Pearson correlation	.525**	.265	.594**	.618**
	Significance	.002	.149	.000	.000
	N	31	31	31	31

Source: authors' calculations based on research data

Table 4

**Pearson correlation analysis between the aspects of social support and social capital relationship dimension**

		Emotional significance of relationship	Civic engagement	Interest in politics	Trust in the public institutions	Trust in people	Cooperation social value	Relationship dimension:
<b>Family</b>	Pearson correlation	.368*	.173	.388*	.081	.044	-.113	.303
	Significance	.042	.352	.031	.664	.813	.547	.098
	N	31	31	31	31	31	31	31
<b>Friends</b>	Pearson correlation	.745**	.318	.130	.254	.498**	-.092	.563**
	Significance	.000	.081	.485	.169	.004	.622	.001
	N	31	31	31	31	31	31	31
<b>Other significant parties</b>	Pearson correlation	.248	.368*	.155	.266	.277	.134	.458**
	Significance	.178	.042	.405	.149	.132	.472	.010
	N	31	31	31	31	31	31	31
<b>Social support</b>	Pearson correlation	.581**	.372*	.299	.259	.346	-.028	.571**
	Significance	.001	.039	.103	.159	.056	.880	.001
	N	31	31	31	31	31	31	31

Note: The level of significance: \*\*  $p < .01$ ; \*  $p < .05$ .

Source: authors' calculations based on the research data

The correlation results show that there is evident correlation between social capital relationship dimension and social support in general, which may lead to the assumption that relationship is important for the start-ups (particularly friends and other significant parties and correlation between family and relationship dimension is not statistically proved. The authors assume that results may be affected by the choice of statements (3 out of 6 statements are linked with the social capital nature. e.g. interest in politics. trust in the public institutions is directly linked with the start-up relationship with local municipality).

The finding of this particular research proved the importance of friends – this is only social support source, which correlates to the all three dimensions of social capital. Thus, the authors draw the conclusion that **the most important social support source for start-ups is friends.**

**Conclusions and recommendations**

The results provide the answers to the research questions.

RQ1: what sort of social capital do Riga start-ups perceive?

- 1) Riga start-ups perceive positively assessed social capital in all dimensions – structural, cognitive, relationship. The negative perception is about engagement into organizations which may be explained by autonomy of start-ups and Latvia specific cultural traits. **Thus, the authors assume that this may not be beneficially to unify Riga start-ups into organization.**

RQ2: what are the sources of social support perceived by Riga start-ups?

- 2) Riga start-ups receive social support from family, friends and other significant parties which allies with the theory.
- 3) Factor of social support that contributes most to the performance of start-ups appeared to be friends. Thus, friends may be taken into consideration when start-ups develop their entrepreneurship.

- 4) The research results proved the statistical correlation between social support and social capital relationship and cognitive dimensions. Authors assume that start-ups do not associate directly social capital structure and social support.
- 5) Start-up structural capital peculiarity arises from the entrepreneurial extraversion and belief that they can control their life. Thus, social capital structural expansion by public sector may be perceived by start-ups as their own performance results not as activity of public sector per se.
- 6) The only correlation between social capital structural dimension and social support dimension "other significant parties" is social ties, i.e. the number of social ties. This may lead to the conclusion that start-ups are ready to make the contacts in terms of intensity. This is supported as well by correlation between social support "feelings" dimension and contact frequency. This may lead to the assumption that persons, willing to develop business, are exert to contacts. Such kind of entrepreneurs may be motivated to engage into entrepreneurship support activities to utilize the expansion opportunities.
- 7) Research results did not prove Melvin Smith (2006) hypothesis that entrepreneurship is mutually beneficial process as this was statistically proved neither by social capital relationship dimension. nor social capital cognitive dimension and social support. Thus, the conclusion may be drawn that the concrete action from one side may not lead to the reaction from start-up side. This assumption was also proved by the perception of social support by start-ups only from friends and family, which may be based on the cultural specific as well.
- 8) The results of this study can motivate start-ups to utilize the opportunities provided by social capital and social support actors as these strategies may help them to develop entrepreneurship by so called non-material asset of modern society – social capital and social support.
- 9) This research has certain limitations and implications for future research. The most important limitation is the size of the sample. Future research should be carried out and answers from more respondents collected. Other limitation is related to the generalizability of the findings. since. respondents represent only grant programme "Take-off" receivers and data from other types of Riga start-ups would enrich the findings. Moreover, certain limitation is related to the relationships between social capital dimensions and social support which certainly are more complex. More research should be done to explore these relationships with more sophisticated methodologies as structural equation modelling for example. Still the present findings could be used as the basis for future investigations in the rural economy context.

## Bibliography

1. Bulsara. H. & Pandureng. V.. 2007. *Academia.edu*. Available at: [https://www.academia.edu/778926/Developing\\_Women\\_Entrepreneurship\\_A\\_challenge](https://www.academia.edu/778926/Developing_Women_Entrepreneurship_A_challenge) [accessed November 11. 2017].
2. Houghton. S. M. Smith. A. D. & Hood. J. H. 2009. The Influence of Social Capital on Strategic Choice: An Examination of The Effects of External and Internal Network Relationships on Strategic Complexity. *Journal of Business Research*. P. 1255–1261.
3. OECD. Scrivens. K. & Smith. C. 2013. Four Interpretations of Social Capital: An Agenda for Measurement. *OECD Statistics Working Papers*.
4. Putnam. R. 2002. 1. Putnam. R. (2000) 'Bowling Alone: The Collapse and Revival of American Community'. Simon and Schuster: Bowling Alone: The Collapse and Revival of American Community. *Journal of Catholic Education*. 6(2). pp. 28-33.
5. Riga City Council. 2014. Strategy 2030. Available at: [http://www.rdpad.lv/wp-content/uploads/2014/11/STRATEGIJA\\_WEB.pdf](http://www.rdpad.lv/wp-content/uploads/2014/11/STRATEGIJA_WEB.pdf)
6. LURSOFT. Available at: <http://blog.lursoft.lv/2017/01/03/2016-gada-likvideto-uznemumu-skaitu-parsniedzis-jaunregistreto-uznemumu-skaitu/> [accessed 7 November. 2017].
7. LURSOFT. [online] Available at: <http://blog.lursoft.lv/2017/11/15/mazais-bizness-nodarbina-66-no-visiem-latvijas-uznemumos-stradajosajiem-cilvekiem/> [accessed 27 November 2018].

8. Riga Council. 2014. *Riga City Sustainability Strategy*. [online] Available at: [http://www.rdpad.lv/wp-content/uploads/2014/11/Attistibas\\_programma.pdf](http://www.rdpad.lv/wp-content/uploads/2014/11/Attistibas_programma.pdf) [accessed December 1. 2017].
9. OECD (ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT). 2015. *www.oecd.com*. [online] Available at: <http://www.oecd.org/site/worldforum/33703702.pdf> [accessed November 29.2017].
10. OECD. Scrivens. K. and Smith C. (2013a) 'Four Interpretations of Social Capital: An Agenda for Measurement'. OECD Statistics Working Papers. 2013/06. OECD Publishing
11. Office for National Statistics. 2014. *UK Government Web Archive*. Available at: [http://webarchive.nationalarchives.gov.uk/20160107115718/http://www.ons.gov.uk/ons/dcp171766\\_371693.pdf](http://webarchive.nationalarchives.gov.uk/20160107115718/http://www.ons.gov.uk/ons/dcp171766_371693.pdf)
12. European Commission. 2017. Internal Market. Industry. Entrepreneurship And SMS. Available at: [http://ec.europa.eu/growth/smes/index\\_en.htm](http://ec.europa.eu/growth/smes/index_en.htm) [accessed December 12.2017.].
13. House. J.S. (1981). *Work Stress and Social Support*. Reading. MA: Addison-Wesley.
14. Smith. M. L. 2006. Social Capital and Intentional Change: Exploring the Role of Social Networks on Individual Change Efforts. *Journal of Management Development*. 25(7). pp. 718-731.
15. Zimet. G. Dahlem. N. Zimet. S. & Farley. G. 1998. The Multidimensional Scale of Perceived Social Support. *Journal of Personality Assessment*. pp. 30-41.
16. Zimet. G. *Multidimensional Scale of Perceived Social Support (MSPSS)*. Available at: <http://gzimet.wix.com/mspss> [accessed October 25. 2017].



## ECONOMIC DIVERSIFICATION ON SMALL AGRICULTURAL HOLDINGS

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**Abstract.** In Latvia, small agricultural holdings comprise a very high proportion of the total agricultural holdings – 90 %. However, their number decreases, which is caused by a decline in their competitiveness and insufficient cash flow. Nevertheless, such holdings play an essential role in rural development in Latvia. One of the main problems to be tackled is the identification of new business paths for the holdings, i.e. their business diversification. The research aim is to identify prerequisites for economic diversification for small agricultural holdings in North Kurzeme. The research revealed that small agricultural holdings used mainly their own funds and less relied on external finance, which could be a hindering factor for their development. In the opinion of agricultural holding owners, the diversification of their holdings is strongly associated with consumer purchasing power, and higher profits have to be the result of the diversification.

**Key words:** small agricultural holdings, diversification, diversification factors.

**JEL code:** Q12

### Introduction

Nowadays, an idea is popularised that the future production of food and other products could be only industrial, large-scale and uniform. Nevertheless, according to the Central Statistical Bureau of Latvia, small agricultural holdings, in terms of utilised agricultural area and standard output, accounted for 90 % of the total in Latvia. The number of such holdings declined year by year; therefore, the retention and development of small and medium agricultural holdings in rural areas in Latvia is an important matter. The insolvency and liquidation of small agricultural holdings can only increase the number of poor families, depopulation and unemployment in rural areas and in Latvia as a whole.

In view of the above, it is necessary to seek solutions to ensure continuous operation of small agricultural holdings, stabilise their cash flows and improve their competitiveness. Economic diversification is a way to increase the viability and competitiveness of small agricultural holdings. The research puts forward a hypothesis: the economic diversification of small agricultural holdings is affected by both endogenous and exogenous factors. A survey of small agricultural holdings was conducted in the northern part of Kurzeme region. The research aim is to identify prerequisites for economic diversification for small agricultural holdings in North Kurzeme. To achieve the aim, the following research tasks were set: 1) to characterise the theoretical aspects of economic diversification; 2) to examine the factors affecting the economic diversification of small agricultural holdings and the significance of the factors in North Kurzeme.

Along with general research methods – abstract and logical analysis, content analysis, monographic and graphic – the following sociological research methods were employed: expert evaluation, surveying and individual interviewing. The survey represented closed-ended questions, except for one open-ended one in which respondents had an opportunity to explain their opinions. A nominal scale, the Likert scale and the semantic differential scale (to measure agreement about an assertion etc.) were employed for closed-ended questions.

### Research results and discussion

#### 1. Nature and kinds of economic diversification

An economic and financial dictionary (2003) explains the term diversification as “a strategy of an organisation to start up business in another industry alongside the current business, thereby attracting new customers”. The academic term database AkadTerm (s.a.) defines diversification as

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"the expansion of the scope of business and of the range of products, which is usually done when an enterprise has no opportunity to grow in the current field of activity or another kind of economic activity is more advantageous (i.e. offering higher profits)" (Diversifikacija (s.a.).

The association of diversification with the development of new products is stressed by A. Coleman (Coleman, 2013) and W. Craig (Craig, 2015); in their works, both authors attribute diversification to the creation of new products, an examination of and entry into new markets and the assumption of new risks.

Diversification is explained also as the reallocation and recombination of farm resources away from its original farming activity to generate another form of income (Meraner, 2014).

Authors J. Cornwall and B. Perlman (Cornwall, Perlman, 1990) and V. Praude (2012) distinguish three *kinds of diversification*:

- **concentrated diversification** – if an enterprise broadens its range of products by similar products; the new products are intended for a new range of consumers;
- **horizontal diversification** – if an enterprise begins producing new kinds of products that help to attract consumers; the products are intended for both the present and new customers of the enterprise;
- **conglomerate diversification** – if an enterprise adds new products that are completely new ones and that are unrelated to the present products; consequently, the enterprise has more customers.

J. Caune and A. Dzedons (2009), T. Volkova, B. Aneraude and others (2010) define diversification as the expansion of activity of an enterprise through engaging in new fields of economic activity, yet this basic strategy is divided into two kinds: **related** and **unrelated diversification**.

A different perspective, which relates to the economic activity of an enterprise and its diversification is given by A. Coleman (Coleman, 2013) and I. Meraner (Meraner, 2014). A. Coleman (Coleman, 2013) believes that diversification could be both a specially designed process and natural business expansion. However, according to I. Meraner (Meraner, 2014), diversification could be characterised by four activities that can be performed by a farm that is engaged in conventional farming and wishes to diversify its business (Table 1).

Table 1

### Characteristics of diversification activities

Name of activities	Characteristics of activities
"On-farm sale"	Small shops on farms, roadside stalls, fruit and berry self-picking etc.
"On-farm processing"	Crafts, processing of berries, fruits and vegetables etc.
"Agrotourism"	Accommodation services (campsites, tent places), active recreation, catering services, animal farm visits etc.
"Care farming"	The purpose of care farming services is the education, care, integration and rehabilitation of vulnerable persons, pensioners and children.

Source: authors' construction based on Meraner, 2014

Economic diversification and farm multifunctionality is a focus and an integral part of the EU Common Agricultural Policy aimed at avoiding a crisis under the agricultural pattern, the main priority of which is to contribute to agricultural output. The CAP, stressing the opportunity for farms to diversify their economic activity and to become multifunctional, raises the farms' interest in mitigating climate change through changing their agricultural practices that are environment-

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friendlier and engaging, for example, in organic farming. Such a change of the policy paradigm encourages farm owners to do their business in a different way – to diversify it, to engage in other kinds of economic activity – in order to, for example, acquire European Union funding for their farm development (Meraner, 2014).

The explanations of diversification given by various authors allow concluding that the key priorities are the viability of farms, higher farm profits and risk reduction for the farms. However, opinions about the need for the economic diversification of farms are diverse. W. Craig (Craig, 2015) believes that diversification is necessary for some enterprises, whereas the others are not going to benefit from it. Diversification can ensure stable operation of an enterprise, yet it involves some risks. In the financial sector, diversification allows reducing risks, i.e. if a negative event occurs, all the investments might be lost. In the market of goods and services, which is volatile, the business operations done by other enterprises could be unpredictable, and any business is regularly affected by changing consumer needs; therefore, diversification can give the enterprise an opportunity to implement new, innovative ideas and enter new markets. W. Craig (Craig, 2015) points out that some enterprises, doing diversification repeatedly, come to conclusions regarding what to produce and how to do it more efficiently.

M. Meraner (Meraner, 2014) points out that a decision on economic diversification is usually made in order to survive in the market because of volatile yields and prices. Besides, the farms that have diversified their business, are more responsive to any change in demand and in consumer wishes, which allows them make higher profits.

I. Weltin and others (Weltin et al., 2016) have focused on other factors that affect a decision to do economic diversification. According to them, there are two decisive factors influencing farmer decisions to diversify the source of revenue:

- main business of the farm;
- family structure.

Farms owned and managed by young households as well as by large households more frequently make a decision to diversify their business, as the risk of labour shortage is lower as well as the young individuals are interested in making their own efforts and develop their farms. In contrast, farms owned and managed by older households or by small households are not interested in diversification because of the shortage of labour and they have difficulties to generate sufficient synergy effects (Weltin, 2016).

## **2. Economic diversification on small agricultural holdings in North Kurzeme**

To accurately describe and assess the factors affecting decisions on the economic diversification of agricultural holdings as well as to identify the attitudes to and opinions of agricultural holding owners on the diversification, the research conducted, first, a survey and, second, individual interviews. The study involved a broad spectrum of agricultural holdings in terms of age of owners, kind of activity and economic size.

The survey participants were owners of small agricultural holdings in North Kurzeme. Their age was diverse: 18-25 (18 %), 26-44 (18 %) and 45-64 (64 %). Farming was the main job for 82 % of the respondents, while off-farm employment was the main job for 18 %. The agricultural holdings analysed were engaged in diverse activities: beef cattle production (19 %), fruit production (15 %), organic farming (9 %) and milk production (11 %), while mixed farming represented 46 %.

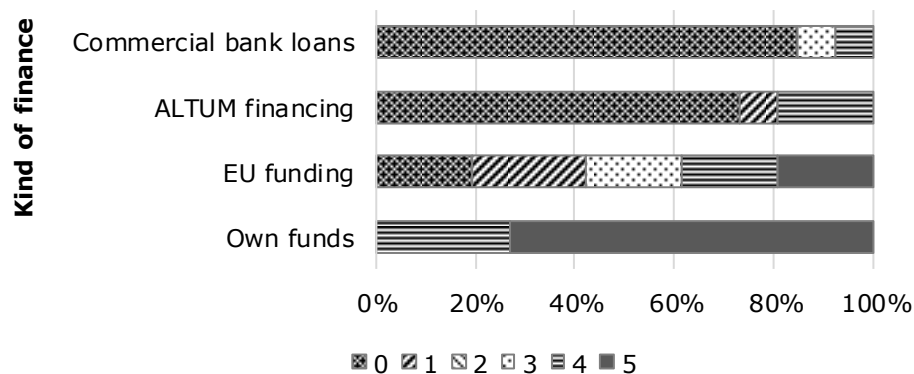
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An analysis of the agricultural holdings in terms of net turnover revealed that the holdings with a turnover of EUR 3001-6000 (37 %) dominated, followed by those with a turnover of less than EUR 3000 (27 %), while the holdings with turnovers of EUR 6001-10000 and more than EUR 10000 represented 18 % each.

An opportunity to borrow funds is an essential factor for farm development, which could also contribute to farm diversification. The sources of finance indicate the ability of farm owners to assume financial risks as well as their trust in financial institutions.

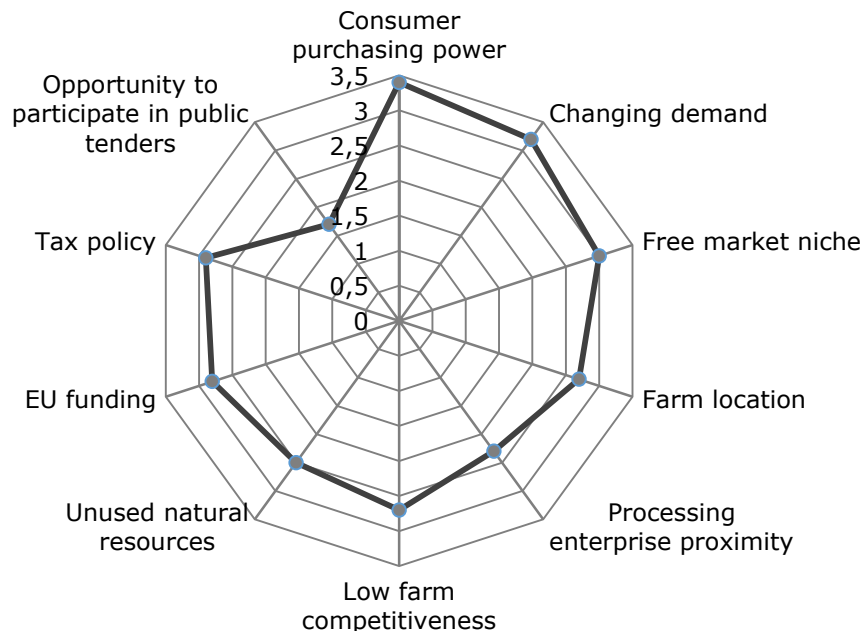


Source: authors' construction

Fig. 1. Percentage breakdown of the ratings of financial resources used by small agricultural holdings for business (0 – the lowest, 5 – the highest)

The survey data acquired revealed that most of the holdings used internal sources of finance or their own funds for their business development, and the significance of their own funds was rated the highest. As regards external sources of finance – commercial bank loans and ALTUM financing – the significance of the sources was rated the lowest (bank loans and ALTUM financing were rated at 0 by 82 % and 73 % respondents, respectively), which indicated the tendency of holding owners avoid assuming financial obligations. The significance of EU funding was rated differently. Breaking down the data by significance of financial resources and by type of agricultural holdings revealed that the holdings that were engaged in rural tourism, poultry production and bee-keeping rated EU co-funding low, yet the holdings that were engaged in organic farming, milk production, beef cattle production and fruit production rated the EU co-funding very high (4 and 5 points), which might be explained by the diversity of kinds of available financial support and the amount of the support for the mentioned kinds of holdings in particular.

The key purpose of the survey was to identify the main factors affecting decisions made by agricultural holdings on the diversification of their business. Every respondent had to rate the effect of every factor on a scale from 1 to 4: "no effect" (1); "insignificant effect" (2); "moderate effect" (3); "significant effect" (4).

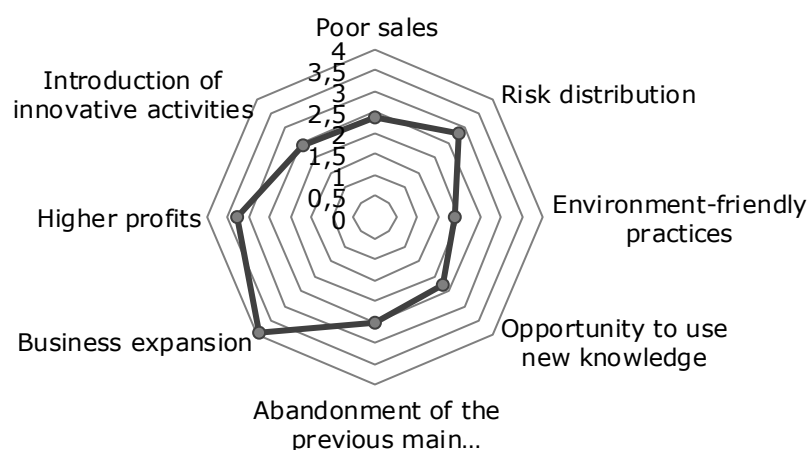


Source: authors' construction

Fig. 2. Ratings of exogenous factors affecting economic diversification on small agricultural holdings

An aggregation of the data on every **exogenous factor** revealed that the decisions to diversify business were mainly affected by consumer purchasing power (3.4), volatile demand (3.2), a free market niche (3.0) and tax policy (2.9). This indicates that the holding managers associated their business development with the standard of living of the population and the national development level.

The data on **endogenous factors** showed that the decisions on business diversification were mainly affected by an opportunity to expand the business (3.9), earn higher profits (3.3) and distribute risks (2.8).



Source: authors' construction

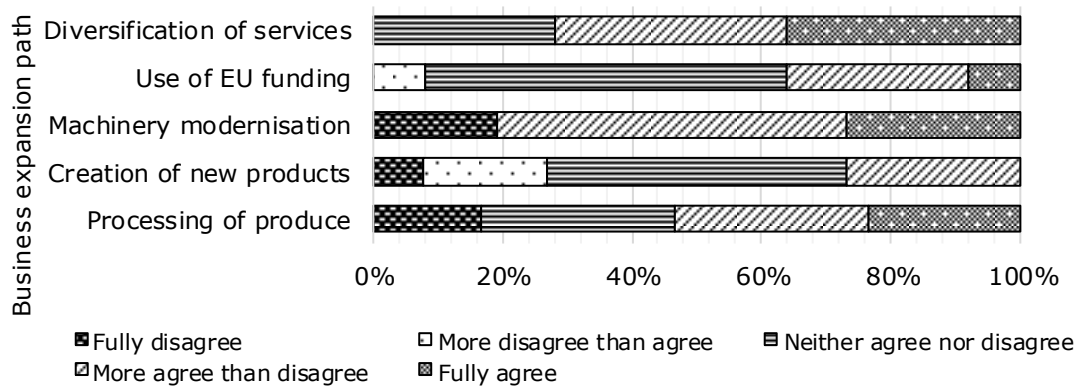
Fig. 3. Ratings of endogenous factors affecting economic diversification on small agricultural holdings

The study revealed that the most important reason of diversification was the wish to expand business; therefore, the study sought to identify the business expansion paths.

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Source: authors' construction

Fig. 4. Percentage breakdown of the ratings of farm diversification paths for small agricultural holdings

The most popular business expansion paths, according to the respondents, were diversification of services and machinery modernisation, while processing of agricultural products was less popular. Use of EU funding was not a decisive prerequisite for business expansion.

Grouping and an analysing the agricultural holdings by kind of economic activity and by future business expansion path allows concluding that the holdings engaged in fruit and vegetable production and rural tourism preferred diversification of services and processing of agricultural products, while the holdings planning to modernise their machinery were engaged in milk, beef cattle and pig production and provision of agricultural machinery services, as modernised machinery allows saving time and facilitating some technological operations in the mentioned kinds of business.

The respondent opinions on whether economic diversification was the only opportunity to ensure the viability of small agricultural holdings differed. Of the respondents, 46 % believed that diversification was the only way how to make small agricultural holdings viable, and the same percentage of them (46 %) considered that no diversification was necessary. However, 8 % chose the reply option "other", adding that business could be diversified based on a feasibility study and if there is demand for new products and services.

An aggregation and an analysis of the respondent opinions on the need for diversification allowed identifying the profile of the holdings (Table 2).

Table 2

**Profile of agricultural holdings according to the respondent opinions on the need for diversification**

Agricultural holdings favouring business diversification	Agricultural holdings not favouring business diversification
<ul style="list-style-type: none"> <li>experienced farm owners aged 45-64;</li> </ul>	<ul style="list-style-type: none"> <li>farm turnover from EUR 6001 to 10000;</li> </ul>
<ul style="list-style-type: none"> <li>farm turnover from EUR 3001 to 6000;</li> </ul>	<ul style="list-style-type: none"> <li>business focuses on miikand beef production;</li> </ul>
<ul style="list-style-type: none"> <li>business focuses on rural tourism, organic farming, fruit production, poultry and pig production, agricultural machinery services;</li> </ul>	<ul style="list-style-type: none"> <li>most important financial resources: own funds and EU co-funding.</li> </ul>
<ul style="list-style-type: none"> <li>most important financial resource is own funds.</li> </ul>	

Source: authors' construction

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The data allow concluding that the opinions of the holding owners about the diversification of their business depend on the kind of their economic activity, which affects the turnover of their holdings, and on the amount and diversity of EU co-funding received. The holdings with a turnover of less than EUR 6000 were engaged in the kinds of economic activity where the consumer was the most important factor, which affected the volume of sales and the quantity of unsold products as well as the stability of demand; the small agricultural holdings (which participated in the survey) did not and could not sufficiently use EU co-funding that could raise the stability of their business.

In contrast, the agricultural holdings that were engaged in milk and beef cattle production and in other kinds of economic activity offering a greater opportunity to receive various kinds of EU co-funding and that sold their products to agricultural processors assigned a greater role to the tax policy and the modernisation of machinery.

### Conclusions, proposals, recommendations

- 1) By diversifying their business, agricultural holdings identify and create new solutions to inefficient resource use, which might result in innovations that optimise costs, enhance farm performance as well as lead to a new specialisation. Innovations might be developed within the agricultural holding and on a broader scale.
- 2) Among the exogenous factors, the most important factors influencing decisions on economic diversification are as follows: consumer purchasing power, volatile demand, a free market niche, the standard of living and tax policy, while most important endogenous factors are an opportunity for business expansion, higher profits and risk distribution.
- 3) According to the survey, the opinions of owners of agricultural holdings on the diversification of their business depended on the kind of their economic activity, which affected the turnover of the agricultural holdings, and on the amount of EU co-funding received.

### Bibliography

1. Atbalsts uzņēmējdarbības uzsākšanai, attīstot mazas lauku saimniecības (2017). Lauku atbalsta dienests (Support for Starting up Business by Small Agricultural Holdings. Rural Support Service). Retrieved: <http://www.lad.gov.lv/lv/atbalsta-veidi/projekti-un-investicijas/atbalsta-pasakumi/6-3-atbalsts-uznemjdarbibas-uzsaksanai-attistot-mazas-lauku-saimniecibas-221>. Access: 31.03.2017.
2. Caune, J., Dzedons, A. (2009) Strategiska vadisana. Otrais izdevums (Strategic Management. Second Edition). Riga: Lidojosa zivs. p. 384.
3. Coleman, A. (2013). *Diversify or Die: Explore New Markets and Help Your Business Grow*: The Guardian. Retrieved: <https://www.theguardian.com/small-business-network/2013/jun/14/diversify-die-explore-new-markets-business-grow>. Access: 10.01.2017.
4. Cornwall, J., Perlman, B. (1990). *Organizational Entrepreneurship*. The United States of America: Richard D. Irwin, INC. p. 241.
5. Craig, W. (2015). *Business Diversification: the Risk and the Reward*: Forbes Media LLC. Retrieved: <http://www.forbes.com/sites/williamcraig/2015/04/24/business-diversification-the-risk-and-the-reward/2/#5700e36635b3>. Access: 08.01.2017.
6. Diversification (s.a.). *Business Dictionary*. Retrieved: <http://www.businessdictionary.com/definition/diversification.html>. Access: 08.01.2017.
7. Diversifikācija (s.a.). *Academic Term Database AkadTerm*. Retrieved: <http://termini.lza.lv/term.php?term=diversifik%C4%81cija&list=diversifik%C4%81cija&lang=LV>. Access: 08.01.2017.
8. *Future of Small Farms* (2014). European Parliamentary Research Service Blog. Retrieved: <https://epthinktank.eu/2014/02/15/future-of-small-farms/>. Access: 31.05.2016.
9. Haines, M., Davies, R. (1987) *Diversifying the Farm Business: A Practical Guide to the Opportunities and Constraints*. Oxford: BSP Professional Books. p. 304.
10. Linton, I. (2015). *Product Diversification Strategy*. Retrieved: <http://smallbusiness.chron.com/product-diversification-strategy-40375.html>. Access: 11.01.2017.
11. Meaning of "farm" in the English Dictionary (s.a.). *Cambridge Dictionary*. Retrieved: <http://dictionary.cambridge.org/english/farm>. Access: 23.03.2017.

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<sup>3</sup>Corresponding author. Tel.: +371 29927672 . E-mail address: Vineta.Pece@inbox.lv;

12. Meraner, M., Heijman, W., Kuhlman, T. (2014). *Determinants of Farm Diversification in the Netherlands*. Science Direct. Retrieved: <http://www.sciencedirect.com.ezproxy.llu.lv/science/article/pii/S0264837714002300>. Access: 10.01.2017.
13. Product Diversification (s.a.). Business Dictionary. Retrieved: <http://www.businessdictionary.com/definition/product-diversification.html>. Access: 15.04.2017.
14. The Importance of Diversification (2016). Investopedia. Retrieved: <http://www.investopedia.com/articles/02/111502.asp>. Access: 08.01.2018.
15. Van der Ploeg, J.D., Laurent, C., Blondeau, F. (2009). Farm Diversity, Classification Schemes and Multifunctionality. Science Direct. Retrieved: <http://www.sciencedirect.com.ezproxy.llu.lv/science/article/pii/S0301479708003472>. Access: 10.01.2018.
16. Volkova, T., Aneraude, B., Eglitis, U., Grinbergs, A. u.c. (2010). *Bizness pari robežam: Praktisks celvedis jaunu tirgu apgusana (Business beyond Borders: a Practical Guide to Enter New Markets)*. Riga: LU Akadēmiskais apgads. p. 184.
17. Weltin, M., Zasada, I., Franke, C., Piorra, A., Raggic, M., Viaggi, D. (2016). *Analysing Behavioural Differences of Farm Households: An Example of Income Diversification Strategies based on European Farm Survey Data*. Science Direct. Retrieved: [1-s2.0-S0264837716300552-main.pdf](https://doi.org/10.1016/j.sbspro.2016.05.001). Access: 15.01.2018.

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## QUALITY MANAGEMENT SYSTEM AS TOOL FOR CORPORATE DEVELOPMENT AND COMPETITIVENESS INCREASE IN SMALL AND MEDIUM COMPANIES

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**Abstract.** In a globalized world characterized by strong competition in various business areas, companies need to be able to find a competitive edge. Small and medium-sized enterprises, which are the backbone of the economy, must be able to compete with large companies that are technologically and financially more secure. It is therefore essential to be flexible, to look for new approaches and use different tools to promote development and competitiveness. A quality management system can be such a tool. Within the framework of this research, the role of the quality management system in ensuring successful operations and competitiveness of small and medium enterprises will be evaluated. Purpose of the methodology is to evaluate and develop four main spheres of organization: recourse management, document management, determination of management competence, efficiency and improvement management. Implementation of quality management systems or methodologies reduces corporate costs and ensures competitive operation.

**Keywords:** efficiency, quality, management, efficiency, competitiveness.

**JEL code:** M5

### Introduction

In the modern business environment, the concept of quality and quality management has become an integral part of the business world and also a part of public administration. Corporate management does not have sufficient knowledge of quality management systems and understanding of benefits from corporate self-assessment. This study considers the most popular quality management system's standards and models. Models and standards have different evaluation criteria and principles, but they have a common goal - to support competitive, balanced and sustainable corporate development. The quality management system is focused on the effective use of resources and increase of productivity per unit invested. Components of the system are not an ever completed process, but a tool for corporate development. There is no single standard or model in today's business environment to assure corporate development and effective use of existing resources. There are a variety of corporate management support standards, models, systems in the world, but the criterion unifying the entire system is the satisfied customer and reduced corporate costs for ensuring competitiveness in the long-term period.

Quality management system is the object of research. Quality management system is a set of interrelated or interacting elements to establish policy and objectives and to achieve those objectives to direct and control an organization with regard to quality.

A properly developed and implemented quality system results in customer satisfaction; it is the essential support to corporate management and the institution's advantage in competition. It is not always necessary to introduce a system certified by ISO (International Organization of Standardization) standards, but one can use the methodology of the quality management system.

Objective of this study is to assess benefits from use of the quality management system in companies as an effective management tool for increasing productivity and competitiveness, optimization of financial and human resources and rational use of the available corporate resources.

Tasks to achieve the objective:

- analyse the dynamics of small and medium enterprises in Latvia and their impact on the economy;
- define the quality management system implementation trends in Latvia;

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- define benefits from quality management system application in companies by interviewing the institution's management.

The research period: 1<sup>st</sup> November 2017 until 1<sup>st</sup> December 2017. Due to specific and versatile nature of quality assurance and management aspects, this particular study has the following limitations: quality problems are studied, mainly, from methodological and organizational points of view; and level of education, age, social status, gender of the respondents and etc. was not taken into account in the study. Results of the managers' interviews are presented all through the content of this thesis. The following research methods are used herein: monographic or descriptive method, logical-constructive method for comparison theoretical material with the empirical results, graphical method for visual display and analysis of the summary information, document analysis for study and compiling of the internal corporate documents and questionnaires – for research of the management's and employees' satisfaction. The aim of survey was to find out the level of usage of quality management systems in enterprises. Methodological basis of the study are works of foreign (E. Deming, J. M. Juran, K. Isikava etc.) and Latvian scientists (J. Pildavs, J. Putnis, I. Reinholde), works of modern authors and publications in magazine 'Quality', which provide an insight into the latest information on trends in the field of quality management system and inform about innovations in quality management, data and reports published by the Latvian Quality Association as well as studies and statistics the International Committee for Standardization with respect to quality management system methodology and requirements.

### **1. An analytical assessment of the changes in competitiveness of Latvia's small and medium enterprises**

The prevalence of small and medium enterprises in Europe and other parts of the world increased sharply after World War II. This was largely due to war damage, high unemployment, limited opportunities for state institutions to provide social assistance to citizens and the willingness of economically active people to take responsibility for their own and employment of their peers. But more attention was paid by scholars (Johnson, 1978; Lucas, 1978; Evans, D S (1985); and others) to small and medium-sized enterprises (hereinafter referred to as SMEs) only in the second half of the twentieth century, when governments of developed countries began to actively in more goal oriented manner support the formation of new enterprises. At this time, SMEs had the opportunity of receiving public financial support for overcoming threats prevalent in the external environment, for the technical modernization of enterprises and for enhancing export capacity.

At present, more than 23 million small and medium-sized enterprises that produce goods and services worth more than 4 billion Euros operate in the European Economic System. These companies employ over 90 million economically active people from different European countries (White Paper on Small and Medium Enterprises in Japan, 2016). In the European Union and in other developed countries, SME development indicators are well above the development indicators of large companies. Thus, since 2003, the number of SMEs has increased by 20 % and the number of employees has increased by 24 %, reaching 67 % of all employees. In Japan, such group of companies employs more than 80 % of the workforce. (Japan's Policy on Small and Medium Enterprises and Micro Enterprises. Small and Medium Enterprise Agency. Ministry of Economy, Trade and Industry. 2013.). Moreover, in this country, the average number of employed people in SMEs is 9, more than 2 times the average development indicators of SMEs. Their distribution

across countries and continents reflects the cultural traditions of economic activity in each of the countries and continents, as well as national efforts to promote business development in their own country, taking into account the country's most relevant traditions and experience in other countries on this issue. The results of the research on the distribution of SMEs worldwide, their impact on the country's economic development and the competitiveness of SMEs in the local and overseas markets clearly demonstrate the need to pay more attention to the problems and solutions of small and medium-sized enterprises development in Latvia, especially in the context of the region. Therefore, it is necessary to increase the number of SMEs, their efficiency, increase productivity and development of the economy as a whole.

## 2. Assessment of the dynamics of economically active Latvian enterprises in the national economy

According to the data in Table 1, the Central Bureau of Statistics of the Republic of Latvia (CSB) offers data on changes in the number of enterprises in 17 sectors of national economy. According to the context of the research, its goals and tasks 10 sectors of the national economy including 8 classified according to the NACE - 2 classification, and 2 sectors - the industry group dominated by the processing industry and the rest of the industry group were used in the analytical evaluation of statistical data. This group combines economic sectors in which the quality management system is not considered to be an essential factor for small and medium-sized enterprises operating in these sectors.

Table 1

**Economically active enterprises in the national economy**

TSN	Change in number of active enterprises over the years (thousand)								Comparison of the change - %		
	2007	2008	2009	2010	2014	2015*	2016*	2017*	17./07.	10./07.	17./10.
<b>RN</b>	12.1	12.0	11.1	11.3	12.9	13.3	13.1	13.8	14.1	-6.6	22.2
<b>PT %</b>	x	-0.4	-8.1	2.0	14.0	3.3	-1.6	5.5	x	x	x
<b>PKN</b>	42.8	44.1	43.4	45.5	45.5	48.3	50.1	51.7	20.9	6.4	13.6
<b>PT %</b>	x	3.1	-1.5	4.8	0.1	6.0	3.8	3.2	x	x	x
<b>TS</b>	54.8	56.1	54.5	56.8	58.4	61.6	63.2	65.5	19.4	3.5	15.3
<b>PT %</b>	x	2.3	-2.9	4.2	2.8	5.4	2.6	3.6	x	x	x

Explanation of abbreviations used in the table: RN – manufacturing sector; PKN – Service sector; TS – national economy; PT – rate of increase

Source: author's calculations by using LR CSB data

The data on the dynamics of active enterprises in Table 1 and the results of calculations show that the competitiveness of enterprises operating in manufacturing sector after the crisis has changed dramatically. This is largely due to the differences in the manufactured product in various sectors of the economy and the use of these products to meet the needs of different economic participants. To a large extent, the competitiveness of enterprises was affected by support measures implemented by the government during recession. In addition, production in the manufacturing sector is more closely connected with the possibility of selling them to overseas markets, which small and medium-sized enterprises operating in the sectors used successfully by attracting money from companies in other countries.

The research first seeks to ascertain which sectors of the national economy are more attractive to start commercial activities – the manufacturing sector or the service sector. Changes in the number of new enterprises in these sectors of the national economy are shown in Table 2.

Table 2

**Newly established enterprises in sectors of the national economy**

TSN	Change in no. of newly established enterprises yearly (thousand)								Relative change - %		
	2007	2008	2009	2010	2014	2015*	2016*	2017*	17/07	10/07	17/10
<b>RN</b>	1.8	2.2	2.3	2.7	3.4	3.5	3.4	3.7	102.1	44.6	39.8
<b>PT %</b>	x	22.2	2.9	14.9	2.8	2.6	2.0	3.7	x	x	x
<b>PKN</b>	9.8	11.8	16.8	15.7	16.6	17.2	17.7	18.3	86.8	60.0	16.7
<b>PT %</b>	x	20.1	42.7	-6.6	6.3	3.5	2.9	3.3	x	x	x
<b>TS</b>	11.6	14.0	19.1	18.3	20.0	20.7	21.3	22.0	89.2	57.6	20.1
<b>PT %</b>	x	20.5	36.3	-4.0	5.7	3.3	2.8	3.3	x	x	x

*Explanation of abbreviations used in the table: RN – manufacturing sector; PKN – Services sector; TS – national economy; PT – rate of increase*

**Source: author's calculations by using LR CSB data**

The data in Table 2 convincingly point to the higher competitiveness of manufacturing sectors in attracting new entrepreneurs compared to the services sector. The increase in the number of new enterprises in this sector is more than 2 times, reaching 3.7 thousand in 2017. In turn, in the services sector, the number of these companies has increased by 1.9 times and according to the forecast, the number of such enterprises could reach 18.3 thousand. After the crisis, the relative growth of the number of enterprises in the manufacturing sector was 39.8 %, which is more than 2 times higher than the level achieved by the respective indicator in the services sector - 16.7 %. In the meantime, during recession, the services sector was able to show a better result in attracting new companies, reaching 60 %, while in the manufacturing sector, the growth rate of new start-ups was lower than 25 %. This means that the manufacturing sector was more attractive to potential entrepreneurs to reach their goals after the crisis. In essence, this is a significant result and the trends revealed clearly indicate a positive change in the manufacturing sector, especially in the field of processing.

In Latvia, the Latvian Quality Association manages the Latvian informative system and disseminates information regarding quality management systems and their effectiveness are managed and disseminated by. The organization is to a large extent the only institution that provides knowledge of quality management systems for entrepreneurs and integrates various quality approaches in the Latvian market.

### **3. Description of quality management systems in Latvia**

Quality management system consists of four main corporate areas (ISO standard requirements), which should be equivalent to efficient corporate management:

- resource management;
- document management;
- senior management responsibilities;
- corporate controls and improvement techniques (Drinke, Janovs, 2011).

Each of these areas must be particularly defined and implemented in processes in the institution. Based on the total quality management principles, there are a number of quality management models and standards developed in the world, which are aimed at excellence in performance. Excellence models and quality standards are designed as practical tools to help institutions to approach to outstanding corporate level by totally assessing actual situation, identifying strengths and weaknesses and promoting improvement and perfection.

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After introduction of the ISO, an institution can choose the most suitable development tool, Investors in Excellence or Investment Excellence (IiE), common assessment framework (CAF) developed by the European public administration, which is based on Excellence Model developed by the EFTQM - European Foundation for Quality Management (EFTQM or EFQM). The authors suggest using of this model assessment elements in the private sector as the self-assessment method to increase efficiency.

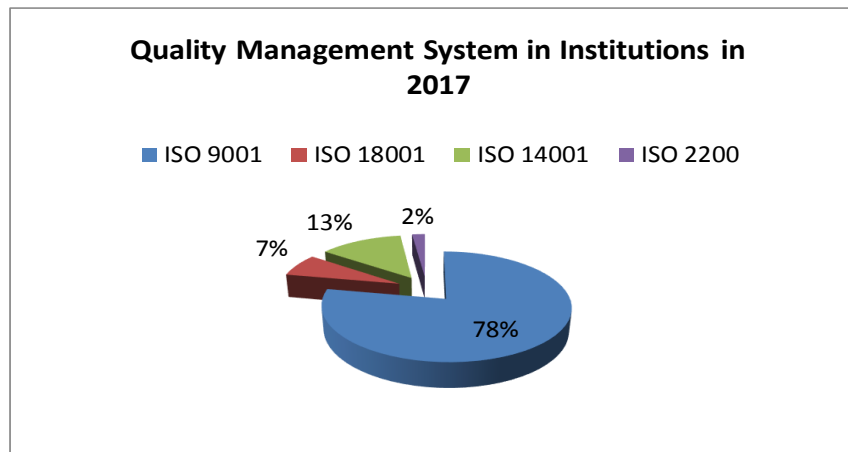
From a previous study, we conclude that in Latvia quality management system comprises **four main areas** of organization that need to be harmonised for *effective* management of the organization:

- corporate responsibility - policy, objectives, planning, quality management system;
- enterprise resource management - human resources, information, equipment
- process management - production, design, order processing, customer satisfaction;
- measurement, analysis and development - audit, process control (Driņķe, Bruksle, 2017).

Open interviews with 10 senior management representatives were performed by authors. According to the results of this study gained by interviewing the senior management, self-assessment in Latvia, unlike other European countries, is carried out if any of the ISO standards or support systems is introduced. As the main benefits of quality systems, we may mention the following:

- ability to learn from the experience of successful enterprises;
- develop productivity;
- knowledge of quality policy and quality aims;
- involvement of institution employees in assessment process, thereby motivating them to "think about what and how we can do better";
- adoption of new ideas from employees about areas to be improved;
- identification of strong areas and areas to be improved on the basis of facts;
- "best practice" identification within the institution;
- ability to hear and listen to colleagues, thus contributing to a better mutual understanding;
- assessment of all processes important for institution;
- application of the resulting conclusions to further operation and resources planning;
- cost reduction;
- internal and external customer satisfaction.

Private, public administration, non-governmental institutions have the opportunity to choose the most suitable model of control system and implement it as a practical and effective tool for performance optimization. Authors of the study, who considered a number of quality management systems, guidelines and conditions acknowledge that it is not the name of management system or the new fashion trends that are important, but what positive changes can be produced in the corporate processes ensuring a better quality of services, effective communication and satisfied customers and other parties concerned, where the relationships could be described by J. Grunig and T.Hant "two-way symmetrical model, which is aimed at mutual awareness. Symmetry is achieved between the sender and recipient of the information. Two-way symmetric model contains the feedback. It is based on dialogue"(Barrie, 2002). Since 1996, a number of different Quality Management Systems were introduced in Latvia and the most popular ones are shown in Figure No. 1.



Source: Designed by the authors using data from the Latvian Quality Association

Fig. 3. Distribution of quality management systems in Latvia in %.

Concluding, in general, there is a trend in Latvia to introduce various Quality Management Systems standards and quantity of these systems certification increases every year.

However, the implementation process is slow, which can be explained by motivation of the management and lack of knowledge about different standards and systems. According to information available to the Latvian Quality Society, in 2017, a total of 1232 companies were certified in Latvia out of which 78 % are certified according to the ISO 9001 standards, and of those 528 companies, which provide services, that is 0.8 % of all service providing companies in Latvia. The ISO 9001 standard system takes the largest share in Latvia, the ISO 14001 standard is the second most implemented standard. More and more companies choose to implement integrated management systems - one integrated system. There is not a single standard in the today's world, which can be simply applied to all institutions. It is also a positive fact, because opportunity is given to institutions to choose, which model to implement in their structures. However, everything is based on the level of interest in the process. If the management fails to show the initiative, there will not be any visible results. Ten countries of the world have the highest registered quantity of ISO certificates: China, Italy, Japan, Spain, the UK, the USA, Germany, India, France and Australia (Drinke, Janovs, 2011). Decrease in certified companies is valued negatively, because quality of services provided by companies could be low. Though it is assumed that introduction of a quality management system is an expensive process, benefits of the system, if it is properly introduced and used, are direct cost savings in the longer term as proved by many studies carried out in the world.

And finally, we want to note that, the results of interviews conducted with the senior management indicate the following competitive advantages for small and medium enterprises in introducing and maintaining quality management systems:

- profitability will increase on average by 15 % over three years;
- productivity will increase on average by 30 % over three years;
- employee satisfaction will increase;
- the number of customers will increase by 10 % compared to the previous year.

## Conclusions and Recommendations

Summarizing the research results, several conclusions and recommendations can be made.

- 1) Understanding of quality is essential for competitiveness growth in private sector.

- 2) Latvian Quality Association has to carry out training, exploratory work on the benefits of different systems and opportunities to optimise the corporate resources.
- 3) The relatively small number of institutions that introduced the quality management system can be explained by the fact that there is no understanding of effectiveness from implementation of the model, and there is no precise definition of the corporate quality objective.
- 4) Common understanding of corporate objectives is achieved by ensuring total quality management in Latvian business environment.
- 5) Implementation of quality management systems or methodologies reduces the corporate costs and ensures competitive operation.
- 6) Quality awareness is essential for increasing competitiveness of the private sector businesses.
- 7) The number of companies that implement the various quality management systems in Latvia is small. 10 countries of the world, which have the highest number of quality management system certificates can be mentioned as examples of ensuring of efficient production. This means that a properly implemented system works effectively and can ensure sustainable development.
- 8) Although Latvia has a great share of small and medium-sized businesses in the total number of enterprises, it is necessary to focus on self-efficacy and promote implementation of the quality management system methodology in businesses.
- 9) Quality management system as tool for small and medium enterprises for competitiveness increase and it is covered by client requirements.
- 10) By ensuring total quality management in Latvian business environment, common understanding of the corporate objectives can be achieved leading to the promotion of national competitiveness in the international environment and increasing productivity.
- 11) The scientific discussion of this issue will be continued in future studies.

## Bibliography

1. Barrie, G.D. (2002). *Managing Quality*. Fourth Edition. Oxford: Blackwell Publishing, pp. 519.
2. Drinke, Z. Total Quality Management Model in Public and Private Sector. *Articles of the University of Latvia* 744. Economics and Management Science. ISSN 1407-2157, 2009.
3. Drinke, Z. Bruksle, I. (2017). Quality Management System as a Global Tool for Corporate Development and Increasing Competitiveness. 17th International Scientific Conference University of Zilina „GLOBALIZATION AND ITS SOCIO-ECONOMIC CONSEQUENCES „ proceedings p. 338- 345. ISBN 978-80-8154-212-1
4. Drinke, Z. Janovs, V. (2011). Quality Management System as the Effectiveness of Operation Instruments. In: *New values for tourism and community development: proceedings of the conference at the school of business administration Turība*. Riga: Turība, CD-pp. 9l. ISSN 1691-6069
5. Drinke, Z. Janovs, V. (2011). Productivity and Quality management systems for the Organization Sustainable Development. Scientific article: Riga Technical University, scientific articles, series 14. „Sustainable development“. RTU, Riga, volume 3, ISSN 1691-6174.
6. International Organization for Standardization (2010). About ISO, 14.09. 2010. Retrieved : <http://www.iso.org/iso/about.htm>. Access: 03.01.2018.
7. Japan's Policy on Small and Medium Enterprises and Micro Enterprises. Small and Medium Enterprise Agency. Ministry of Economy, Trade and Industry. 2013.
8. Juran , J.M..( 1989). *Juran on Leadership for Quality*. An Executive Handbook, The Press. pp. 527.
9. Latvian Quality Association ( 2010). *Regarding Management Systems*, 09.09.2010. Retrieved: [http://www.lka.lv/index.php?module=Articles&cat\\_id=12&view=list](http://www.lka.lv/index.php?module=Articles&cat_id=12&view=list). Access: 12.01.2018.
10. Latvian Ministry of Economics ( 2006). *Study on Promotion of Latvian Quality Policy Development*. Riga: University of Latvia, pp. 89.
11. Regulations of the Cabinet of Ministers No. 501.04.12.2001. „Regulations on introduction of quality management system in public administration“ Riga: MK, pp. 2.
12. Pildavs, J. (2004). *Principles of Quality Management Theory*. Riga: Kamene, pp. 56.
13. Putnis, J. (2001). *ISO 9001:2000 Standard Interpretation*. Quality.- No.1, pp. 3.
14. Reinholde, I.( 2002). *Total Assessment System in the Public Administration*. Quality – No. 2, pp. 2.

15. Uchikawa, S. (2009). Small and Medium Enterprises in Japan: Surviving the Long-Term Recession. ADI Working Paper 169. Tokyo: Asian Development Bank Institute.  
Retrieved: <https://www.adb.org/sites/default/files/publication/156024/adi-wp169.pdf> Access: 07.02.2018.
16. White Paper on Small and Medium Enterprises in Japan. Small and Medium Enterprise Agency. 2016.  
Retrieved : [http://www.meti.go.jp/english/press/2016/0422\\_04.html](http://www.meti.go.jp/english/press/2016/0422_04.html). Access: 03.01.2018.



## TERRITORIALISATION OF SPATIAL DISPROPORTIONS OF INFRASTRUCTURE AND DEVELOPMENT OF RURAL AREAS OF THE SWIETOKRZYSKIE VOIVODSHIP

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**Abstract.** The region is a system in which various types of relationships between individuals and groups take place. Its activities should be considered at the spatial level (equipping with natural, economic and social resources) and organizational (activities of local authorities). The aim of the article is to assess the spatial disproportions of infrastructure based on selected diagnostic variables of rural communes in the Swietokrzyskie Voivodeship. The analysis includes a comparison of the situation of 70 units in 2010, 2012 and 2015. Equipping municipalities with infrastructure shows little variation. The value of the infrastructure measure in 2010 and 2012 ranged from 0.67 to 0.85 and in 2015 - 0.66 to 0.86. Between groups, one can capture displacements over time. Information about the entity's membership in the group is important for both the investor, the authorities of the unit and the central authorities. Infrastructure is one of the elements of creating opportunities or barriers to competitiveness.

**Key words:** infrastructure, development of the region, synthetic measure, commune.

**JEL code:** H41, H7; H72; H83

### Introduction

The region is a system in which various types of relationships between individuals and groups take place. It constitutes a separate area characterized by specific economic, functional and legal-organizational features (Borodako, 2009). According to Parysek, development can be understood as an activity for the local economy with the use of resources and taking into account the needs of the inhabitants (Parysek, 1995, p. 37). R. Brol similarly defines the local development, treating it as a harmonized systematic operation of local authority and other entities operating in the municipality aimed at creating new and improving existing utility values of the commune (Brol, 1998, p. 11). The process of diffusion from well-developed areas to weaker areas as well as polarization have an impact on local development (Pawlik, 2011). It is stimulated by the so-called growth poles. They can be local communities (Domanski 2006; Marcysiak, Prus, 2017).

Ensuring a balance of economic, social and environmental goals aimed at long-term development means basing the functioning of local and regional systems on the principle of sustainable development, which should be the goal of decisions of local authorities. The use of endogenous factors in this process (resources of the geographical environment, the structure of the economy, the state of technical and social infrastructure etc.) leads to the improvement of the general well-being of the inhabitants (Prus, Drzadzynska, 2017).

The socio-economic space of municipalities is a multi-element system, which includes local community, economic enterprises, as well as endogenous and exogenous factors. The resources of the natural environment, infrastructure, labour and capital should be mentioned here. Infrastructure is one of the elements of creating opportunities or barriers to attractiveness. Infrastructure is an element conditioning the scope, structure and spatial distribution of business operations. The high level of infrastructure equipment is considered by investors as a place beneficial for the location of economic activity (Ossowska, Poczta, 2013). The unit's operation takes place in many elements of the internal and external environment. These factors are interdependent and should be considered together.

## Data / Methods

The aim of the article is to assess the spatial disproportions of infrastructure based on selected diagnostic variables of rural communes in the Swietokrzyskie Voivodeship. The analysis includes a comparison of the situation of 70 units in 2010, 2012 and 2015. Due to the multidimensional character of the phenomenon of infrastructure competitiveness, a synthetic measure was built. Some potential variables could not be included in the group of analysed variables, because the Local Data Bank of the Central Statistical Office does not collect data on the level of municipalities (incomplete data, unavailable).

Variables were selected for analysis based on substantive criteria and data availability. They are stimulant and destimulant (Grabinski, Wydymus, Zelias, 1989). The statistical criterion of variable selection allowed to eliminate from the further research procedure features of a relatively constant level in the analysed period (due to the volatility index > 0.15) and excessively correlated (according to the reversed matrix method of correlation coefficients) (Smilowska 1997; Mlodak, Jozefowski, Wawrowski, 2016).

The method of zero-standardization was used for the comparability of variables. Stimulants were neutralized according to the formula:

$$z_{ij} = \frac{x_{ij} - \min_i x_i}{\max_i x_i - \min_i x_i} \quad (1),$$

while destimulant:

$$z_{ij} = \frac{\max_i x_i - x_{ij}}{\max_i x_i - \min_i x_i} \quad (2),$$

where:  $i=1,2,\dots,N$ ;  $j=1,2,\dots,p$  ( $N$  amount of units (communes), and  $p$  – Mount of features);  $z_{ij}$  – means the value of the neutralizing feature for the tested unit,  $x_{ij}$  – means the value of the  $j$  value of this characteristic for the tested unit,  $\max$  – the maximum value of the  $j$  of this feature,  $\min$  – the minimum value of the  $j$  value of this feature (according to the zero unitarization method) (Wysocki, Lira, 2005; Walesiak, 2005, pp. 106-118; Dziekanski, 2016, pp. 79-91).

The synthetic measure describing the infrastructure was built on the method based on the distance in the real space with the Euclidean metric (Tokarski, 2005; Dziekanski, 2017; Dziekanski, 2017a), according to the following formula:

$$OE_{it} = \sqrt{\frac{\sum_{j=1}^p (1 - z_{ijt})^2}{p}} \quad (3).$$

Synthetic measure (3) measures the distance in the actual space with the Euclidean metric from the hypothetical commune in the year  $[0; 1]$ . If the value of indicator (3) was equal to 0, then the given commune would have the maximum value of the synthetic measure. The higher the value of this indicator, the worse the financial situation of the commune.

Finally, the examined objects were divided into four quartile groups and the results were verified based on the correlation coefficient, a synthetic scattering graph was presented (Wysocki, Lira, 2005; Zelias, Malina A., 1997; Kachniarz, 2012; Dziekanski, 2017).

## Research results and discussion

The region's competitiveness is defined as the advantage over other regions being the resultant of the attractiveness of the offer addressed to current and potential users of the region, which are residents, companies, investors, guests. Its source is the modern infrastructure of the region (Stawasz, 2004, p. 203). The basic factors affecting the competitiveness of regions, alongside infrastructure, are: human capital, financial capital, natural resources, scientific research etc. (Brdulak, 2001, p. 71).

The balance of the region, which is the basis for the assessment of development (competitiveness, attractiveness), is the sum of factors that form integrated order. The development possibilities of particular regions are determined by their endogenous potentials and the exogenous environment. Territorial capital reveals the specificity of the place and its elements as well as strategic value in market competition. As T. Markowski writes, it constitutes external benefits and available as a result of interaction of users of the separated territory. It has a dynamic character in time and space of a complex club good available for users operating within the region (Markowski, 2011, pp. 25-44; Markowski, 2016).

The Local Government Act assumes that the municipality should be understood as a self-government community of a separate territory. Its task is to meet the needs of: technical infrastructure, public order and safety, as well as spatial and ecological order. The public nature of these tasks means that they have their statutory authority.

Infrastructure as a factor activating socio-economic progress is one of the determinants of living conditions of the population, creation of economic activity. Its current level is still insufficient and significant disparities persist between individual regions. It decides about the attractiveness or unattractiveness of the region. It is about opportunities or barriers to its further development (Dolata, 2013, pp. 63-67). High quality of infrastructure is conducive to development processes as well as high level of development of business entities increases the processes of expansion and modernization of infrastructure and the entire region (Satola, Luty, 2016, 101-102).

In the Swietokrzyskie Voivodeship one can observe a clear division into the industrial north of the region and the agricultural south and east (with gardening and orchard elements). The voivodship's industry was shaped in close connection with the existing resources of rock, chemical and energy resources. The metallurgical, machine and food industries also play an important role. This voivodship is a region with a clean natural environment that has valuable tourist values, which puts it in a group of attractive tourist districts.

The synthetic measure of infrastructure indicates a different level of the examined units. It shapes its economic character of the unit (industrial, agricultural), financial independence, level of own revenues, local taxes or expenses. The value of the infrastructure measure in 2010 and 2012 ranged from 0.67 (Pawlow, the best unit, Starachowice powiat) to 0.85 (Slupia (Konecka), the weakest unit, the Konecki powiat) and in 2015. 0.66 (Pawlow) to 0.86 (Slupia (Konecka)). Between groups, one can capture displacements over time. Information about the unit's membership in the group is important both for the investor seeking location for the company and may have practical significance for both the authorities of the unit and the central authorities (Table 1).

The diversity of the units of the studied rural communes in the Swietokrzyskie Voivodeship in the analysed area of infrastructure is stable. This is indicated by both the standard deviation (0.04 in subsequent years), the value of the range (0.18, 0.18, 0.19). The coefficient of variation from 0.04 to 0.05, decreased slightly over the period under consideration (Table 2).

Table 1

**Classification of communes by the measure of the synthetic financial situation in 2010, 2012 and 2015**

Groups	2010	2012	2015
<b>Group A very good</b>	1 Pawlow 0.67 3 Samborzec 0.71 13 Pacanow 0.75	1 Pawlow 0.67 3 Samborzec 0.70 11 Pacanow 0.74 15 Solec-Zdroj 0.75	1 Pawlow 0.66 2 Samborzec 0.70 22 Pacanow 0.76 23 Solec-Zdroj 0.76
<b>Group B good</b>	20 Iwaniska 0.77 21 Lopuszno 0.77 25 Solec-Zdroj 0.77 26 Wodzislaw 0.77 27 Wojciechowice 0.77	21 Iwaniska 0.77 22 Klimontow 0.77 23 Lopuszno 0.77	24 Klimontow 0.77 25 Lopuszno 0.77 45 Wodzislaw 0.79 46 Zlota 0.79
<b>Group C weak</b>	44 Zlota 0.79 47 Gowarczow 0.8 48 Imielno 0.8 50 Klimontow 0.8 53 Slupia 0.8	46 Wodzislaw 0.79 47 Wojciechowice 0.79 48 Zlota 0.79 50 Gowarczow 0.80 51 Imielno 0.80	47 Imielno 0.8 48 Iwaniska 0.8 58 Slupia 0.81 59 Wojciechowice 0.81
<b>Group D bad</b>	61 Bejsce 0.82 67 Moskorzew 0.83 70 Slupia (Konecka) 0.85	60 Bejsce 0.82 66 Slupia 0.82 69 Moskorzew 0.84 70 Slupia (Konecka) 0.85	60 Bejsce 0.82 61 Gowarczów 0.82 69 Moskorzew 0.84 70 Slupia (Konecka) 0.86

Position / powiat / value of a synthetic measure; the table presents the best and the weakest in the year, and units by sorting in 2015; earlier years according to communes presented in 2015. The synthetic measure was built based on variables describing: the length of the active water distribution network (s), water consumption in households in total per capita (d), distribution network per 100 km<sup>2</sup> water supply network (s), distribution network for 100 km<sup>2</sup> sewerage network (s), distribution network for 100 km<sup>2</sup> gas network (s), forest land area (s), legally protected areas (s), natural monuments (s) and water consumption for the needs of the national economy and population (d).

Source: author's calculations based on Local Data Bank of the Central Statistical Office

Table 2

**Differentiation of the synthetic infrastructure measure**

Measures of differentiation	2010	2012	2015
<b>average</b>	0.78	0.78	0.78
<b>median</b>	0.78	0.78	0.79
<b>standard deviation</b>	0.04	0.04	0.04
<b>coefficient of variation</b>	0.04	0.05	0.05
<b>min</b>	0.67	0.67	0.66
<b>max</b>	0.85	0.85	0.86
<b>gap</b>	0.18	0.18	0.19
<b>quarterly division</b>	0.04	0.05	0.05
<b>slant</b>	-0.75	-0.71	-0.62
<b>measure of concentration-kurtosis</b>	0.62	0.62	0.56

Source: author's calculations based on Local Data Bank of the Central Statistical Office

In the rural communes group of the Swietokrzyskie Voivodeship, there is a positive correlation dependence between the synthetic index of infrastructure and the measure of development in subsequent years. The correlation value between the indicated measures was 0.517 (in 2010), 0.614 (in 2012) and 0.638 (in 2016), which indicates the growing role of infrastructure in the process of changes in the region. In the analysed period, we had to deal with convergence (Pearson's coefficient 2015-2010 - 0.869), and the spatial differentiation according to the examined measures was quite stable (Table 3).

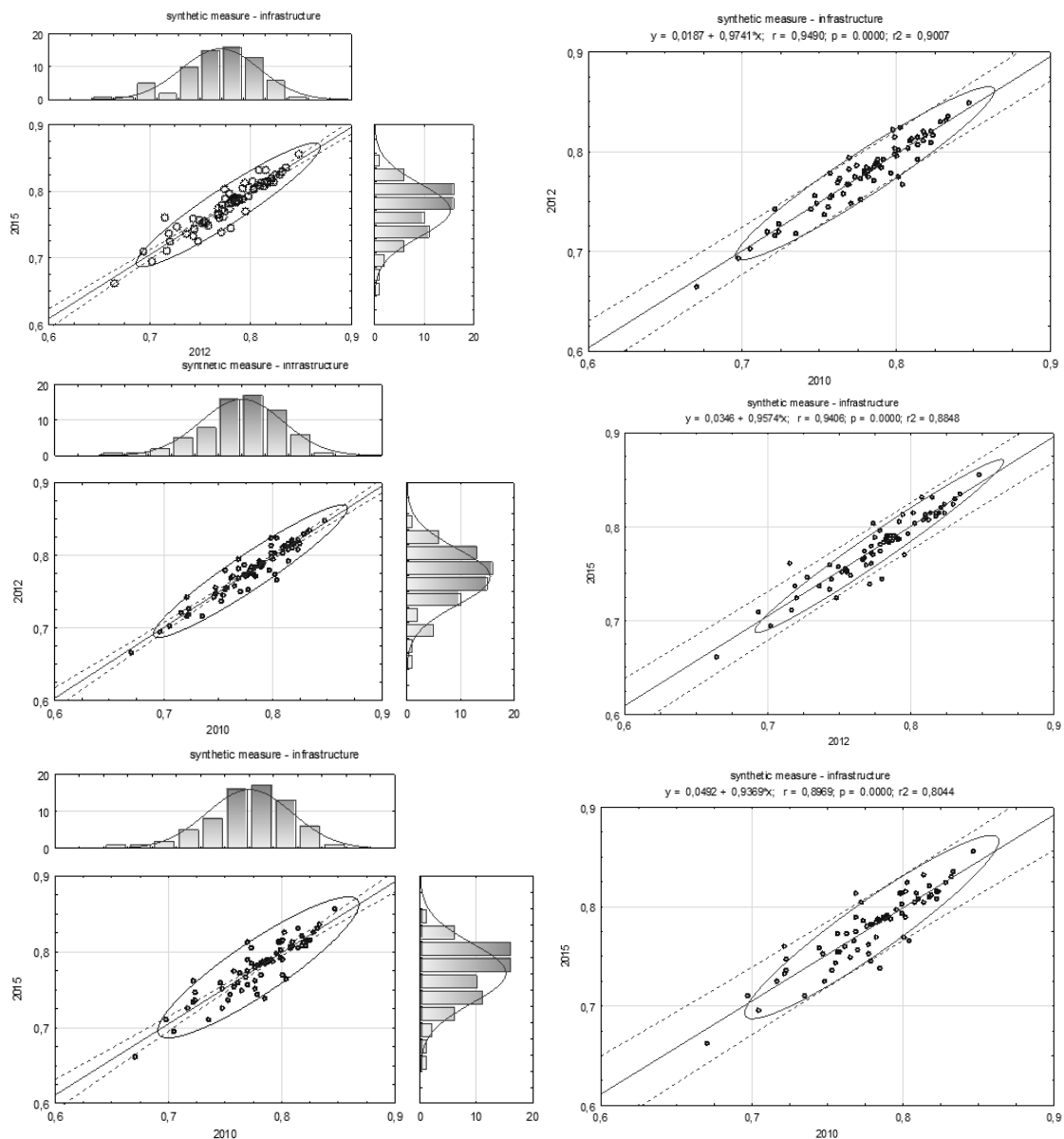
Table 3

**Correlation of synthetic measures of infrastructure and development  
 (2010, 2012, 2015)**

Year of correlation	Gamma correlation coefficient	Spearman's correlation coefficient	tau Kendall's correlation coefficient	Pearson's correlation coefficient
<b>Si 2010-2012</b>	0.783	0.912	0.778	0.949
<b>Si 2012-2015</b>	0.805	0.936	0.799	0.940
<b>Si 2015-2010</b>	0.732	0.874	0.726	0.869
<b>Si – Sr 2010</b>	0.343	0.483	0.339	0.517
<b>Si – Sr 2012</b>	0.432	0.588	0.427	0.614
<b>Si – Sr 2015</b>	0.473	0.650	0.468	0.638

*Si synthetic measure - infrastructure; Sr synthetic measure - development*

**Source: author's calculations based on Local Data Bank of the Central Statistical Office**

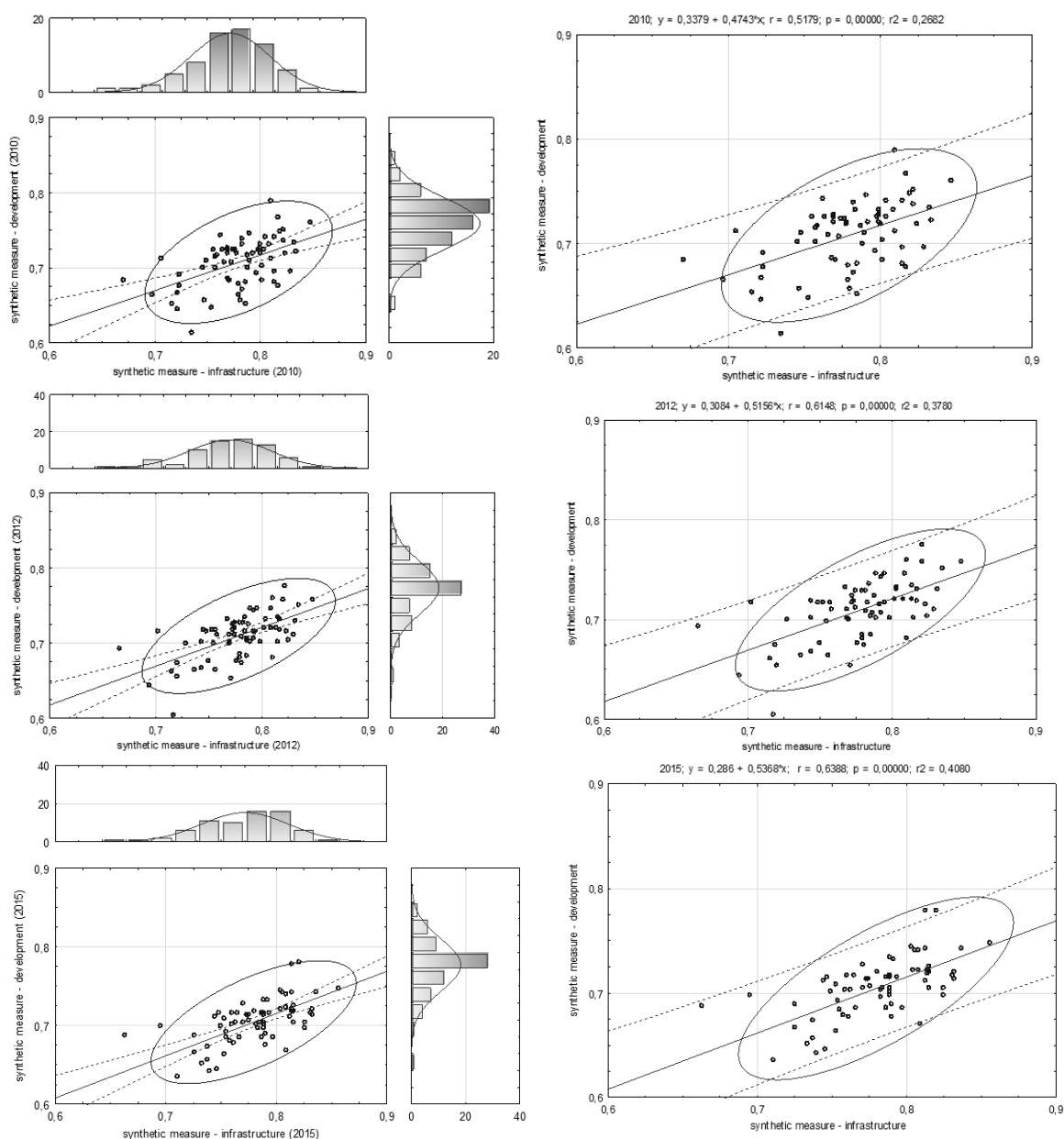


**Source: author's calculations based on Local Data Bank of the Central Statistical Office**

**Fig. 1. The relation of synthetic measures year to year with adjusting the regression line  
 (YEAR TO THE YEAR. METHODS)**

Figure 1 presents correlograms describing the relationship between the synthetic measures of infrastructure in subsequent years. It was subject to the convergence period in 2010-2015 (Pearson's correlation coefficients in the analysed time period and the level increased). The location of individual municipalities in a graph in one large group may also indicate that they are statistically similar to each other.

The analysis of the scatter graph indicates that the increasing value of the coefficients is accompanied by a change in the position of the points that are getting closer and closer to the straight line. Figure 2 presents correlograms describing the relationship between infrastructure level and development. They were subject to convergence in 2010-2015 (Pearson's correlation coefficients in the analysed period of time and the level increased, 2010 -  $r = 0.517$ , 2012 -  $r = 0.614$ , 2015 -  $r = 0.638$ ). Measures indicate a similar level of infrastructure equipment and stability of its level over time.



Source: author's calculations based on Local Data Bank of the Central Statistical Office

Fig. 2. Relation of synthetic infrastructure and development

## Conclusions, proposals, recommendations

- 1) The socio-economic potential of the poviats is a kind of synthesis of four components: economic, social, technical and ecological potential. A competitive region is one that allows the creation of ever-new structural combinations through the use of its human and material resources. This must be supported by infrastructure and a complex system of relations operating in the region (Klamut (ed.) 1999, p. 7).
- 2) The process of an individual's activity or its development takes place in a multidimensional space, creating a network of mutual connections and acting for the benefit of a given community. They shape measures of a financial, economic nature, technical infrastructure, social infrastructure, public order and safety, spatial order and ecology.
- 3) The effectiveness and efficiency of municipalities depend to a large extent on the rational identification and use of variables in time and space. They also shape their inner diversity in a given economic and social situation.
- 4) The value of a synthetic measure depends on the number and type of adopted variables to be tested. It can be used by local authorities to evaluate the effectiveness of past development instruments used. It allows to assessing disproportions between individual units.
- 5) The indicated method gives a comparative image between objects subjected to analysis. It allows indicating weaker and better areas of the unit's operation. In the case of low spatial aggregations, we encounter data deficits most often caused by the lack of data representativeness.
- 6) The value of the infrastructure measure in 2010 and 2012 ranged from 0.67 to 0.85 and in 2015 0.66 to 0.86. Between groups, one can capture displacements over time. Information about belonging to a group is important for both the investor, the authorities of the unit and the central authorities. The inclusion of the synthetic measure indicated by the author gives the opportunity to look at the development processes, competitiveness or the studied phenomenon from a broad perspective, taking into account the different contexts of the functioning of the studied species.

## Bibliography

1. Borodako, K. (2009). Foresight w zarządzaniu strategicznym (Foresight in strategic management), C.H. Beck, Warszawa.
2. Brdulak, J. (2001). Problemy rozwoju regionalnego (Problems of regional development). Dom Wyd. Bellona, Warszawa, p. 71.
3. Broł, R. (1998). Rozwoj lokalny – nowa logika rozwoju gospodarczego (Local development - new logic of economic development). In *Gospodarka lokalna w teorii i praktyce (Local economy in theory and practice)*, AE, Wrocław, p. 11.
4. Dolata, M. (2013). Infrastruktura gospodarcza jako czynnik kształtujący rozwój regionu (Economic infrastructure as a factor shaping the region's development). *Roczniki Naukowe Stowarzyszenia Ekonomistów Rolnictwa i Agrobiznesu*, 15, z. 3, p. 63-67.
5. Domanski, R. (2006). *Gospodarka przestrzenna (Spatial economy)*, PWN, Warszawa.
6. Dziekanski, p. (2017a). Economic effectiveness of the activities of local self-government units in the light of the municipality financial resources. *Scientific bulletin of Polissia*, nr 3 (11), P. 1, pp. 76-82.
7. Dziekanski, p. (2016). Spatial changes and assessment of the financial condition of local government units in the context of the income structure. In Formankova S., *International Conference on Management (ICoM), Trends of Management in the Contemporary Society (Peer-Reviewed Conference Proceedings)*, Brno, Publisher Mendelova univerzita v Brně, pp. 153-156.
8. Dziekanski, p. (2017). Diversification synthetic indicator for evaluating the financial capacity of local government. The case of polish voivodeships. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*. Volume 65 Number 2., pp. 79-91.
9. Grabinski, T., Wydymus, S., Zelias, A. (1989). *Metody taksonomii numerycznej w modelowaniu zjawisk społeczno-gospodarczych (Methods of numerical taxonomy in modeling socio-economic phenomena)*, PWN, Warszawa.

10. Kachniarz, M. (2012). Efektywność usług publicznych – teoria i praktyka (Efficiency of public services - theory and practice). Wyd. UE we Wrocławiu, Wrocław 2012.
11. Klamut, M. (ed.) (1999). Konkurencyjność regionów (Competitiveness of regions). Wyd. AE im. O. Langego we Wrocławiu, Wrocław, p. 7.
12. Marcysiak, T., Prus, P. (2017). Life strategies of rural inhabitants of unfixed economic function. In Proceedings of the 26th International Scientific Conference Agrarian Perspectives XXVI "Competitiveness of European Agriculture and Food Sectors", Czech University of Life Sciences Prague, Faculty of Economics and Management, pp. 212-218.
13. Markowski, T. (2011). Funkcjonowanie gospodarki przestrzennej – założenia budowy modelu zintegrowanego planowania i zarządzania rozwojem (Functioning of spatial management - assumptions of building an integrated planning and development management model). In System planowania przestrzennego i jego rola w strategicznym zarządzaniu rozwojem kraju (The spatial planning system and its role in the strategic management of the country's development), Studia KPZK PAN, t. CXXXIV, Warszawa, p. 25-44.
14. Markowski, T. (2016). Kapital terytorialny jako cel zintegrowanego planowania rozwoju (Territorial capital as the goal of integrated development planning). Mazowsze Studia Regionalne, nr 18.
15. Młodak, A., Jozefowski, T., Wawrowski, L. (2016). Zastosowanie metod taksonomicznych w estymacji wskaźników ubóstwa (Application of taxonomic methods in estimation of poverty indicators). Wiadomości Statystyczne, R. LXI, nr 2.
16. Ossowska, L., Poczta, W. (2013). Poziom uwarunkowanie pozaprzrodniczych renty położenia obszarów wiejskich w Polsce (The level of conditions for non-environmental pensions of rural areas in Poland). Journal of Agribusiness and Rural Development, 4(30).
17. Parysek, J.J. (1995). Rola samorządu terytorialnego w rozwoju lokalnym (The role of territorial self-government in local development). In Rozwój lokalny: zagospodarowanie przestrzenne i nisze atrakcyjności gospodarczej (Local development: spatial development and niches of economic attractiveness). ed. J.J. Parysek. PWN, Warszawa, p. 37.
18. Pawlik, A. (2011). Zróżnicowanie rozwoju społeczno-gospodarczego w województwie świętokrzyskim (Diversification of socio-economic development in the Świętokrzyskie province). Wiadomości Statystyczne, nr 11, PTS, GUS, Warszawa, pp. 60-70.
19. Prus, P., Drzazdzynska, K. (2017). Farmers' Assessment of Training Services and the Impact of Agricultural Advisory on Selected Developmental Factors Affecting Farming. In Proceedings of the International Scientific Conference "Economic Science for Rural Development", Latvia Univer. of Agriculture, Jelgava, No. 44, pp. 338-344.
20. Satola, L., Luty, L. (2016). Poziom wyposażenia w infrastrukturę komunalną a sytuacja finansowa gmin (The level of equipment in municipal infrastructure and the financial situation of municipalities). Metody Ilościowe w Badaniach Ekonomicznych, Tom XVII/2, p. 101-102.
21. Stawasz, D. (2004). Ekonomiczno-organizacyjne uwarunkowania rozwoju regionu - teoria i praktyka (Economic and organizational conditions for the development of the region - theory and practice). Wyd. UL, p. 203.
22. Smiłowska, T. (1997). Statystyczna analiza poziomu życia ludności Polski w ujęciu przestrzennym (Statistical analysis of the living standards of the Polish population in spatial terms). Studia Prace, Z Prac Zakładu Badan Statystyczno-Ekonomicznych GUS i PAN, Zeszyt 247, Warszawa.
23. Tokarski, T. (2005). Statystyczna analiza regionalnego zróżnicowania wydajności, zatrudnienia i bezrobocia w Polsce (Statistical analysis of the regional diversity of productivity, employment and unemployment in Poland), Wydawnictwo PTE, Warszawa.
24. Walesiak, M. (2005). Problemy selekcji i wazenia zmiennych w zagadnieniu klasyfikacji (Problems of selecting and weighing variables in the classification issue). Prace Naukowe AE we Wrocławiu, Taksonomia 12, p. 106-118.
25. Wysocki, F., Lira J. (2005). Statystyka opisowa (Descriptive statistics), Wyd. AR, Poznań.
26. Zeliński, A., Malina, A. (1997). O budowie taksonomicznej miary jakości życia. Syntetyczna miara rozwoju jest narzędziem statystycznej analizy porównawczej (On the construction of a taxonomic measure of the quality of life. The synthetic measure of development is a tool for statistical comparative analysis). Taksonomia z. 4



## SUSTAINABLE RURAL DEVELOPMENT THROUGH IMPROVING WATER SUPPLY IN MOUNTAIN HUTS

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**Abstract.** Among the issues of the public services of economic interest, the water supply of urban and rural localities (areas where investment in this sector is limited) is of particular importance in maintaining social cohesion, raising the quality of life and ensuring sustainable development. The purpose of this analysis is to propose solutions for insuring and improving the water supply of isolated consumers in mountain rural areas, which is why a mountain tourist mountain hut has been chosen for this study. In this context, this paper addresses as a solution for the sustainable management of natural resources the use of rainwater. It is proposed to redesign the sanitary installation so that plumbing items that do not require drinking water can be fed through a separate installation. The proposed solutions are based on a comparative analysis of the microbiological parameters and the quality indicators between precipitation water and spring water with which the mountain hut is fed by an individual system. It is concluded that the recovery, storage and the use of the rainwater plays an important role in ensuring the supply of drinking water for the mountain cabin during periods when the water flow of the spring is low (in winter) and it contributes significantly to saving the freshwater resource in the area where the mountain hut is located.

**Key words:** rural development, water supply, rainwater harvesting, mountain huts.

**JEL code:** O18, R00, Q56, Q57

### Introduction

The White Paper has introduced a new concept of democratic partnership between different levels of government in Europe and it deals with issues of public services of general economic interest and water supply and sewerage, considering them to be of particular importance for maintaining social cohesion, raising quality of life on the European continent and ensuring sustainable development (Romanian Water Association, 2009). Given that water is an important natural resource and the amount of rainfall decreases, a responsible use of rainwater in an ecological and natural way is a solution for sustainable management of the natural resources. The specialized literature provides extensive information regarding forecasts on the global water potential (Graham, 2006; Liu, 2009; Liu, 2010; Falkenmark, 2006; Foris, 2017; Rockstrom, 2015; Tokar, 2016; Vorosmarty, 2000). Although Romania's water resources potential is of 6450 m<sup>3</sup>/year/person, a figure much higher than the European average of 4000 m<sup>3</sup>/year/person (Romanian Water Association, 2009),

In Romania, the drinking water supply for the inhabitants of rural settlements is not completely assured through centralized water supply systems. Generally, in areas with significant hydrographic potential and large accumulations of water, potable water supply and distribution networks have been built with own or European funds, but there are still settlements, especially in the hill and mountain areas, where villagers use water from their own individual systems (fountains, springs etc.). Generally, the investments were made where there were large human agglomerations, and the rural localities with few households have not come to the attention of the authorities. (Bocioaca C., 2017). It is important to bear in mind that the public water supply and the sewerage services play a vital role in improving the quality of life of all citizens and in combating social exclusion and isolation, and there is no need to distinguish between urban or rural localities, large ones or those with few households or between the ones in the lowlands or those in the highlands.

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Therefore, increasing the access of the population to these services, regardless of the type of locality, is absolutely necessary.

The article analyses the improvement of the water supply of isolated consumers in the mountain areas, which is why it refers to the tourist mountain huts. The tourist lodge is a relatively low capacity touristic structure, functioning in an independent building, with a specific architecture that ensures accommodation, food and other specific services necessary to the tourists who are hiking or resting in mountain areas, in natural reservations, near spa resorts or other touristic objectives (Order 65/2013, Annex 1.3). The classification of the mountain huts in Romania is mandatory and is made on stars, according to three categories of classification, 1, 2 and 3 stars respectively. The sanitary equipment is one of the sets of mandatory minimum criteria for the classification of the mountain huts. For this purpose, in the 3-star category, the rooms have to have a bathroom (bowl with shower, wash-basin and WC) of at least 25 %, common sanitary group in the cabin, separated by gender, consisting of: 1 shower cabin with hot water/cold for 15 persons; in the 2 and 1-star category, it must have common sanitary unit in the cabin, separated by gender, composed of: 1 WC cabin for 10 persons (separated from the ones serving the public catering unit), 1 washer with washbasin with hot water, hot/cold for 10 persons. In the 1-star category, dry towel and outside washers are also available, powered by natural sources or reservoirs. Another mandatory minimum criterion involving water supply is its existence within the cabin of a public catering establishment involving a hot/cold water sanitary group, except for the 1-star cabins located in hard-to-reach areas where they also allow meals to be prepared and served.

In Romania, mountain huts were built almost in all mountain areas, but most of them have deteriorated over time or simply disappeared. The authors chose for this study a tourist mountain hut from The Postavaru Mountains, which is not supplied with water from public systems and operates both in winter and summer, and which is visited by a large number of tourists. The Postavaru Massif is part of The Curvature Carpathians, forming together with The Piatra Mare Massif The Barsa Mountains Group. It is located between the Intra-Carpathian Depression of Brasov, over which it rises at 1200 m and the steep northern slope of The Bucegi Mountains (The Postavaru, Great ..., 2018). In The Postavaru Massif, there are currently five tourist mountain huts.

The study was conducted for The Postavaru Hut - Julius Römer Hutte, situated in The Postavaru Mountains, in the Poiana Brasov area, the largest and the most popular ski resort in Romania. It is necessary to mention the fact that the water supply of the cabin is made by an individual system using a nearby spring as a source of water. One problem of providing the necessary amount of water in the mountain hut is the reduced water flow of the source used (spring) in the winter. For this reason, the paper analyses the solutions that can be adopted for the water supply of The Postavaru Hut - Julius Romer Hutte. As the basis of this study, the authors have used hydrological, climatic, meteorological information and analysis of the quality indicators for the potential water sources from which the mountain hut can be fed (The Postavaru, Great ..., 2018). Given the rather limited existence of the water sources in the area, meteoric waters can be an alternative to replacing a quantity of drinking water needed for the cabin's own consumption or supplementation if the incoming flow rate used does not cover the water demand for consumption. All of this information has been used to determine whether the recovery of the meteoric water can be a sustainable solution for the water supply of the cabin during periods when the flows of the natural sources in the area are insufficient.

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## Research results and discussion

The Postavaru Hut - Julius Romer Hutte was founded in 1883 and is situated in The Postavaru Massif at an altitude of 1604 m (5262 ft) (Fig. 1).



Fig. 1. The Postavaru Hut - Julius Romer Hutte

The Postavaru Mountains are part of The Curvature Carpathians and are developed on Cretaceous conglomerates. Hydrological information indicates that The Postavaru Mountains are drained by a hydrographic network with many waterfalls and a series of shorter tributaries. The higher courses are intermittent, they have a torrential character, presenting in longitudinal profile numerous cascades and slopes. In the parts where the waters pass through limestones or screes, they are lost underground only to appear downstream as powerful springs. The highest flows are recorded in spring, in April and early summer, due primarily to the melting of the snow and of long-lasting rain that find water-saturated soil. In the summer, during torrential rains, short but powerful floods can be formed, which can aggravate access on the valleys. At the end of the summer and autumn, the streams have the lowest debits due to reduced rainfall (Mountain Guide Postavarul ..., 2018). Based on these considerations, it can be concluded that the storage of meteoric waters collected during periods of abundance of precipitation is a solution for ensuring the water demand for isolated buildings, as is the case with The Postavaru Hut.

The annual rainfall amounts vary between 1100 mm in the Postavaru high section and 700 mm at the foot of the mountain. The highest rainfall falls in June (100-140 mm), and the lowest in September and February. In general, spring and early summer are the rainiest periods (Mountain Guide Postavarul ..., 2018). Although the first snowfall can be recorded in some years in September, the continuous snow blanket usually begins laying in October and may last until the end of April in Poiana Brasov. In the high part of Postavarul, snow can last about 200 days a year, which is about 55 % of the calendar year (Mountain Guide Postavarul ..., 2018).

The mountain hut has a capacity of 100 seats with rooms for 2-6 persons equipped with bathrooms or shared bathrooms and a dining room with kitchen serving 100 people. Considering the technical condition of the meteorological water collection and discharge facility (Fig.2), investments are needed at least for the rehabilitation of this type of installation. In this context, the solution of redesigning of the indoor sanitary facilities was analysed so that the sanitary items that do not require drinking water (toilet tanks, both for the bathrooms of the accommodation rooms and for the sanitary groups adjoining the dining room, the maintenance of the hygienic sanitary facilities in the building, washing machines etc.) to be fed by a different installation from the drinking water supply (washbasins, washers, showers, bathtubs etc.).

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Fig. 2. **Highlights of the technical state of the meteorological water collection and evacuation system**

As mentioned above, the amount of precipitation varies greatly between the four seasons, but the annual rainfall being estimated at 1100 mm, in the high section of Postavaru, where the mountain hut is located, it offers considerable potential for supplying the mountain hut. Studies conducted for the period 2090-2099 for the assessment of the rainwater regime in Romania indicate for the climate models that more than 90 % of them will be affected by drought in the summer (with deviations higher than 20 % compared to the reference years 1980-1990) , and for the winter periods, the deviations are lower, but the uncertainty is higher (Guide on adapting ..., 2008). The collection and storage of the meteoric waters is the proposed option for the water supply of the sanitary items that do not require drinking water during the winter, when the water flow of the spring, which represents the water supply of the mountain hut, is low, failing to meet the water requirements.

In order to assess the possibility of using rainwater, an analysis of the physico-chemical and bacteriological parameters of the collected water from rainwater collecting and evacuation facilities was carried out. Considering the proposal for the use of collected meteorological waters, only for sanitary objects that do not require potable water consumption, the following water quality indicators were analysed: nitrates, nitrites, PH, ammonium, chlorides, total number of germs (NTG) at 22° C and 37° C, coliform bacteria, E-coli bacteria and Enterococi. The water samples were collected in plastic containers and analysed in the laboratories of The Public Health Directorate (DSP) Brasov (Water quality indicators ..., 2018), RENAR accredited laboratories.

Considering that the collected water is not used immediately, a storage being required, the water samples were analysed 12 hours after collection and then after 7 days of storage. The sample analysed after 7 days was stored in plastic containers in the dark at a temperature of 0° C. The storage temperature was set at 0° C given that the underground storage capacity of the storage tanks (under 1.5 m in the area under consideration) is quite limited taking into account the large differences in the curvature level of the mountain hut site. Although there are solutions to avoid water frost, the underground storage of tanks under frost is also recommended for keeping water quality (microorganisms do not develop). In this study, the water quality was analysed

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globally, the results of the analyses being interpreted by reference to national water quality limits (Puchianu, 2015). It is necessary to emphasize that for the internal sanitary installations for water supply of WC tanks and washing machines, it is not necessary for the water to meet drinking conditions; however, the parameters analysed in this study are part of the parameters required for quality assessment of the drinking water. For a comparative assessment of rainwater quality, analyses were also carried out on a sample of water collected directly from the internal sanitary water system in its own water supply system that captures a spring.

Table 1 presents the results of the Quality Indicators in which the maximum admissible concentrations (MCAs) are specified in accordance with 458/2002 Law on drinking water quality, with subsequent modifications and completions or the limit of quantification (LOQ), as well as the method used.

Table 1

**Quality indicators and microbiological parameters of meteoric water and drinking water**

Quality indicator	Measured value (UM)	Admissible values (UM)	Method
<b>Sample rainwater collected - stored for 12 hours</b>			
<b>Total hardness</b>	2.34 German degree	Min.5	SR ISO 6059/2008
<b>Nitrates</b>	2.8 mg/l	50 mg/l	Fast test Spectoquant NOVA
<b>Nitrites</b>	0.24 mg/l	0,5 mg/l	SR EN 26777:2002/C91:2006
<b>PH</b>	5,9	6.5-9	SR ISO 10523:2012
<b>Ammonium</b>	0.32 mg/l	0.5 mg/l	Fast test Spectoquant NOVA
<b>Chlorine free-chlorine</b>	7.0 mg/l	250 mg/l	SR ISO 9297:2001
<b>NTG la 22° C</b>	19 ufc/100 ml	100/ml	SR EN ISO 6222:2004
<b>NTG la 37° C</b>	17 ufc/100 ml	20/ml	SR EN ISO 6222:2004
<b>Sample rainwater collected - stored for 7 days</b>			
<b>Total hardness</b>	2.75 German degree	Min.5	SR ISO 6059/2008
<b>Nitrates</b>	1.8 mg/l	50 mg/l	Fast test Spectoquant NOVA
<b>Nitrites</b>	0.35 mg/l	0,5 mg/l	SR EN 26777:2002/C91:2006
<b>PH</b>	6.4	6.5-9	SR ISO 10523:2012
<b>Ammonium</b>	0.32 mg/l	0.5 mg/l	Fast test Spectoquant NOVA
<b>Chlorine free-chlorine</b>	12.6 mg/l	250 mg/l	SR ISO 9297:2001
<b>NTG la 22° C</b>	21 ufc/100 ml	100/ml	SR EN ISO 6222:2004-
<b>NTG la 37° C</b>	18 ufc/100 ml	20/ml	SR EN ISO 6222:2004
<b>Drinking water sample collected from the water supply plumbing of the mountain hut</b>			
<b>Total hardness</b>	2.55 German degree	Min.5	SR ISO 6059/2008
<b>Nitrates</b>	3.4 mg/l	50 mg/l	Fast test Spectoquant NOVA
<b>Nitrites</b>	0.37 mg/l	0.5 mg/l	SR EN 26777:2002/C91:2006
<b>PH</b>	6.4	6,5-9	SR ISO 10523:2012
<b>Ammonium</b>	0.37 mg/l	0.5 mg/l	Fast test Spectoquant NOVA
<b>Chlorine free-chlorine</b>	7.8 mg/l	250 mg/l	SR ISO 9297:2001
<b>NTG la 22° C</b>	24 ufc/100 ml	100/ml	SR EN ISO 6222:2004-
<b>NTG la 37° C</b>	18 ufc/100 ml	20/ml	SR EN ISO 6222:2004

In addition, along with the water quality indicators and water microbiological parameters presented in Table 1 for the water samples, the presence of coliform bacteria, E-coli bacteria and enterococci were also analysed. The analysis did not indicate the presence of these microbiological parameters in any of the analysed samples.

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Considering that the proposed solution for the use of meteoric waters does not imply the supply of sanitary objects requiring drinking water, the low value of the total hardness for all analysed samples cannot be interpreted as a disadvantage. It is well known that low water hardness values are favourable to the proper operation of water supply facilities by reducing the risk of deposits on the installations' piping. There is, however, an increase in total water hardness after 7 days of storage.

The recorded values for nitrates, nitrites, ammonium and chlorides fall below the detection limits, with close values between meteoric water and spring water. Although there is an increase in chlorine value after 7 days of storage for the rainwater sample, this is well below the permissible limit and there are no grounds for concern for the corrosion of the meteorological water pipe installations.

The PH analysis indicates a slightly acidic character, which does not adversely affect the decision to collect, store and use meteoric waters. After analysing the test results for the number of colonies at 22° C and 37° C, it appears that this parameter does not show any abnormal change for the analysed samples. For meteorological water samples, a slight increase in colonies counts is observed at 37° C between the 12-hour analysis and the 7-day storage. The presence of mesophilic flora in the water allows the assessment of the sanitary conditions and of the drinking water quality, but the values do not exceed the admitted value; therefore; there are no reasons to apply water chlorination methods.

In conclusion, with the exception of the total hardness, the water quality for the three samples subjected to the laboratory analyses, falls within the limits of the drinking capacity stipulated by the law and there are no notable differences between the values of the quality indicators and the microbiological parameters between the two sources of water (meteoric water and spring water). As far as the total hardness of the water is concerned, the classification below the limit stipulated by the law does not mean that it does not meet drinking conditions, but it indicates that it is low mineralized.

### **Alternative solutions for water supply of the mountain huts**

The results of the microbiological parameters and quality indicators for the collected water samples are the main factor that has been taken into consideration when proposing solutions that provide an efficient water supply system for the mountain cabin. Other relevant factors that have been considered relate to the amount of the rainfall associated with the area and the potential of freshwater sources in the area.

The constructive solutions of the rainwater facilities, collected through gutter and drainage systems and stored in the underground or above ground tanks, can be made either by direct feeding of sanitary items from the underground/above ground storage tank or from an extra high tank located in the cabin floor where the water gets pumped from the underground/overground storage tank. In the case of a solution with an extra high tank, it will operate automatically when the water level in the underground/ overground storage tank is low. The control system is programmed to fill the network storage tank when there is not enough rainwater collected. For these installations, which supply the sanitary items in buildings, it is advisable to capture rainwater from the roofs of buildings through gutter and pipe systems. In order to maintain the quality of the collected water on the roof, it is necessary to inspect and clean the collection system periodically.

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The water frost problem in the collection system pipelines during the cold periods of the year can be avoided by installing the heater cable defrosting systems. These systems are mounted on the rooftops and on gutters with automation systems that start the heater system when sensing ice formations that can clog the rainwater collecting systems. Experimental studies on defrosting systems indicate their effectiveness (Langlois, 1999; Rusen, 2017).

Collecting rainwater from the ground is more problematic because it can be contaminated and will require additional cleaning. However, contamination cannot be a problem if rainwater is only used to water plants or clean outdoor terraces, and if it is also used to supply sanitary items in the buildings, it needs treatment according to contaminants. In the case of roof-collecting, simple, non-disinfecting filtration is sufficient to allow rain water to be used to wash the floors of the cabin, to fill the toilet tanks and to feed the washing machines. The filters can be positioned on the rainwater collection system or in the underground tank, depending on the most economical option. The efficiency of a filter mounted on the rainwater collection system is high when the meteor shower is clean, but it will drop significantly if it is not cleaned regularly. The storage tanks will be placed underground as priority because light and high temperature favour the bacterial growth. However, annually, tanks should be inspected to check for sludge accumulation and need to be washed with calcium hypochlorite. To raise water pressure in the sanitary installations of using reused water, pumps are required. From the point of view of the safety of the supply of the sanitary plumbing requiring drinking water, the rainwater utilization facilities will be appropriately marked and no connections will be made between these installations and the sanitary facilities that supply sanitary plumbing that requires drinking water. The description of the solutions is basic so they can be complemented with safety and automation elements, depending on the local situation, the area where it is installed and the type of sanitary items.

### **Conclusions, proposals, recommendations**

- 1) A sustainable development implies the preservation of ecosystems, and their protection is conditional on sustainable development. Through its essential coordinates, the strategy of environmental protection is therefore found in the strategy for sustainable development of urban and rural localities.
- 2) The water protection measures – as a vital resource - are defined in close connection with the economic development policy and with the medium and long-term economic and social forecasts. The society and the economy must work, and the protection of freshwater and, implicitly, the environment must be done at all costs.
- 3) The study was conducted to exemplify the improvement of the water supply of an isolated consumer from a mountain area, which is why it refers to tourist mountain huts. In order to establish an efficient solution in terms of reduction of fresh water consumption, as well as to ensure the necessary of the water supply in the mountain hut, the opportunity to use rain water was used as a source of water supply. In this respect, the analysis of the pluviometric potential in the area, where the mountain hut is located, as well as the microbiological parameters and the rainwater quality indicators, show the meteoric water as a potential source of water supply.
- 4) The study shows that the meteoric water meets the drinking conditions, but for the safety of the consumers, it is proposed to redesign the indoor sanitary facilities so that the sanitary items that do not require potable water supply are fed through a separate plumbing, as long as there

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is a sufficient quantity of collected and stored rainwater, as well as the possibility of supplying water from the drinking water supply system.

- 5) In strategies for the development and modernization of the public water service infrastructure, especially in the mountain rural localities, where there are often isolated consumers such as the mountain huts, it is necessary for the local authorities to develop their own strategies to ensure these consumers with appropriate and affordable quality services by promoting technical solutions correlated with the latest technologies.
- 6) In conclusion, the authors consider that the recovery, storage and the use of rainwater can play an important role in increasing the water security and it contributes significantly to saving freshwater resources in water-shortage and dry areas.

## Bibliography

1. Bocioaca, C. (2017). Water - A Priority for the Villages, but not for the Mountains. World Village Magazine. No. 3, pp. 52-53.
2. Falkenmark, M., Rockstrom, J. (2006). The New Blue and Green Water Paradigm: Breaking New Ground for Water Resources Planning and Management. Journal of Water Resources Planning and Management. Vol. 132. No. 3, pp. 129-132.
3. Foris, D., Plesca, M. (2017). Sustainable Tourism through the Protection of Sweet Water Resources in Mountain Area. Bulletin of the Transilvania University of Brasov. Series II: Forestry Wood Industry Agricultural Food Engineering • Vol. 10 (59) No.1, pp. 107-112.
4. Graham, J. (2006). Integrating Blue and Green Water Flows for Water Resources Management and Planning. *Physics and Chemistry of the Earth, Parts A/B/C*. Vol. 31, No. 15-16, pp. 753-762.
5. Guide on Preparation of Master Plans for Water and Wastewater Projects. (2007). Bucharest: MESD, p. 34.
6. Guide on adapting to the effects of climate change. Ministry of Environment and Sustainable Development – MMDD (2008). Retrieved: <http://www.monitoruljuridic.ro>, Access: 26.01. 2018.
7. The Strategy for Sustainable Development of Public Water Supply and Sewerage Services "Romania 2025". (2009). Bucharest: Romanian Water Association - ARA, p. 47.
8. Langlois, D. (2018). Fire Investigation Involving Electrical Heating Cable. Retrieved: <https://iaeimagazine.org>. Access: 28. 01. 2018.
9. Liu, J., Yang, H. (2010). Spatially Explicit Assessment of Global Consumptive Water Uses in Cropland: Green and Blue Water. Journal of Hydrology, Vol. 384. No.3, pp. 187-197.
10. Liu, J., Zehnder A. J, Yang, H. (2009). Global Consumptive Water Use for Crop Production: The Importance of Green Water and Virtual Water. Water Resources Research. Vol. 45, No. 5, pp. 1-15.
11. Mountain Guide Postavaru Mountains. Retrieved: [http://www.carpati.org/ghid\\_montan/muntii/-56/hidrografie/](http://www.carpati.org/ghid_montan/muntii/-56/hidrografie/). Access: 30.01.2018.
12. Order no. 65/2013 For the approval of the methodological norms regarding the issuance of certificates for the classification of the tourist accommodation structures with functions of accommodation and public catering, licenses and tourism certificates.
13. Puchianu, G., Necula, V., Enache D.V., Necula V. (2015). Research on Microbiological Quality of Drinking Water Used in Some Establishments Slaughtering and Processing of Food of Animal Origin from Brasov County. The 3rd North and East European NEEFOOD Congress on Food. Global and Local Challenges in Food Science and Technology. Brasov, Romania.
14. Rockstrom, J., Lannerstad, M., Falkenmark M. (2006). Assessing the Water Challenge of a New Green Revolution in Developing Countries. Proceedings of the National Academy of Sciences of the United States of America. Vol. 104. No. 15, pp. 6253-6260.
15. Rusen, A. M., Scurtu, A., Craciun, A. (2017). Alternative Methods for De-Icing Dangerous Parts of the Road. Energy - Resources - Environment of the Students from Oradea. Oradea, Romania.
16. Stănescu, R., Sene, M., Volintiru, C. (2012). European Policies Guide, Brochure No. 4 - Environmental Policy. European Institute of Romania. 29 p.
17. The Postavaru, Great Stone and Baiului Mountains. Retrieved: <http://muntii-nostri.ro/munte/muntii-postavaru-piatra-mare-si-baiului/>. Access: 29.01.2018.
18. Tokar, A. (2016). Sanitary and Gas Installations. Part I. Timisoara: Politehnica, p. 333.
19. Tokar, A., Negoitescu, A. (2015). Treatment Solutions for Rainwater Contaminated with Various Pollutants. Annals of the University "Eftimie Murgu" Resita. Vol. XXII. No. 1, pp. 405-414.
20. Vorosmarty, C. J. Green, P., Salisbury, J., Lammers, R. (2000). Global Water Resources: Vulnerability from Climate Change and Population Growth. Science. Vol. 289. No. 5477, pp. 284-288.
21. Water Quality Indicators - Analysis Report. Public Health Directorate Brasov - PhD Braşov. (2018). p. 1.

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## REFLECTIONS IN THE SETTLEMENT PATTERN AND LANDSCAPE OF SOVIET MILITARY ACTIVITIES IN ZVĀRDE PARISH (LATVIA)

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**Abstract.** A landscape develops through the interaction of natural factors and human economic activities, and accordingly is influenced by changes in the economic, political and social spheres. The article examines changes in settlement in Zvārde Parish during the 20th century and the reflection in the landscape of the activities of the USSR's armed forces and the military legacy. Zvārde Parish was the location of one of the Soviet armed forces' largest military training grounds in Latvia: a former bombing range. This rural area was relatively densely populated in the early 20th century, with a landscape dominated by managed farmland surrounding individual farmsteads, separated by clumps of forest, roads and lakes. Along with the establishment of the military range, the residents were forced to abandon their homes, and the military exercises lasting several decades completely interrupted farming as well as all other peacetime economic activities. Forest developed in the abandoned areas, along with meadows and fields overgrown with scrub. Nowadays, agricultural land has been established only in limited areas. A significant part of the former bombing range is nowadays taken up by protected natural areas. At the present day the parish is sparsely populated, except for its north-western part, which was located outside of the range. The half-collapsed military facilities preserve visual evidence of the former training ground.

**Key words:** military heritage, landscape change, population centres, Zvārde, parish, Latvia.

**JEL code:** N131

### Introduction

A landscape develops and changes over time through the interaction of natural factors and human economic activities. The natural conditions constitute the basis, determining and influencing the visual image of the landscape, the settlement pattern and the spatial division of different forms of land use. Changes in the economic, political and social sphere also have an effect on the landscape. In Latvia, in the 20th century such critical developments (Melluma, 2010; Melluma, 2012) impacting on the landscape include the destruction of the First and Second World War; the Soviet period with the establishment of collective farms, extensive land improvement work, elimination of individual farmsteads and the formation of villages; and the land reform and advent of the real estate market at the end of the 20th century (Melluma, 2010; Grīne, 2009; Grīne et.al, unpublished). Changes in land use affect the visual value of the landscape (Bell et al., 2010; Nikodemus et al., 2005). The settlement pattern also has an important role in the changes occurring in the landscape and land use (Roca et al., 2011).

In the Soviet period, present-day Latvia had over 500 military sites (Upmalis et al., 2006; Military heritage). The establishment and functioning of these military sites affected the settlement structure and environment and, being a non-traditional form of land use, also had an effect on the landscape as a whole. Following the withdrawal of the Soviet forces, Latvia has been left with a military legacy that has a range of functions – some of the former military sites are utilised by Latvia's National Armed Forces, while others form part of *Natura 2000* protected natural sites (Grīne et.al, unpublished). Although the former military sites are now mostly owned by the municipalities, many are abandoned, unmanaged and freely accessible. Some have been included in tourist routes, witnesses to the history of the socialist period, while some may be dangerous because of contamination with ordnance (Military heritage).

The **aim** of the study is to assess the changes in settlement pattern and landscape since 1950 in Zvārde Parish, the location in the years 1953-1993 of one of the USSR's largest military areas in Latvia – an aviation bombing range.

## **Materials and methods**

The study is based on analysis of cartographic material, statistical data and archive material along with the results of fieldwork and internet resources (publications). The main information sources are topographic maps (scale 1:75 000, 1:50 000 and 1:25 000), satellite maps (scale 1:50 000 and 1:25 000) and orthophotographs, providing information about the area in the 20th century and about the present-day situation, as well as the Corine Land Cover 2006 and 2012 data. Information about the parish before establishment of the range comes from documents in the State Archive of Latvia and the Museum of the Occupation. It needs to be borne in mind that the statistical data for the 1930s and the Soviet period relate to the area within the administrative boundaries of Zvārde Parish as they were at that time; even so, they help to provide a picture of the area (Grīne et.al, unpublished). In the course of the study, fieldwork was conducted in 2011, 2012 and 2015-2017, involving photographic recording and a survey of the residents in 2015 that included 63 people (one individual from each household). Spatial analysis was conducted and new maps created using the GIS software *ArcView 10*.

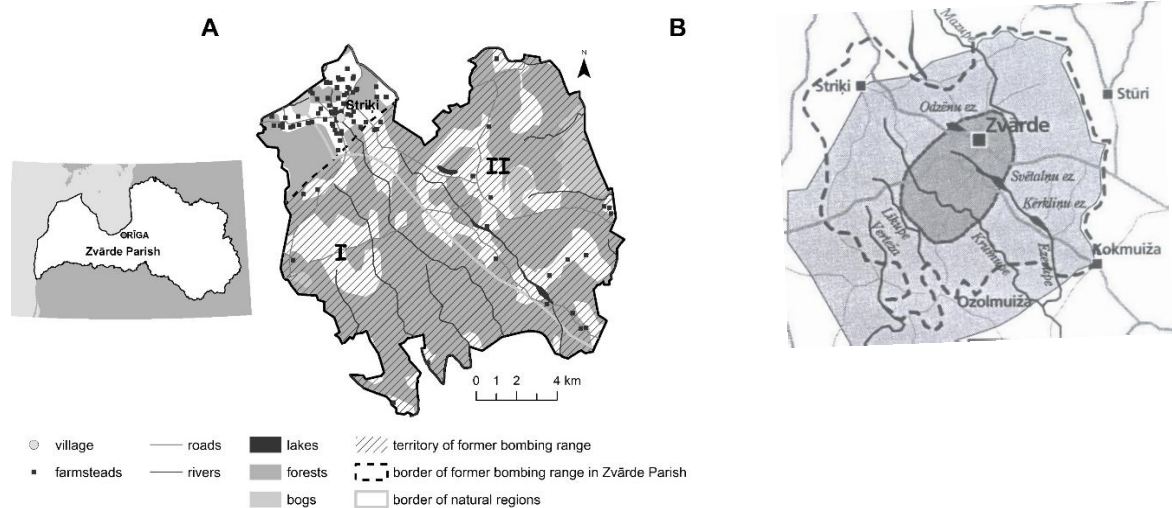
## **Main research results**

### **Characterisation of Zvārde Parish.**

Zvārde Parish is located in the southern part of western Latvia, in Saldus Municipality, about 10 km from Saldus. The former Zvārde aviation bombing range (area: 24 418.5 ha) (The Zvarde base; LR MP lēmums) occupies about 89 % of the area of the parish, and about 75 % of the bombing range lies within Zvārde Parish. The bombing range and the parish as a whole span two divergent areas that differ in terms of relief and height above sea level: the hilly Eastern Kursa Upland and the flat Central Latvia Lowland (Fig. 1A). The relief and geological structure are significant natural factors behind differences in the natural landscape and land use between the lowland and the upland area. The differences in the degree of relief dissection give rise to different drainage and growing conditions. The dominant soil parent material, namely carbonaceous glacial till, is a significant factor, ensuring soil fertility in well-drained areas.

According to statistical data, Zvārde Parish had a population of 334 in 2017 and a population density only 1.6 inhabitants per km<sup>2</sup>. The population is concentrated mainly in the north-western part of the parish, outside the limits of the former bombing range. Based on data from the catalogue of addresses, in 2017 the parish had 124 populated locations (farmsteads) and a single village – the parish centre at Striķi, home to about 20 % of the parish population. According to planning documents, Striķi and Zvejnieki have been given the status of villages (Saldus novada teritorijas ..., 2012-2013).

According to data from the population survey (2015), about 47 % are 1-2 person households, and 40 % are 3-4 person households. The survey data indicate that 32 % of respondents have lived in the parish since birth, 52 % have lived here for more than 20 years, and 16 % for less than 20 years. Respondents who have moved to the parish mention the following as the main reasons: factors relating to the family or work, the purchase of a landholding, or better living conditions. The three main factors indicated by respondents as motivating them to stay in the parish are: property ownership, peace and quiet in the countryside, and the family (Grīne, Beneža, 2016).



Legend: I – Central Latvia Lowland; II – Eastern Kursa Upland. Hatched area: the former extent of the bombing range. light grey – area of the range; dark grey – active bombing zone

Source: A. author's calculations based on *Envirotech Latvija 10.2 gdb*; B. after Štāls, 1996

Fig. 1. A. Location of the study area and Zvārde Parish. B. Scheme of Zvārde bombing range (after Štāls, 1996).

### Characterisation of the parish during the time of use of the bombing range

The decision to create an aviation bombing range was taken in 1953, and resulted in the 15th Air Army obtaining use of an area of more than 24 thousand ha (Sprūde, 2011; LR MP lēmums Nr. 329) (Fig. 1B). The territory of the bombing range became a zone closed to the civilian population. Two collective farms established in the 1940s were abolished. As a result, Zvārde Parish was divided into two areas with radically different functions: 1) the area outside the bombing range and 2) the area within the range.

**The north-western part of Zvārde Parish** is a small area that was inhabited during the Soviet period. The largest population centres were Striķi, which was the centre of a collective farm (with 157 inhabitants according to statistical data from 1989), as well as Zvejnieki (population in 1989: 52) and Liepas (population in 1989: 34). In terms of buildings and economic activity, the situation was similar to that of other rural areas of Latvia. The landscape includes the historic buildings of Striķi Manor as well as an apartment house from the Soviet period at Striķi and Līvāni-type houses at Striķi, Zvejnieki and Liepas. A characteristic feature from the Soviet period is the presence of large farms in the environs of the major population centres, where economic activities were concentrated.

**The area of the parish that fell within the bombing range** developed according to a different scenario. The roads were closed, and the inhabitants had to leave their homes, being resettled in adjacent parishes. During the time the range was in use only a small number of farmsteads continued to exist, mainly at the edge of the range, in its south-eastern part. Several historical cemeteries were destroyed during the time of existence of the range, the largest of these being the Rīteļi cemetery (Upmalis et al., 2006).

In order to conceal the military activities, the area was marked on maps from the Soviet period not as a bombing range but as a forest district with a non-Latvian name that is completely out of place in western Latvia, namely the "Morozov Forest District".

During the time when the Zvārde military range was active, it can be divided approximately into three zones.

- 1) The active bombing or target zone, which took up about 1.8 thousand ha in the central part of the range. All economic activities in this zone were discontinued, with the exception of ploughing, which made it easier for the airmen to identify their targets (Beneža, 2015). The populated locations and the elements of the cultural landscape that had been preserved up to that time were destroyed. Rīteļi cemetery became a target area for air strikes. Although the bomb craters were filled and levelled every year, within the active bombing zone the farmland was turned into terrain filled with bomb craters, earthworks and mock military facilities that served as bombing targets. As noted in other publications, targets included farms, churches, cemeteries, roads and other elements of the infrastructure. Bombs and rockets often landed in adjacent areas as well, within a radius of 5-10 km from the centre of the bombing zone (Grīne et.al, unpublished).
- 2) Adjacent to the active bombing area was a zone where new military facilities were built and where the historical buildings were placed in the service of the military (Lāce, 2017), thus introducing new features into the landscape. A military unit stationed at the historical population centre of Lapsas had the task of setting up targets and directing bombing runs within the range, and ensuring that civilians did not enter the range. At Zvārde Manor a three-storey building was erected on an artificial mound, used to direct the air force training exercises. Radar facilities were set up on an artificial hill nearby. For the needs of the military, buildings were also erected at Lake Odzēni (Grīne et.al, unpublished).
- 3) The zone of limited economic activity: here the military undertook forestry work and created a gravel quarry. Grazing of animals and hay-mowing were permitted in small areas at the margin of the bombing range, mainly in the south-eastern and eastern parts of the range. Apart from this, hay-mowing was necessary to maintain the bombing range, preventing the growth of long grass that would ignite from the bombing and cause wildfires (Beneža, 2015). Because of this, the area did not become overgrown with scrub and forest: albeit at a limited scale, the land was managed. Since there were essentially no checkpoints on the small roads in the south-eastern part of the range, civilian residents as well as soldiers would illicitly gather cranberries in the Zvārde and Stūri bogs. Soviet officers would use the visually attractive landscape of meadows and forests around Lake Ķerklīni as a recreational area (Grīne et.al, unpublished).

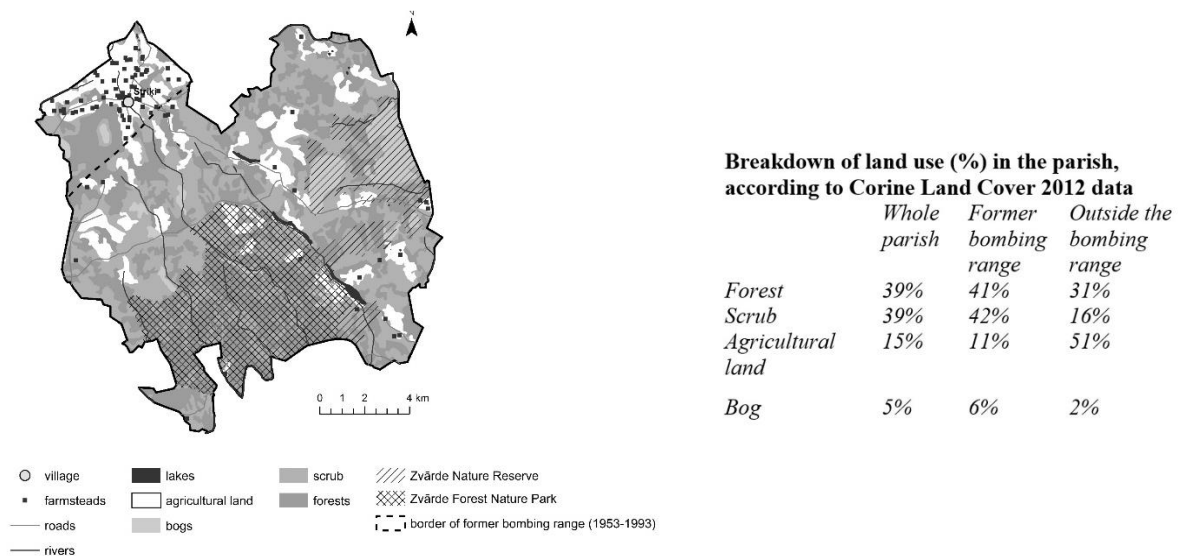
As indicated by the cartographic material, in 1970-1980 forest cover in the area of the bombing range reached about 75 %, with agricultural land taking up about 13 %. This is confirmed by the recollections of local residents: "In 1972 ... all the land was overgrown with impenetrable forest. Only the locations of the farms were marked by scraggy lilac shrubs and withered apple trees" (Upmalis et al., 2006).

Zvārde bombing range was closed in 1993 (Tooma, 2004). According to the statistical data, in 1994 the parish had a population of 386, or 1.9 inhabitants per km<sup>2</sup>. Since the closure of the range, Zvārde Parish has been a sparsely populated area. The population of the parish is eight times lower today than it was in 1935.

Even today, differences in the settlement pattern remain between the former area of the bombing range and the north-western part of the parish, outside the range. Thus, farms and villages are mainly concentrated in the north-western part of Zvārde Parish. In the former area of the range, there are no more than 20 farms, most of them in the south-eastern part (Fig. 3), in areas with a visually attractive landscape.

The land use pattern is closely related to the divergent settlement pattern. **Outside the area of the range** there is a landscape of unbroken farmland surrounding the population centres, namely Striķi, Zvejnieki and Liepas, whereas the western part has extensive tracts of forest.

The **former bombing range** presents a mosaic landscape consisting of forest and clumps of trees, alternating with abandoned farmland overgrown with scrub. Most of the area of the former range is occupied by forest, primarily deciduous and coniferous/small-leaved. There are small patches of coniferous forest in a boggy area in the eastern part of the range and to the south of the bogs. Most of the farmland is overgrown with forest and scrub. Farmland constitutes separate "islands" in the south-eastern part of the range: around Lake Ņerkliņi and Jaunzvārde, where limited economic activity was permitted during the time of the bombing range, as well as in the central part of the range (around Rīteļi, Veczvārde and Vītiņceplis) and in the western part (around Sāti and Lapsas) (Fig. 2). In the central part of the range, there are subglacial lakes surrounded by trees and scrub. Only in places have farmsteads been re-established, with farmland around them. The ruins of churches, former manor buildings and farms constitute landscape elements here and there, hidden in the scrub and trees. The roadways divide the area into separate sections; these are the main routes along which people traverse the terrain, and they provide the immediate visual impression of the parish landscapes. Because of the extensive forest and scrub, the mosaic landscape with newly-established farms is not visible, and the natural as well as artificial features remain concealed. Thus, for example, the main thoroughfares do not provide a view of the scenic hilly landscapes and the deep depressions, within which Lakes Ņerkliņi and Svētaiņi lie.



Source: author's calculations based on map 1:50000 scale satellite map and Corine Land Cover 2012

Fig. 2. Zvārde Parish in the 2000s

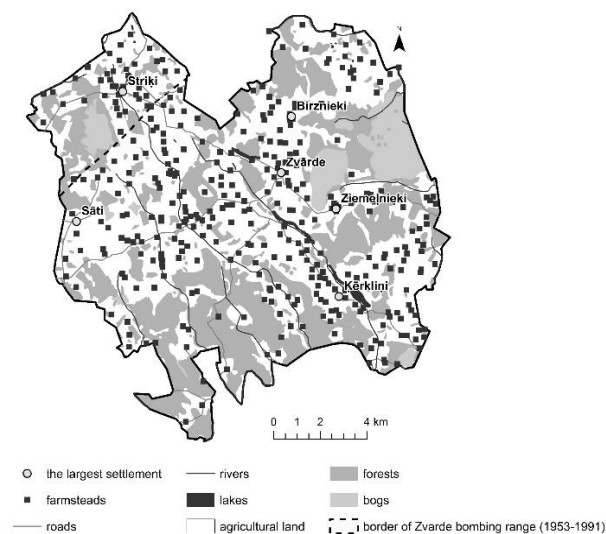
In order to maintain biodiversity, the Zvārde Nature Reserve was set up in the eastern part of the former range in 1999, encompassing tracts of bog and forest as well as Lake Ņerkliņi and its environs. In 2004, the Zvārde Forest Nature Park was established in the southern part of the former range. Both protected natural areas are included in the *Natura 2000* network of protected areas of the EU and are important for migratory birds and as a habitat for rare and protected birds.

## Discussion

### The parish before establishment of the bombing range

The main factors affecting the landscape and population structure in Zvārde Parish after 1950 are: establishment and use of the aviation bombing range during the Soviet period, as well as closure of the range and land reform following the restoration of Latvia's independence.

In order to better understand the changes occurring since 1950, it is necessary to consider the situation in the area before the bombing range was established. In the 1930s, Zvārde Parish was more densely populated than today (Fig. 3). The parish had 503 populated places in 1935, with 3117 inhabitants (census and statistical data), the population density reaching 15.3 inhabitants per km<sup>2</sup>. The major population centres were Zvārde, Strīķi and Ķerkliņi. In 1940, Zvārde Parish had about 510 populated locations, of which more than 80 "old farms" are mentioned in church registers starting from 1708 (material in Lapsas Museum; Lāce, 2017).



**Source:** author's calculations based on map 1:75000 scale topographic map

Fig. 3. Zvārde Parish in the 1920s

The mosaic landscape consisted of individual farms, groups of farms and manors, areas of forest and clumps of trees, tracts of bog, lakes and roads. Populated locations were dispersed throughout the area – along the watercourses and major roads, and in the vicinity of the lakes (Fig. 3).

In the early 20th century, more than 60 % of the area of the parish was taken up by agricultural land (within the present administrative boundaries; within this area, the territory of the later bombing range had about 58 % agricultural land) (Fig. 4). Soil fertility provided one of the preconditions for Zvārde's position in the 1930s as one of the most agriculturally developed parishes of Kuldīga County. As recalled by local residents, "Up to the outbreak of the Second World War, the parish had a large number of wealthy farms, substantial houses and well-tended fields" (Jermaks, 2012; Grīne et al., unpublished).

About 36 % of the total area of Zvārde Parish was covered by forest. The largest tracts of forest were in the south-western part of the area as well as in the eastern part, surrounding the bogs. The main sources of income in Zvārde Parish in the time of independent Latvia were connected with agricultural production: stock-keeping and cereal farming.

During the Second World War, the fighting of 1944–1945 destroyed about 90 % of the buildings, including farms and historical buildings. The ruined houses had to be rebuilt, either

repaired or built anew (Lāce, 2017). Only in the north-western part around Strīķi were farms and outbuildings preserved, and here large farms were subsequently established in the period of collective farming (Lāce, 2017); this area was later excluded from the bombing range. According to statistical data from, Zvārde Parish had a population of 1.7 thousand in 1946, which fell to 1.5 thousand in 1949, in the wake of the deportations (archive sources).

From the outbreak of the Second World War up to the present day the proportions of the different components making up the land use and landscape mosaic have changed markedly.

It is important to consider such facts as the reduction of the area of agricultural land **within the area of the range** from about 58 % before establishment of the range to only about 11 %. The area of agricultural land has fallen more than five times, whereas the extent of forest has increased from 36 % to about 59 % in 2006 (41 % in 2012). This pronounced reduction in agricultural land in an area of fertile soils is in itself a pointer to major historical developments. Changes in the parish are indicated not only by statistical data but also by cartographic material and photographs, which permit comparison of the landscapes before the Second World War with those of the present day. In the 1930s, the landscape included many farms and manors with occasional clumps of forest and trees, whereas nowadays the landscape is constituted mainly of forest tracts and scrub, surrounding lakes, bogs, roads and the ruins of historic cultural sites. The presence of the former farms, landholdings and historical sites is indicated only by ruins overgrown with scrub and trees, along with lilac and apple trees, as well as the farm names appearing on old maps, and information stands and historical photographs. After the Second World War, agricultural land could have been taken back into use, but this was interrupted by the establishment of the Zvārde aviation bombing range during the Soviet period. In contrast to the rest of the parish territory, farmland within the range could not be utilised for at least 40 years (during the life of several generations). This is sufficient time for the former arable land to change into forest, and for meadows to become overgrown with scrub. Witnesses to the former bombing range include half-collapsed military facilities, such as the mound with the ruins of the observation tower. Also testifying to the functioning of the bombing range is the overgrown meadow with bomb craters and a few crosses next to Rīteļi cemetery. The military heritage at Lapsas is in use today: there is a shooting-range (SIA *Zvārdes šautuve*), a museum room has been created in the former barracks, and other buildings have been adapted for economic purposes – as a sawmill (Grīne et.al, unpublished).

In the hilly terrain of **the parish as a whole** the open landscape with agricultural land and farms has been replaced in the 20th century by a mainly closed landscape of forest, scrub and overgrown meadows. Only some of the hilltops provide a wide, clear view of the surroundings – for example, the artificial mound, where scrub is gradually reducing the panoramic view. Those areas of the landscape not being managed or cultivated are becoming overgrown. There is a landscape of farmland only in the northern part of the hilly area – where economic activity also occurred in the Soviet period.

Within the hilly area a lake landscape and a bog landscape may be distinguished, these having a major role in biological and landscape diversity. The lake landscape is formed by subglacial lakes: the Lakes Ķerkliņi, Svētaiņi and Odzēni and the environs, with forest and small areas of farmland. Cartographic material shows that in the 1920s and 1930s all three lakes were clearly visible from the Kokmuiža-Strīķi road, whereas today there are wide belts of vegetation along the lakes, with forest and scrub, and access to the lakes is limited because of private land ownership. Farmsteads have been re-established along the Lake Ķerkliņi, and farmland has been created around them; the

lake landscape is gradually being managed, reducing the area of scrub. However, the managed lake landscape can be reached only by a very limited number of people, because the private land is not accessible to tourists. The bog landscape has seen little change: here, natural processes occur more slowly and human impact is not significant.

In the flat landscape of the Central Latvia Lowlands, roads play a significant role, constituting boundary areas between separate blocks of the landscape. In the early 20th century, most of the area consisted of a mosaic landscape dominated by agricultural land, whereas now in the southern part of the plain the landscape is formed by forest tracts, with small bogs in places. The farmland, left uncultivated for 60 years, has become overgrown with forest and scrub. Agricultural land now forms small "islands" within tracts of forest.

Whereas the establishment of the bombing range, along with the elimination of settlement and economic activities, was instituted by means of a single decision, the re-establishment of settlement and economic activity after closure of the range has been a gradual process. The former owners regained their lands in the course of the land reform of the 1990s. About 350 former owners and their heirs wished to regain their properties, and about 130 requested compensation (Virbicka, 1993). Many homes had been destroyed in the war and during the time the range was in use. Houses had to be built anew, which required financial means as well as equipment and a great deal of work. Because of a shortage of funds and equipment, only a small proportion of the former farms have been re-established, rebuilding the houses and taking up farming again (Štāls, 1996; Jermaks, 2012; Grīne et.al, unpublished).

The lack of roads also affected the resumption of economic activities. Saldus-Striķi-Kokmuiža road was re-established only in the mid-1990s thus providing partial access to this area. Other roads have been built by forest owners in order to facilitate forest management. Power lines have also had to be re-established.

According to visits in the field and data from the survey of residents (2015), agriculture is mainly being practiced today in the area that remained outside the bombing range. There are only a small number of large farms, and their owners are leasing land in order to augment their farming activities. The landowners are mainly engaged in farming, forestry and beekeeping, with dairy and sheep farming on some holdings. Respondents also named cereal farming, stock farming and beekeeping as branches of agriculture with potential for development in the parish. These results confirm the idea expressed in other studies that the farmers themselves connect the development of rural areas with the development of farming (Latvijas lauku telpas ..., 2012). Survey data indicate that agricultural land is mainly being managed in order to maintain a tended landscape (40 %), provide for the family (25 %) and receive EU direct payments (17 %). EU agricultural policy directly or indirectly influences land use and the development of the rural landscape (Bell et al., 2010; Penēze, 2009), along with the maintenance of landscapes. EU payments promote the maintenance of agricultural land, but do not always promote agricultural activity (Ruskule, 2013; Vanwambeke et al., 2012). Apart from this, 25 % of respondents indicate that they are not engaged in agriculture.

Agriculture and forestry are also hampered by soil contamination with fine metal splinters and unexploded ordnance in the active bombing zone as well as outside it. The bombing range has still not been completely cleared of unexploded bombs. Even in 2011-2015, unexploded Soviet ammunition as well as shells from the Second World War were discovered. This contamination extended within a total area of about 12 thousand ha (Driķe, 2001; Svetoka, 2012; Ozola, 2015).



This means that the area is contaminated and dangerous for local residents and tourists alike, and it is the reason why agricultural land remains uncultivated in many areas.

Economic activities within the former bombing range are also limited because of the establishment of the Zvārde Forest Nature Park and the Zvārde Nature Reserve, intended to preserve the undisturbed natural assets and biodiversity. It is the beautiful scenery, the attractive hilly landscape with lakes and the historical heritage that provide significant potential for the development of tourism.

## **Conclusions**

- 1) Visual evidence of the period before establishment of the bombing range and the time it was in use as well as cartographic information indicate that the main influence on landscape changes has been the Zvārde range, which interrupted normal life and economic activity for more than 40 years.
- 2) The reduction in populated places and the interruption of economic activities has brought about an increase in areas overgrown with forest and scrub at the expense of former agricultural land. Open landscapes with farmland and farms have generally been replaced with closed forest landscapes and scrub.
- 3) Nowadays, economic activities – both agriculture and forestry – can be undertaken throughout the area of the range, except for the former bombing zone and the nature reserve and nature park, where economic activities are still restricted today.
- 4) The territory with lakes and adjacent forest tracts and open areas, including farmland, constitutes a mosaic hilly landscape, one of the most attractive in the Eastern Kursa Upland, offering a significant resource for tourism and recreation.
- 5) The extensive overgrown belts around the lakes as well as the restricted access to them because of private land ownership hinder the development of tourism and the public environmental education. The area has an insufficient tourist infrastructure.

The former Zvārde bombing range is regarded as a unique legacy of military activity, with important cultural history sites. The historical churches and manors, and the devastated Rīteji cemetery testify to the attitude of an alien power and ideology towards the local population and their culture. The cemeteries overgrown with scrub and forest within the area of the Zvārde range are also a consequence of military activity, whereas vandalism in the cemetery of Sili, which took place after closure of the range, is not due to the Russian military. The cultural and natural sites in Zvārde Parish, along with the experience that has been built up and the information brought together concerning the parish are significant for public education, tourism, the economy and the country's future development.

## **Bibliography**

1. Bells, S., Nikodemus, O. (2000). *Meža ainavas plānošanai un dizainam. Rokasgrāmata (Forest landscapes for planning and design. Handbook)*. Rīga: Valsts Meža dienests, 76 p.
2. Bell, S., Alves, S., de Oliveira, E., Zuin, A. (2010). Migration and land use change in Europe: a Review. Retrieved: <http://landscaperesearch.livingreviews.org/Articles/lr-2010-2/download/lr-2010-2Color.pdf>. Access: 29.01.2018.
3. Beneža, S. (2015). *Apdzīvojuma struktūras un zemes lietojumveidu izmaiņas Zvārdes pagastā (20.gs. sāk. – 21.gs. sāk.) (Changes of settlement structure and land use in Zvārde Parish (beginning of the 20th century – beginning of the 21st century))*. Rīga: LU, 73 p.
4. *Dabas parka „Zvārdes meži” dabas aizsardzības plāns (Nature Park "Zvārdes forests' conservation plan) (2005)*. Retrieved: [https://www.daba.gov.lv/upload/File/DAPi\\_apstiprin/DP\\_Zvārdes\\_meži-05.pdf](https://www.daba.gov.lv/upload/File/DAPi_apstiprin/DP_Zvārdes_meži-05.pdf). Access: 29.01.2018.

5. Driķe, I. (2001). Neticami piesārņotā zeme (Incredible contaminated land). Retrieved: <http://www.diena.lv>. Access: 04.04.2015.
6. Grīne, I. (2009). Lauku iedzīvotāju un apdzīvojuma telpiskās struktūras izmaiņas pēc Otrā pasaules kara (Cēsu rajona teritorijas). Promocijas darba kopsavilkums (Changes in the structure of rural population and spatial pattern of settlements after the World War II (Territories of Cēsis District). Summary of the Doctoral Thesis.)). Rīga: LU, 80 p.
7. Grīne, I., Beneža, S. (2016). Zvārdes pagasts šodien – iedzīvotāji, apdzīvojums, saimnieciskā darbība (Zvarde Parish today – inhabitants, settlement, economic activity). Retrieved: [https://www.geo.lu.lv/fileadmin/user\\_upload/lu\\_portal/projekti/gzzf/Konferences/LU\\_74\\_zin\\_konference\\_A5\\_F.pdf](https://www.geo.lu.lv/fileadmin/user_upload/lu_portal/projekti/gzzf/Konferences/LU_74_zin_konference_A5_F.pdf). Access: 29.01.2018.
8. Grīne, I., Strautnieks I., Beneža, S. (unpublished). The reflection in the landscape of changes in land use and settlement within the former Zvārde bombing range (Latvia). PECSRL 25th Session. Reflection on landscape change: the European perspective. Papers of presentation.
9. Jermaks (2012). Viensētu stāsti: Aitas peļņai, puķes skaistumam (Stories of farmsteads: sheep for profit; flowers for beauty). Retrieved: [http://la.lv/index.php?option=com\\_content&view=article&id=338706&Itemid=93](http://la.lv/index.php?option=com_content&view=article&id=338706&Itemid=93). Access: 14.01.2013.
10. Lakovskis, P., Benga, E., Miķelsons, Z. (2013). Platību maksājumu nozīme lauksaimniecības zemes izmantošanā (Importance of area payments for the agricultural land use). Zinātniski praktiskā konference Lauksaimniecības zinātne veiksmīgai saimniekošanai. Jelgava, LLU, 98-104.lpp. Retrieved: [http://llufb.llu.lv/conference/Latvia\\_Agricult\\_Science\\_Successful\\_Farming/Latvia\\_Agricult\\_Science\\_Successful\\_Farming-98-104.pdf](http://llufb.llu.lv/conference/Latvia_Agricult_Science_Successful_Farming/Latvia_Agricult_Science_Successful_Farming-98-104.pdf). Access: 02.01.2018.
11. Latvijas lauku telpas attīstība un tās iespējamie nākotnes scenāriji (Development of Latvian Rural Space and its Future Scenarios) (2012). Retrieved: <http://www.laukutikls.lv/latvijas-lauku-telpas-attistibas-un-tas-iespejamie-nakotnes-scenariji>. Access: 20.12.2017.
12. Latvijas Republikas Ministru Padomes lēmums Nr. 329 „Par Saldus un Dobeles rajonā izvietotā aviācijas poligona likvidēšanu” (Decision of the Council of Ministers of the Republic of Latvia Nr. 329 “About the closing of air force bombing range in Saldus and Dobeles Districts”, 12.08.1992. Retrieved: <https://likumi.lv/doc.php?id=66478>. Access: 30.01.2018.
13. Lāce, D. (2017). Zvārde gadsimtu griežos. Fakti un atmiņu stāsti par Zvārdes pagastu (Zvārde in centuries. Facts and memory about Zvārde Parish). Biedrība Vienoti Zvārdei, 697 p.
14. Melluma, A. (2010). Ieskats Latvijas ainavu klājumā (Overview of the Latvian landscape). Grām. Latvijas Avīzes gadagrāmata 2011. Rīga: Izdevn. LZ, pp. 242-253
15. Melluma, A. (2012). Historical contexts and development paths of Latvian landscapes. In: Proceedings of the Latvian Academy of Sciences. A: Humanities and Social Sciences, Proceedings of the 24<sup>th</sup> session of PECSRL: Living in landscapes: knowledge, practice, imagination, Vol. 66 (2012), Nr. 3. Rīga: LZA, pp. 27-41.
16. Military heritage. Retrieved: [http://www.celotajs.lv/cont/wrth/military\\_lv.html](http://www.celotajs.lv/cont/wrth/military_lv.html). Access: 21.03.2013.
17. Nikodemus, O., Bell, S., Grīne, I., Liepiņš, I. (2005). The impact of economic, social and political factors on the landscape structure of the Vidzeme Uplands in Latvia. Retrieved: <https://www.sciencedirect.com/science/article/pii/S016920460300210X>. Access: 08.02.2018.
18. Ozola, I. (2015). Zvārdē neitralizē desmitiem sprādzienbīstamu lādiņu (In Zvārde is neutralizing dozens of explosive charges). Retrieved: <http://www.lsm.lv/raksts/zinas/latvija/zvarde-neitralize-desmitiem-spradzienbistamu-ladinu.a130588/>. Access: 20.12.2017.
19. Penēze, Z. (2009). Latvijas lauku ainavas izmaiņas 20. un 21. gadsimtā: cēloņi, procesi un tendences. Promocijas darbs (Changes in rural landscape in Latvia in 20. and 21. centuries: causes, processes and trends. Summary of the Doctoral Thesis.)). Rīga: LU, 255 p.
20. Roca, M., Roca, Z., Oliveira, J. (2011). Features and Impact of second homes expansion: the case of the Oeste Region, Portugal. Retrieved: <https://pdfs.semanticscholar.org/052a/314fdd42d35014d5ca4ca94ac26bc6bfbe48.pdf>. Access: 20.12.2017.
21. Ruskule, A. (2013). Lauksaimniecības zemju aizaugšanas ainavu ekoloģiskie un sociālie aspekti. Promocijas darba kopsavilkums (Ecological and social aspects of agricultural land overgrowing. Summary of the Doctoral Thesis.)). Retrieved: [https://dspace.lu.lv/dspace/bitstream/handle/7/5179/30050-Anda\\_Ruskule\\_2013.pdf?sequence=1&isAllowed=y](https://dspace.lu.lv/dspace/bitstream/handle/7/5179/30050-Anda_Ruskule_2013.pdf?sequence=1&isAllowed=y). Access: 04.02.2018.
22. Saldus novada teritorijas plānojums 2013.-2025. gadam (Territorial planning of Saldus county, 2013-2025) (2012-2013). Retrieved: <https://www.saldus.lv/pasvaldiba/dokumenti12/planosanas-dokumenti9/teritorijas-planojums1/>. Access: 04.02.2018.
23. Sprūde, V. (2011). 1951.gada 29.septembris. Latvijas Avīze, 29.09.2011. Retrieved: [http://la.lv/index.php?option=com\\_content&view=article&id=328517&Itemid=177](http://la.lv/index.php?option=com_content&view=article&id=328517&Itemid=177), last accessed 28 January 2013. Access: 04.02.2018.
24. Svetoka S, 2012. Zvārdes poligonā atklās stendu par sprādzienbīstamu priekšmetu apdraudējumu (In the former Zvārde bombing range will be open a information board about danger of unexploded ordnance). Retrieved: <http://www.lvportals.lv/visi/preses-relizes/251653-zvardes-poligona-atklas-stendu-par-spradzienbistamu-prieksmetu-apdraudejumu/>. Access: 10.03.2015.
25. Štāls, A. (1996). Zvārdes sūrā atjaunošanās (Hard restoration of Zvārde). Diena, 14.08.1996., 7.lpp.
26. The Zvarde base. Retrieved: <http://www.celotajs.lv/lv/e/zvardespoligons>. Access: 24.01.2013.

27. Tooma, A. (2004). Zvārde – melni nāvīgais Kurzemes katla dibens (Zvārde - 'Courland Pocket'). Žurnāls „Vides Vēstis”, Nr. 4 (69), 2004.
28. Upmalis, I., Tilgass, Ē., Dinevičs, J., Gorbunovs, A. Latvija – PSRS karabāze. 1939-1998.: materiāli un dokumenti par Padomju armijas atrašanos Latvijā un tās izvešanu (Latvia – military base of USSR. 1939-1998: materials and documents of Soviet Army in Latvia and its disposal). Rīga: Zelta grauds, 359 p.
29. Vanwambeke S., Meyfroidt P., Nikodemus O., 2012. From USSR to EU: 20 years of rural landscape changes in Vidzeme, Latvia. Retrieved: <https://www.deepdyve.com/lp/elsevier/from-ussr-to-eu-20-years-of-rural-landscape-changes-in-vidzeme-latvia-h8cugohkFA>. Access: 03.02.2018.
30. Virbicka, I. (1993). Dažreiz izzūd pat veseli pagasti (Sometimes disappear whole parishes). Lauku Dzīve, Nr.6.
31. Zvārdes pagasts (Zvarde Parish) (2002). Latvijas pagasti. Enciklopēdija. 2.sējums. (Parishes of Latvia. Encyclopaedia. Volume 2). Rīga: Preses nams, 685-688.lpp.

## PRODUCTION FACTORS AND ECONOMIC RESULTS OF SMALL FARMS IN SELECTED EUROPEAN UNION COUNTRIES

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**Abstract.** The study attempts to assess production factor and the economic performance of small farms in the European Union. A small farm was defined in accordance with the methodology used by Farm Accountancy Data Network (FADN), with economic size from 8 thou. up to 25 thou euro.

The conducted analysis indicates a significant differentiation in the resources possessed (land, labour and capital) and achieved economic and production results. The highest labour productivity (VA/AWU) was achieved by Danish farms (20.7 thousand euros), while the highest rate of asset productivity (0.78) was reached by French farms. In the analysed sample of small farms, the farms with "fieldcrops" orientation prevailed. All analysed production types of small farms, despite significant differences in possessed resources, achieved positive income from farming activities. They were characterized by very low indebtedness of own capital, reached a positive balance of cash from operating activities and performed a negative asset replacement rate.

**Key words:** small farm, FADN, EU, family farm, economic results.

**JEL code:** Q12, Q14

### Introduction

In agriculture, the farm is considered as a basic unit of agriculture production, in many cases farms have character of family owned business. The discussion on the issue of family farms appears widely in world literature (OECD, FAO, USDA studies) as well as within EU bodies. That fact is proved by increasing number of instruments addressed to family farms (e.g. Drygas M., 2014). Many terms related to the agricultural holdings are in use; terminological diversity results from the specificity of these entities and their functions (e.g. Parzonko A., Hornowski A., 2017). A special group among family farms are farms with a small area or a small economic size. These types of farms dominate on a global scale. In the literature, there is no unambiguous definition of this group of entities (e.g. Zegar J. St., 2012); following terms are used: small-, subsistence-, family-, self-supply-, peasant-, social- or small scale-farms (e.g. Žmija J., Czekaj M., 2014). For their definition, the authors use a number of different criteria (e.g. What is a small farm?, 2001). The most frequently accepted ones include: the area of agricultural land, the economic size expressed in Economic Size Units (ESU), standard production (e.g. Michalska S., 2012), number of animals, market share or available labour force (AWU) (e.g. Poczta W. and others, 2012). In the European Union, two criteria are most often used for the classification of farms: area and standard production. According to the area, in 2013, there were 10,841 thousand (e.g. Eurostat) farms in the EU. Farms running agricultural activity. Farms up to 5 ha accounted for 65 % of all farms and used only 6 % of UAA of the European Union. Using the criterion of standard production, which determines the income potential of the farm and the possibilities of its development, small farms (up to 25,000 euros) accounted for 82 % of all EU farms in 2013 and used 23 % of UAA. As the European structure of agriculture is very heterogeneous, general differences among the European farms were observed by various authors (e.g. Svoboda J. and others, 2016; Spicka J., 2014; Trnkova G., MALA, Z. 2013; Hornowski A., Kotyza P., 2017). But small farms were not always among their interest. Also since small farms are numerously important, receive significant portion of CAP payments and still employ large amount of people, their economic performance is not always assessed in literature. From that perspective, main aim of the contribution is to assess differences in used production factors (capital, labour, land) and economic performance of small

farms in the EU countries. Based on above formulated aims, research questions were formulated. Q1: Are there significant differences among EU small farms in their access and utilisation of production resources? Q2: Is availability of resources connected to main farming activity?

## **Materials and methods**

The article attempts to characterize small farms in the European Union. For the purpose of this article, small farm is characterised in accordance with the rules applicable in FADN based on economic size; i.e. enterprises between 8.000 and 25.000 euro of standard output (SO). The economic size of an agricultural holding is defined as the sum of the values of standard output of all agricultural activities on the farm, which is expressed by the value in euro. In the first part of the article, data on average small farms in the EU countries are analysed. Small farms from Belgium, Germany, Luxembourg, the Netherlands and Slovakia were not included in the analysis due to the lack of data in the European FADN. In the second part of the article, an analysis was made to compare different production types of small farms.

The following information and indicators were used in the economic and production analysis of European small farms: (i) net value added per full-time employed in EUR / AWU; (ii) income from a family farm per full-time employed person in EUR / FWU; (iii) share of subsidies in farm income; (iv) total production per 1 ha of UAA in EUR/ha; (v) production profitability (Total output / Total input); (iv) asset productivity (total production over total assets); (vii) productivity of fixed capital expenditures (total production over depreciation); (viii) Debt-equity Ratio (total debt over equity); (ix) assets/AWU (x) cash flow I; (xi) fixed assets replacement rate.

The cash flow balance from operating activities (Cash Flow I) is calculated as revenues less expenses of operating activities in the accounting year. Fixed assets replacement rate is calculated as net investment value to the total amount of fixed assets and informs about the degree of property reproduction. The values between 0 and 0.99 % indicate straight reproduction, negative values inform about negative reproduction, and the values above 1 % indicate extended replacement (e.g. Jozwiak W., 2013).

The contribution was based on most recent data from Eurostat (2007-2013) and from the EU-wide FADN (2007-2015).

## **Research results and discussion**

According to the Eurostat data, the number of small farms in 2013 (with less than 25,000 euro of SO) decreased by 4 percentage points in comparison with 2007. A very high share of small farms in the total number of farms makes them an extremely heterogeneous over the whole Europe. Differences of selected features among small farms in the EU countries are presented in Table 1.

On average, the analysed farms had an area of 14.51 ha of agricultural land. The highest UAA was occupied by small farms in the United Kingdom (47.36 ha), Estonia (37.15 ha) and Sweden (36.41 ha), while the lowest UAA farms are found in Malta (2.44 ha). Thus, the difference between the smallest and largest farms was 44.92 ha. The highest production per 1 ha of UAA was achieved by French (9,916 EUR) and Malta (6,145) farms. While farms in France and Malta are the smallest among other countries. France farms focus mainly on field crop production, while Maltese farmers depends on horticulture. In the countries, where proportion of small farms is the biggest, the production per 1 ha of UAA was usually below 1,000 EUR (UK, FI, LV, IE, EE, CZ).

As it can be found in Table 1, only in three countries (DK, ES, FR) agricultural farms covered by the study showed labour productivity measured by net value added per full-time person (AWU) exceeding 15 thousand euro. The value of this measure was very diverse and fluctuated in the analysed group of farms in the range from 2.7 thousand euro (Slovenia) to 20.7 thousand euro (Denmark). The lowest level of labour productivity (less than EUR 4,000 per AWU) was characteristic for the countries of Central and Eastern Europe.

Table 1.

**Selected information about small farms, 2015**

Economic size 8 000 - < 25 000 EUR							
	Total Utilised Agricultural Area (SE025) total	production per 1 ha of UAA	Production profitability	Farm Net Value Added / AWU (SE425)	Asset productivity	Productivity of fixed capital	Dominant farming type
<b>BG</b>	13.82	1,174	1.22	7,098	0.37	9.51	Fieldcrops (35 %)
<b>CY</b>	8.11	2,068	1.08	5,827	0.14	6.81	Other permanent crops (43 %)
<b>CZ</b>	24.97	792	0.84	5,767	0.17	3.24	Fieldcrops and Other permanent crops (32 %)
<b>DK</b>	18.01	4,077	0.89	20,723	0.11	6.31	Fieldcrops (49 %)
<b>GR</b>	7.96	2,220	1.28	10,211	0.16	5.00	Other permanent crops (40 %)
<b>ES</b>	22.56	1,187	1.51	17,779	0.14	8.78	Other permanent crops (40 %)
<b>EE</b>	37.15	495	0.88	6,398	0.26	5.81	Fieldcrops (36 %)
<b>FR</b>	5.31	9,916	1.16	18,998	0.78	14.09	Fieldcrops (69 %)
<b>HR</b>	11.74	1,444	1.15	3,792	0.11	4.41	Mixed (28 %)
<b>HU</b>	20.58	949	1.25	12,530	0.22	11.67	Fieldcrops (52 %)
<b>IE</b>	32.59	626	0.92	9,626	0.03	8.06	Other grazing livestock (94 %)
<b>IT</b>	8.88	2,246	1.52	13,328	0.10	7.73	Other grazing livestock (38 %)
<b>LT</b>	30.75	472	0.87	4,241	0.21	3.01	Milk (37 %)
<b>LV</b>	30.41	505	0.97	5,120	0.32	7.06	Milk and Mixed (33 %)
<b>MT</b>	2.44	6,145	1.54	6,241	0.13	10.38	Horticulture (50 %)
<b>AT</b>	14.65	2,044	0.91	7,387	0.10	2.85	Other grazing livestock (49 %)
<b>PL</b>	13.47	1,085	1.09	3,705	0.11	3.96	Mixed (40 %)
<b>PT</b>	13.8	1,184	1.41	9,186	0.22	5.74	Other grazing livestock (30 %)
<b>RO</b>	8.83	1,580	1.53	5,319	0.36	11.28	Other grazing livestock and Mixed (29 % x 2 = 58 %)
<b>FI</b>	31.94	749	0.59	4,656	0.11	2.38	Fieldcrops (96 %)
<b>SE</b>	36.41	1,371	0.85	12,549	0.12	5.77	Other grazing livestock (63 %)
<b>SI</b>	9.16	2,067	0.92	2,743	0.09	2.77	Other grazing livestock (38 %)
<b>UK</b>	47.36	586	0.72	8,157	0.04	3.45	Other grazing livestock (98 %)
<b>Total</b>	<b>14.51</b>	<b>1,319</b>	<b>1.24</b>	<b>8,504</b>	<b>0.12</b>	<b>5.81</b>	<b>Fieldcrops (30 %)</b>

Source: authors' study based on European FADN data

Lower volatility was observed in the asset productivity, which ranged from 0.03 up to 0.78 (Table 1). Farmers in Ireland (.1), the United Kingdom (.04) and Slovenia (.09) held the least productive assets. Ireland and the United Kingdom are characterised as countries with of the highest amount of assets, land and labour, which resulted into such low values of above-mentioned indicator (below 0.1). The most productive assets were owned by French farms (more than 2x higher productivity than Danish farms), reaching asset productivity at the level of 0.78. Average French farm from the FADN observation is characterized by low value of UAA and by low capital intensity per one AWU (below EUR 55 thousand per AWU). For farm development opportunities, it

is important whether and to what extent farms invest in renewal of fixed assets and what is the effectiveness of the capital resources involved in production. This efficiency could be measured by productivity of fixed capital expenditures calculated as production value over depreciation. In the most efficient farms, the productivity exceeded 10 (FR – 14; HU - 11.6; RO -11.2; MT – 10.38). Maltese farmers, although have very limited area available, can reach high production profitability and they also evince investments into the horticultural production which is considered to be capital and labour intensive. Farms in Finland (2.38), Slovenia (2.77) and Austria (2.85) proved to be the least effective.

Table 3 informs about average annual income of a single person, without children with 100 % of average wage, in selected counties of the EU. As the table indicates, the lowest income is reached in Bulgaria and Romania, while Sweden and Austria are located on the opposite side of the scale. Family farm income to one family labour unit (SE430) express net remuneration per one family member.

Table 2.

**Family farm income as a share of average income,  
 selected EU countries, 2015**

2015	BG	CY	CZ	DK	GR	ES	EE	FR
<b>Family farm income/FWU (SE430)</b>	8,054	4,559	6,257	-5,893	9,693	17,095	5,180	15,355
<b>Annual average Income<sup>1</sup></b>	6,529	N/A	15,617	54,881	25,046	34,391	17,454	51,905
<b>Farmers income to average income</b>	123 %	N/A	40 %	-11 %	39 %	50 %	30 %	30 %
	HR	HU	IE	IT	LT	LV	MT	AT
<b>Family farm income/FWU (SE430)</b>	3,474	14,104	9,477	12,417	4,810	4,712	6,094	4,772
<b>Annual average Income<sup>1</sup></b>	14,612	13,149	38,401	40,488	11,296	11,854	22,451	56,614
<b>Farmers Income to average income</b>	24 %	107 %	25 %	31 %	43 %	40 %	27 %	3 %
	PL	PT	RO	FI	SE	SI	UK	TOTAL
<b>Family farm income/FWU (SE430)</b>	3,417	10,294	5,257	-28	4,447	2,811	6,463	7,926
<b>Annual average Income<sup>1</sup></b>	13,766	21,406	3,427	53,104	59,203	21,005	54,926	42,531
<b>Farmers Income to average income</b>	25 %	43 %	62 %	-0.1 %	3 %	13 %	12 %	19 %

Note: <sup>1</sup> - Annual average income - annual net earnings, single person without children, 100 % of AW

Source: authors' processing, based on EUROSTAT and European FADN data

The Table 3 indicates, that only in Bulgaria and Hungary family income per one person is comparable with average annual salary. It means that farmers are able to reach income comparable to national average and therefore it can be concluded, that they can live only from the farming activities, without additional income. On the other hand, in other EU countries, farming activities do not generate enough income to fulfil needs of farmers. Farmers income to average income ranges from 8 % in Sweden and Austrian, to 62 % in Romania, with an average of about 19 %. Special case can be observed in Denmark and Finland, where farm net income is negative and therefore farming activities needs to be subsidised by farmers from other non-agricultural activities.

Above presented selected indicators and economic and production measures show that small farms defined by economic size from 8 to 25 thousand euro of standard output is a strongly heterogeneous group of farms. Differences between farms in individual countries were mainly

caused by differences in dominating farming types in individual countries. The analysis of farming types is presented in Table 3.

Table 3.

**Selected features characterizing types of small farms in EU. latest data – 2015**

Type of Farming	Fieldcrops	Horticulture	Wine	Other permanent crops	Milk	Other grazing livestock	Granivores	Mixed	Total
Structure [ %]	30	3	6	19	7	17	1	17	<b>100</b>
Total labour input (SE010)	1.06	1.51	0.97	1.14	1.45	1.24	1.21	1.36	<b>1.19</b>
Total Utilised Agricultural Area (SE025)	18.92	2.31	7.23	9.38	12.14	19.92	6.28	12.38	<b>14.51</b>
Total assets (SE436)	17,5023	96,548	140,265	166,181	113,763	227,466	71,781	103,078	<b>160,946</b>
Assets/AWU									
[thou euro/AWU]	165.12	63.94	144.6	145.77	78.46	183.44	59.32	75.79	<b>135.25</b>
Fixed assets replacement rate [ %]	-0.92	-1.14	-1.71	-0.81	-1.19	-0.22	-2.97	-0.98	<b>-0.79</b>
Total output (SE131)	19,203	27,763	18,851	23,712	14,723	19,564	17,463	14,295	<b>19,140</b>
Total Inputs (SE270)	17,065	17,594	11,420	14,647	13,212	18,254	14,615	12,342	<b>15,409</b>
Profitability of production index (SE132)	1.13	1.58	1.65	1.62	1.11	1.07	1.19	1.16	<b>1.24</b>
Farm Net Value Added / AWU (SE425)	9,122	9,273	11,688	14,292	4,112	7,685	3,919	4,355	<b>8,504</b>
Farm Net Income (SE420)	7,910	11,066	9,589	12,898	5,551	8,562	4,282	5,478	<b>8,521</b>
Balance current subsidies & taxes (SE600)	5,717	535	2,091	3,976	3,973	7,048	1,364	3,410	<b>4,726</b>
Share of subsidies in farm income [ %]	72.3	4.8	21.8	30.8	71.6	82.3	31.9	62.2	<b>55.5</b>
Farm Net Income without subsidies	-3,579	9,634	5,340	5,089	-2,462	-5,738	1,484	-1,457	<b>-995</b>
Family Farm Income / FWU (SE430)	8,175	9,317	11,729	14,655	3,968	7,381	3,767	4,136	<b>7,926</b>
Debt-equity Ratio [ %]	3	3	2	1	2	4	4	3	<b>3</b>
Cash Flow 1 (SE526)	11,050	13,298	12,174	15,765	8,007	10,686	6,562	7,591	<b>11,146</b>

Source: authors' processing based on European FADN data



In the surveyed European countries, the largest share in the structure of small farms were farms with the "fieldcrops" type of agricultural production. Holdings of this type together with other "grazing livestock" farms were characterized by the largest UAA (less than 20 ha) and reached the highest values in Assets to AWU indicator (over 160). The "horticultural" farms occupied the smallest area of UAA, and their share in the structure of all small farms was only 3 %. Farms of this type were characterized by the highest input of labour (1.51 AWU) and at the same time achieved one of the lowest values of assets to AWU at the level of 63,940 EUR/AWU. The smallest number of farms were among farms producing mainly granivores (1 %). They were characterized by average labour input in total (1.21), low UAA (6.28 ha; more than 2 times less than the average for the surveyed group of farms) and the lowest value of assets to labour (59.32). All farm groups were characterized by a negative fixed assets replacement rate, which proves that these farms are unable to maintain value of their existing fixed assets.

Only horticulture farms and other permanent crop farms reached total production exceeding 20,000 euro. The highest work efficiency, measured by net value added per AWU, reached farms producing other permanent crops (14,292 euro/AWU), while the lowest values reached farms producing Granivores (3,919 euro/AWU), which accounted for 27 % of the highest value. All farms evinced profitability, but only horticultural, wine and other permanent crop farms reached profitability (SE132) above 1.5.

The highest agricultural income as well as income per one full-time employee (measured by AWU) were generated by farms producing other permanent crops. For comparison, among those farms, agricultural income and income per one AWU was 3 time and 4 time higher than in Granivores. Farm subsidies played a very important role among all surveyed of farms. In half of the analysed farms types, the share of subsidies in income exceeded 50 %. This means that without subsidies farms these farms would have a negative financial result (valid for field crops farms; milk farms; other grazing livestock farms and mixed farms). The highest share of subsidies in income was observed in Other grazing livestock farms, where subsidies created about 82 % of total income. This largely makes these farms dependent on external factors (help). Least subsidy dependent were farms focusing on Horticulture (4.8 %), followed by wine producing entities (21.8). Horticulture farms also evince highest farm net income without subsidies, in 2013 it was 9,634 euro, followed by wine (5,340 euro) and other permanent crops farms (5,089 euro).

All farms surveyed. regardless of the production direction. achieved high profitability of production (subsidies included). Indebtedness in all types of surveyed farms was relatively small, not exceeding 4 %, so it does not pose a threat to farm financial security. In all the farms surveyed, the cash flow from operating activities was positive, which means that households generated savings on operating activities.

## **Conclusions**

1) The conducted analysis indicates a significant diversification of economic and production results as well as available resources (land, labour, capital) in the group of small farms from selected EU countries (Q1). The highest labour productivity (VA/AWU) was achieved by Danish farms (20.7 thousand euros), while the highest rate of asset productivity (0.78) was reached by French farms. In the analysed sample of small farms, the farms with "fieldcrops" orientation prevailed (30 % of all farms surveyed).

- 2) The highest profitability of production was achieved by farms with orientation toward other permanent crops (54 %). Among these farms, the share of subsidies on total income reached the highest value – 82 %. The share of subsidies on total incomes exceeded 50 % also in fieldcrops, milk and mixed farms. The above-mentioned farms' types would have achieved a negative financial result without subsidies. The highest income per one full-time employee was reached by other permanent crops farms (14,655 euros/FWU), while the lowest income was evinced among Granivore farms (3,767 euros/FWU). (Q2)
- 3) All analysed production types of small farms, despite significant differences in possessed resources, achieved positive income from farming activities. They were characterized by very low indebtedness of own capital and reached a positive balance of cash from operating activities. All farm production types were characterized by a negative asset replacement rate; that fact may lead to problems in the future, as fixed capital is not being replaced continuously.
- 4) It should be taken in consideration that in the FADN database occur only farms conducting production that is intended for sale. In addition, the FADN standard results only contain information on agricultural activities carried out on farms, whereas no information is recorded about revenues from non-agricultural activities. Owners of small farms, due to incomplete use of their labour resources on their own farms, often take up full- or part-time work outside the farm. Usually the farm is run by one person and his/her spouse works outside the farm, while income earned is shared and combined (both income from the farm and from outside the farm may be used for the farm operation or vice versa). Therefore, by focusing exclusively on FADN data, it is not possible to obtain a real picture of the situation of small farms in the whole EU.

### Acknowledgements

This contribution was supported from funds provided by National Science Centre Poland under project no. UMO-2015/17/N/HS4/01550.

### Bibliografia

1. Drygas, M. (2014). Możliwości określenia definicji gospodarstwa rodzinnego (Possibilities to determine the definition of a family farm).  
Retrieved from: [www.senat.gov.pl](http://www.senat.gov.pl). Access date 06.01.2018 r.  
EUROSTAT. <http://ec.europa.eu/eurostat/data/database>. Access date 06.01.2018 r.
2. Józwiak, W. (2003). Przewagi komparatywne polskich gospodarstw rolniczych (Comparative advantages of Polish farms), IERiGŻ, Warszawa.
3. Parzonko, A. Hornowski, A. (2017). Economic and Social Assessment of the Use of Structural Funds in the Creation of the Development of "Small" Farms in Poland. *Journal of Agribusiness and Rural Development*, nr 2. s. 413-420.
4. Poczta, W., Czubak, W., Kiryluk-Dryjska, E., Sadowski, A., Siemiński, P. (2012). Koncepcja ukierunkowania wsparcia gospodarstw rolnych w perspektywie 2014-2020 (The concept of targeting farm support in the 2014-2020 perspective). Ekspertyza wykonana dla MRiRW w Warszawie.
5. Michalska, S. (2012). Społeczny wymiar funkcjonowania drobnych gospodarstw rolnych (Social aspects of the functioning of small farms). *Problemy Drobnych Gospodarstw Rolnych*, nr 1. ss. 85-94.
6. What is a small farm?. "Agricultural Economics Briefs". (2001). No. 2- July.
7. Zegar, J. St. (2012). Współczesne wyzwania rolnictwa (Contemporary agriculture challenges). PWN, Warszawa, str. 106.
8. Zegar, J. S. (2012). Rola drobnych gospodarstw rolnych w procesie społecznie zrównoważonego rozwoju obszarów wiejskich (The role of small farms in the socially sustainable development of rural areas). *Problemy Drobnych Gospodarstw Rolnych*, nr 1. ss. 129-148.
9. Svoboda, J., Lososová, J. and Zdeněk, R. (2016). "Subsidies on Investments in the EU Member States". *AGRIS on-line Papers in Economics and Informatics*. Vol. 8. No. 4. pp. 153 - 162. ISSN 1804-1930. DOI 10.7160/aol.2016.080414.
10. Spicka, J. (2014). The Regional Efficiency of Mixed Crop and Livestock Type of Farming and Its Determinants. *Agris on-line Papers in Economics and Informatics*. 6(1). 99-109.

11. TRNKOVA, G. MALA, Z. (2013). *Analysis of Inequality of Gross Added Value of Conventional And Organic Farms in Selected EU Countries*. Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis. LXI. No. 7. pp. 2883–2891.

## ACTIVITY OF MASTER CRAFTSMEN IN LATVIA

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**Abstract.** In the regions of Latvia, there is still a huge under-researched and unused resource – crafts. Its products are represented by small entrepreneurs who operate according to the Law on Commercial Activity. Accounting of craftsmen's data is performed by the Latvian Chamber of Crafts (LCC). Crafts is not separated as a statistical unit in Latvia. Demand for crafts manufactured products is significant; the supply is wide as well. Crafts is a valuable cultural, social and historical asset, which encourages creation of income and economic development, especially in rural districts and at the regional level. Crafts as a cultural and social asset requires a development strategy. Market globalization reduces the geographical distance of the consumers and the producers of the crafts products, and it is directly linked with the use of internet technology. The present research summarizes crafts activity in Latvia, analyses the use of marketing instruments by master craftsmen. The results revealed the professional experience of the master craftsmen – 26 years on average, which indicates to a serious problem of master craftsmen's aging and the insufficient master craftsmen's ability to apply modern technology to promote their products and services.

**Key words:** regional development, crafts, indicators.

**JEL code:** R12

### Introduction

At present the notion (handi) craftsman has become topical. In Latvia, the activity of a craftsman is regulated by the law "On Craftsmanship" (Amatniecibas, 1993). In the National Development Plan of Latvia (NAP, 2012), the unique culture and creative human capital resources are emphasised as factors of competitive non-agricultural entrepreneurship. The development of these factors is determined in two directions, within which the tasks to be executed are related to support for traditional crafts, developing products and services based on the material and non-material cultural heritage. The responsible institutions have been determined: the Ministry of Agriculture (MA), the Ministry of Culture (MC), the Ministry of Education and Science (MoES), municipalities, social partners, non-governmental organizations. There are few publications and little research on the development and evaluation of crafts in Latvia, but research could facilitate benefits both at the municipality and at the regional level. The research novelty – research on the economic significance of crafts has been conducted in Latvia, and it attempts to explain the expression of traditional cultures as valuable cultural, social and historical assets that encourage the economic development of the country, but the evaluation of the activity of craftsmen in regions has not been performed yet.

**Research goal:** comparison of crafts activity in the regions of Latvia.

To attain the research goal, the following **tasks** were executed: 1) the essence of crafts was clarified; 2) the factors influencing crafts were compared.

### Materials and methods

The research was both qualitative and quantitative, summarizing information about 155 craftsmen in Latvia. The number of respondents comprises 24 % of females and 76 % of males. The respondents were divided based on their experience of activity, distinguishing the following groups: 1-10 years, 11-20 years, 21-30 years, 31-65 years. As a result, the current crafts situation and product promotion were characterized. Based on the obtained data, conclusions and recommendations were developed. The data that characterise the crafts sector and that are

published on the site of the Latvian Chamber of Crafts (LCC) were used as the informative basis to perform the research.

**Research methods:** content analysis of the literature and internet sources was performed to prepare this publication; the selected data were processed and interpreted applying statistical data processing and interpretation methods. Year 2017 was the analysed period.

**Research limitations:** data about the activity of craftsmen in Latvia were analysed.

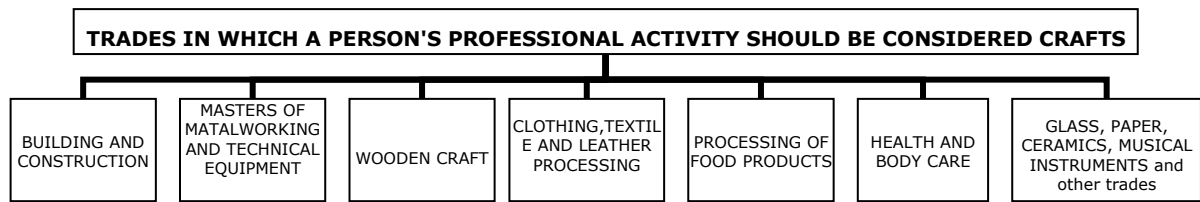
### Research results and discussion

Summarizing the opinions of the world researchers about the importance of crafts in the national, regional and local development the various meanings and opinions are marked:

- in the rural territories of Asia, it offers the opportunities of the least provided population to obtain livelihood, which is especially true regarding women and children. Those market segments are not aimed at becoming international enterprises. They represent a respective production alternative, especially developing manual handicraft SMEs, which happens in relation with certain requirements regarding demand (Divandari, 2017, Ammar, 2017);
- as a result, the overall rural development takes place, especially regarding sustainable preservation of the environment and mastery of crafts (Bilgin at al., 2011; Mir, 2014, Mustafa, 2011);
- it is a way to attract tourists in order to obtain income (Lukich at al, 2015);
- state support is necessary – development and implementation of the crafts policy in order to protect the viability of the industry and its development for future generations (Dutton, 1983);
- the creative power of the people is transformed into raw materials and goods; crafts forms simple industries without complicated methods; it can be considered a source of income and an additional job for people (Divandari, 2017);
- in crafts, nature and culture are complementary categories. They cannot be considered separately. The identity of public culture is linked with the natural environment in which it is developing (Hadgich, 2005).

In Latvia, there exists research on the economic significance of crafts, explaining the expression of traditional cultures as valuable cultural, social and historical assets that facilitate the development of income and economic development, especially in rural districts and at the regional level. Facilitation of the expression of local cultures enhances the increase of culture-related economic activities, for example renewing food traditions and producing handicraft products, including crafted ones (Jeroscenkova at al., 2015).

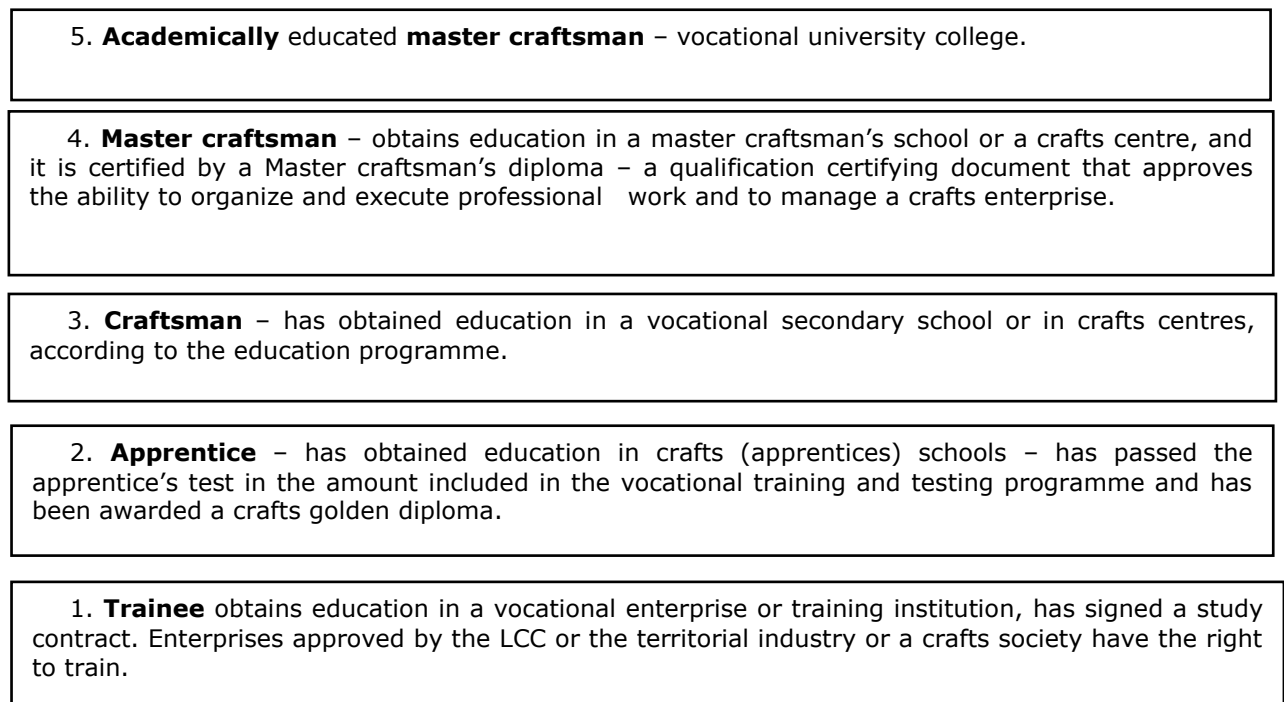
The crafts activities in Latvia are regulated by a number of normative documents: law "On Craftsmanship" (1993), Regulations of the Cabinet of Ministers (CM) No. 762 "Regulations on trades in which a person's professional activity shall be considered crafts" (Noteikumi, 2009), which define crafts as a person's professional activity in trades, the list of which has been approved by the Cabinet of Ministers, and which state the limitations for receiving the titles 'craftsman' and 'master craftsman' (Par Amatniecibu, 1993). The Regulations list 7 groups, which comprise 269 trades (Fig. 1.).



Source: authors' designed, based on the law "On Craftsmanship" (Par Amatniecibu, 1993)

Fig. 1. Groups of crafts trades in Latvia in 2017

In Latvia, territorial and industry crafts organizations and the Latvian Chamber of Crafts (LCC) are professional crafts organizations. Professional crafts organizations develop programmes for crafts education and qualification requirements. Summarizing the available information of the LCC about the territorial organizations, three of them are indicated: "Talsu Amatnieku biedriba" (Talsi Craftsmen's Society) in Kurzeme region, "Jelgavas Amatnieku biedriba" (Jelgava Craftsmen's Society) in Zemgale region and "Daugavpils Amatnieku biedriba" (Daugavpils Craftsmen's Society) in Latgale region. Only the latter one ("Daugavpils Amatnieku biedriba" in Latgale region) is active. It offers cooperation with 7 trade coordinators of Daugavpils Craftsmen's Society. In the LCC webpage section of territorial organizations, there is no wider information available on the events related to the activities of crafts production. Searching in the indicated regions for crafts related activities, it can be concluded that the LCC is not the only organization which craftsmen can join to establish cooperative sales places. The strength of the LCC is awarding certification, which is not obligatory for craftsmen, but which, as any standard, approves of stronger competition. To provide substantiated recommendations for improving the operation of the LCC, additional research is required.



Source: authors' designed, based on the LCC

Fig. 2. Craftsmen's qualification levels in Latvia in 2017

The LCC represents the professional and social interests of craftsmen, facilitates the development of crafts, organizes training in trade, develops programmes for awarding the title of an apprentice, a craftsman and a master craftsman, assigns the craftsman's qualification, registers trade masters, apprentices and trainees, accounts crafts enterprises and master's workshops, and

maintains the crafts register. Latvia has developed a system how one can become a craftsman via reaching various degrees of crafts (Fig. 2.).

To certify the craftsman's qualification, the Craftsman's Map has been designed. It is a certification document issued for a particular time by the Latvian Chamber of Crafts. The LCC includes a Crafts Council which executes the process of master craftsman's qualification and certification approval. In order to become a master craftsman in Latvia, a master craftsman's profile has been developed, which comprises basic requirements for the candidate's education: secondary education; 8 years of work experience in the suitable position, including training in vocational education (4 years). Candidates with higher education in the profession need 3 years of practical work experience; a passed qualification examination in the trade according to the "Requirements for Testing Master Craftsmen" as approved by the LCC and according to a testing programme developed by the respective professional organization of the LCC and approved by the MoES and the LCC Crafts Council.

To record data on craftsmen, the LCC has designed an electronic database. Crafts enterprises, master craftsmen, apprentices and trainees, as well as other information related to craftsmen and crafts is accounted. The database is maintained by the LCC. Craftsman as a profession is included in the profession classifier of Latvia (LM, 2017). Craftsman as a statistical category is not accounted in Latvia. Therefore, a problem exists that many craftsmen have not registered their activity in the LCC database. The available database reflects only part of the craftsmen's activity in Latvia. It is impossible to separate the economic contribution of master craftsmen to evaluate the effectiveness of their activity. In normative documents a crafts enterprise is defined as entrepreneurship dealing with crafts.

As of 1992 a conception of vocational education has been designed in Latvia. It states that vocational education should be inherited so that it would correspond to the interests of both the population and the economy. The document is 26 years old, which indicates to a serious loss of its topicality. In the section of legal documents on the LCC site one can find a number of more documents adopted in 1990-ies. The research authors did not conduct in-depth research of those documents to prove that they are outdated, but it is clear that over time any document requires both modern definitions and revision of processes. The development of crafts requires working out and implementation of a new policy in order to protect the viability of the industry and its development for future generations. Strategic development documents related to crafts activity are not available now, which leads to a conclusion that crafts as an element of culture, social identity and national sustainability is insignificant at present although the NDP 2014-2020 (NAP, 2012) emphasizes the unique culture and human capital resources as factors of competitive entrepreneurship.

Using the LCH database, the professional experience of master craftsmen was grouped with the purpose to compare it with average and group indicators.

As it can be seen in Table 1 summarized indicators, on average a trade master has 26 years of professional experience. The oldest 7 trade masters have an experience of 52-66 years, which indicates to a very rich professional experience. The group of 21-65 years possesses the largest proportion of experience as in total it comprises 65 % of all trade masters. The indicators approve that trade masters as heirs of crafts are aging, and in the future it can cause extinction of some professions and losing the cultural identity.

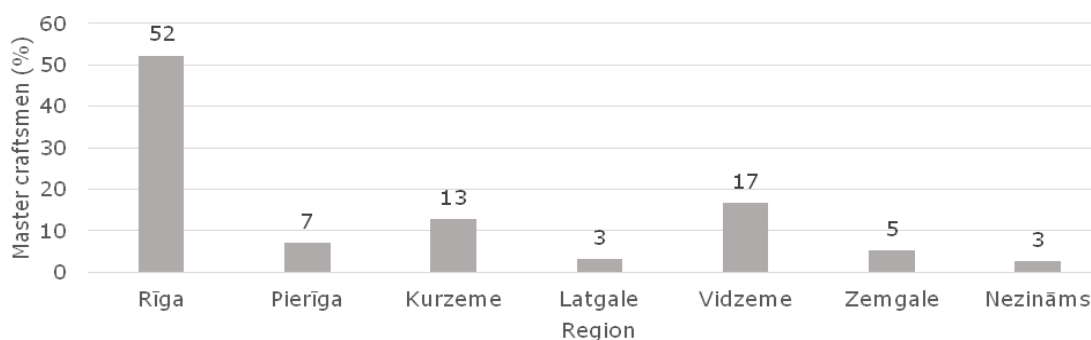
Table 1

**Indicators of the professional experience and marketing activities of craftsmen in Latvia in 2017**

Groups of master craftsmen' professional experience	Number	Structure (%)	E-mail address indicated	Structure (%)	Craftsman's webpage has been developed	Structure (%)	Created Facebook account	Structure (%)	Informative photo available in the database	Structure (%)
<b>1-10 years</b>	19	12	12	8	3	2	0	0	2	1
<b>11-20 years</b>	30	19	28	18	6	4	2	1	7	5
<b>21-30 years</b>	55	35	49	32	17	11	2	1	10	6
<b>31-65 years</b>	44	28	39	25	7	5	0	0	11	7
<b>Not indicated</b>	7	5	27	17	121	79	151	97	125	81
<b>Total</b>	<b>155</b>	<b>100</b>	<b>155</b>	<b>100</b>	<b>155</b>	<b>100</b>	<b>155</b>	<b>100</b>	<b>155</b>	<b>100</b>

Source: LCC database and authors' calculations

Craftsmen should join together to establish strong societies. As the information summarized in Figure 2 indicates, master craftsmen concentrate in Riga (52 %). In other regions of Latvia, they are distributed like this: 17 % in Vidzeme, 13 % in Kurzeme, 7 % in Pierīga, 5 % in Zemgale, 3 % in Latgale, and 3 % in Nezināms. The geographically fragmented location of master craftsmen does not allow them to be active members of societies and reduces their ability to participate in societies. According to the LCC data, the Society of Latvian Chimney-sweeps is the strongest as it comprises 34 chimney-sweeps of Riga.



Source: Authors' designed, based on the LCC database

Fig. 2. Regional distribution of master craftsmen in Latvia in 2018

Nowadays, the market globalization reduces geographical distance between the craftsman and the client; the internet and social networks have even more encouraged market globalization. As emphasized in the guidelines developed by the International Market Centre "Marketing of Crafts and Visual arts – Practical Significance of Intellectual property", craftsmen can compete in the market with a qualitative product, a different brand and effective marketing. Nowadays effective marketing is related to the use of the internet environment to promote a product (Marketing, 2003). Such indicators of marketing activities as whether the craftsman has created an email un publishes it in the database, whether the craftsman has designed a webpage, has created and uses a Facebook account, has added his/her photo and the photos of the product and the production process were compared. As Table 1 depicts, indicators of marketing activities are very low. 17 % of the craftsmen have not created and indicated their email addresses, 79 % do not possess a website, 97 % do not own a crafts activity related Facebook account, 81 % of the craftsmen have not entered photos in the LCC database, but photos would enhance clients' interest about the craftsman's product or service.



Modern technology allows anyone to analyse not only marketing activities, but also the content of the information carrier – craftsmen's websites. The SEO (*Search Engine Optimization*) tool, which determines the webpage content, was applied to analyse the websites via performing the audit of key words, the analysis of competition; determining the strategic words or primary words; promotion of the webpage in Google search ensuring "TOP" level (first page); development of a promotion strategy and an implementation plan. In total 30 craftsmen's webpages were evaluated, which is 19.3 % of the total number of respondents. Evaluating the "TOP" level of the webpages, 4 (13.3 %) webpages appear on the first page of Google search, which is a very good indicator (*average top 3 place in Latvia*). 4 (13.3 %) webpages cannot be found among the first 100 pages, which purports that the sites designed by master craftsmen perform a formal function and are not aimed at the client. The other webpages, which are found between the first and the hundredth level, constitute 73.6 % in total.

Evaluating the key words of the craftsmen's webpages and comparing the product or the offered service, it can be stated that in 9 cases (30 %) the key words have been properly determined. In the other cases a consequent action in providing information cannot be observed. Analysing the headings of the webpages, it can be concluded that they correspond to overall accepted standards only in one case. It has to be taken into consideration that headings of the webpage sections are reflected in search results, they provide a short description of the topic. Key words must appear in the webpage headings.

Evaluating the webpage content, it was observed that in 5 cases (16 %) a product, a service or a producer's or service provider's description was developed, which is a very poor indicator.

Evaluating the total of webpages, the situation is bad. Factors that can create such a situation is craftsmen's work in a narrow niche market where clients are well known; craftsmen's poor knowledge about communication, especially in the internet environment, which is approved by the low number of webpages; the weak cooperation among the respondents (craftsmen) about the types of crafts. As it can be observed in the analysis, cooperation exists between separate categories of craftsmen – for example chimney-sweeps, whose number of webpages is one of the best among the respondents. Communication problems in crafts have not been studied and are difficult to be researched because craft is very fragmented, it does not possess a development strategy.

### **Conclusions, proposals, recommendations**

- 1) Latvia has a developed basis of normative documents for craftsmen's activity and the status of a craftsman has been defined. A strategy for the development of crafts in Latvia has not been designed.
- 2) Latvia has developed an organizational structure that supports, educates and certifies craftsmen – territorial and industry organizations of crafts and the Latvian Chamber of Crafts (LCC). A system how one can become a craftsman, achieving various degrees, has been developed in Latvia.
- 3) For crafts to develop, design and implementation of a policy is required in order to protect the industry's viability and its development for future generations. Crafts as an element of culture, social identity and national sustainability is unimportant in Latvia at present.
- 4) To account the master craftsmen, a database has been developed, but the statistical record and evaluation of the craftsmen's activity in the total data record of the Central Statistical Bureau

has not been performed. That does not allow anyone to analyse the economic benefits, particularly regarding master craftsmen.

- 5) Master craftsmen in Latvia as carriers of crafts skills are aging, and in the future it may cause extinction of some professions and losing the cultural identity.
- 6) Master craftsmen in Latvia insufficiently use information technology and social networks to promote their products and services, which reduces the product recognition and master craftsmen's economic benefits. The webpages created by master craftsmen perform a formal function and are not aimed at the customer.
- 7) The LCC as a provider of crafts traditions needs to design a development strategy and an action plan for implementing the strategy.
- 8) The LCC as a craftsmen's consultative and educational organization needs to educate craftsmen to apply IT in product promotion.
- 9) Crafts activities in Latvia should be continued to be studied in-depth.

## Bibliography

1. Ammar F. (2017). The Growth Factors of Tunisian Handicraft Small and Medium-sized Enterprises (SMEs): towards an integration. *International Journal of Technology Management & Sustainable Development*. Vol. 16 Issue 3, p229-248. Retrieved: <http://web.a.ebscohost.com/ehost/results?vid=0&sid=ded8ccbe-678e-493c-8a85-3eda8ceb10b1%40sessionmgr4010&bquery=handicraft&bdata=JmRiPWE5aCZkYj1sMGgmZGI9ZTAwMHh3dyZkYj1ubGViaYzkyj1lcmljJmRiPWldiZkYj04Z2gmZGI9aHhoJmRiPWljaCZkYj1seGgmZGI9ZjVoJmRiPWntZWRTJmRiPW5maCZkYj10cmgmZGxpMD1OTCZkbHYwPVkmZGxkMD1ubGViaYz0eXBIPtAmc2I0ZT1laG9zdC1saXZl>. Access: 15.01.2018.
2. Bilgin, M. H., Demir, E., Lau, M. C. K., Kin-Man To, C., Zhang, Z. M. (2011). The Turkish handmade carpet industry: analysis in comparison with select Asian countries. *Journal of the Textile Institute*, 102 (6), p514-526.
3. Celvedis majražošana (b.g.) (Home produced guide). Izdevejs: SIA „Latvijas Lauku konsultāciju un izglītības centrs. Ozolnieku novads, LV-3018. Retrieved: [https://www.zm.gov.lv/public/ck/files/PVD/celvedis\\_majrazosana.pdf](https://www.zm.gov.lv/public/ck/files/PVD/celvedis_majrazosana.pdf). Access: 15.01.2018.
4. Divandari, J., Danaeinia, A., Izadi, p. (2017). Analysis of the Role of Handicraft Production in Rural Sustainable Development: A Case of Sar Aqa Seyyed, Chaharmahal and Bakhtiari Province. *Journal of History, Culture & Art Research / Tarih Kültür ve Sanat Arastirmalari Dergisi*. Special issue, Vol. 6 Issue 1, p549-565.
5. Dutton, R. W. [1983]. Handicrafts in Oman and their role in rural community development. *Geoforum*, 14 (3), p341-352.
6. Hadgich, O. (2005). *Kulturni turizam. (Cultural tourism)*. Novi Sad: Univerzitet u Novom Sadu, Prirodno-matematički fakultet, Departman za geografiju, turizam i hotelijerstvo.
7. Jeroscenkova, L., Rivza, B., Kruzmetra, M., Melece, L., Spaks, A., Artisiusevski, M. (2015). The value of cultural heritage: the state in Belarys and Latvia. *Proceedings of the 25th NJF Congress, Nordic View to Sustainable Rural Development*. 2015, p481-488.
8. LM. (2017). *LR Labklajības ministrija. Profesiju klasifikators. (LV Ministry of Welfare)*. Classifications of professions. Retrieved: <http://www.lm.gov.lv/>. Access: 15.01.2018.
9. Lukich, T., Stojanovich, T., Đerčan, B., Zivkovich, M., Zivkovich, J. (2015). The Geographical Aspects of Traditional Handicrafts in Serbia. *European Researcher*. Vol. 100 Issue 11, 747-758.
10. *Marketing Crafts and Visual Arts: The Role of Intellectual Property (2003)*. Practical guide; Geneva: ITC/WIPO, p135.
11. Mir, L., Bhushan, S. (2014). An Analysis of Current Scenario and Contribution of Handicrafts in Indian Economy. *Journal of Economics and Sustainable Development*, 5(9), p75-78.
12. Mustafa, M. (2011). Potential of Sustaining Handicrafts as a Tourism Product in Jordan. *International Journal of Business and Social Science*, 2 (2), p145 -152.
13. NAP (2012). *Latvijas nacionālais attīstības plans 2014.-2020. (The Latvian National Development Plan 2012-2020)*. Retrieved: <https://likumi.lv/doc.php?id=253919>. Access: 15.01.2018.
14. *Noteikumi par amatiem, kuros personas profesionāla darbība ir uzskatāma par amatniecību (The provisions of posts which personal professional activity is considered as crafts)*. MK noteikumi (Regulations of Minister Cabinet) nr. 762 (14.07.2009.). Retrieved: <https://likumi.lv/doc.php?id=194944>. Access: 15.01.2018.
15. *Par Amatniecību (Handicrafts Law) (1993)*. LR likums. Retrieved: <https://likumi.lv/doc.php?id=63052>. Access: 15.01.2018.

## THE AVAILABILITY AND USE OF MEDIA INFORMATION SOURCES IN RURAL AREAS

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**Abstract:** This paper explores the availability and use of media information sources in rural areas. The theoretical part compares the content delivered by traditional media to the one delivered by new media. The empirical part provides analysis of data from years 2013 - 2017 provided by the Central Statistical Office (GUS), which show changes in the availability and use of information and communication technologies (ICT) in Poland by household, with particular focus on rural areas. Additionally, the paper presents the findings of the study Polish Rural Areas and Agriculture (Polska Wies i Rolnictwo) carried out for the Ministry of Agriculture and Rural Development and subordinate institutions, including: Agency for Restructuring and Modernization of Agriculture (ARiMR), Agricultural Market Agency (ARR), Rural Property Agency (ANR) and Agricultural Social Insurance Fund (KRUS). The study was conducted in years 2014-2016 and involved a survey research of rural residents, including farmers. Part of the study focused on media information sources. The paper uses a descriptive method, and detailed data is presented in a tabular format. The analysis demonstrates that there is less availability and use of new ICT in rural areas compared to Poland's average, but these differences are gradually decreasing. In particular, a high growth rate was recorded in the category of household access to broadband Internet, the number of farmers and rural residents regularly using the Internet increased and so did number of rural residents using social networking sites. The awareness of the role of competences necessary to use new technologies is also growing. However, rural residents and farmers are still less likely to use e-government services. Farmers still consider television to be the main source of information on available EU funds for the development of agriculture and rural areas, although they also hold the opinion that the Internet should be used more widely.

**Key words:** information, media, new information and communication technologies, rural areas.

**Jel code:** 033

### Introduction

Information has become one of the most important commodities today and that is why access to it as well as appropriate use of relevant information sources, including media, is so important. This applies to all areas of social and economic life, including agriculture and rural residents. Thanks to modern technology, information transfer can take place virtually anywhere in the world. The medium that allows the fastest information transfer is undoubtedly the Internet and this particular means of communication has clearly inspired changes in the style of media use in recent years. Information has become the main attribute of information society and it has developed as a result of the use of new information and communication technologies (ICT). The information availability itself is insufficient as the incoming messages need to be received, processed and analysed. Therefore, it is necessary to be able to use new technological solutions in the field of information management.

The aim of this paper is to present the availability and use of media information sources in rural areas and the characteristics of the content delivered by traditional and new media. ICT are still less available and used in rural areas compared to Poland's average, but these differences are gradually decreasing. Farmers still regard television as the main source of information on EU funds, although they also suggest that the Internet should be used more widely in this area.

Therefore, the data from 2013 - 2017 provided by the Central Statistical Office (hereafter referred to as GUS) were analysed to show changes in the availability and use of ICT in Poland by household, with particular focus on rural areas. In Poland, the monitoring of the use of ICT in households was implemented in 2004. The used methodology was correlated with counterpart

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research conducted in the European Union. The research is carried out by direct and telephone interview. In 2014, changes were made to the methodology used until 2013 (the new method included farms with family members aged 12-15, previously - 16-74 year olds, and the number of surveyed households increased from 8100 to 16 200) (Central Statistical Office, 2017).

This paper also analyses the results of the study Polish Rural Areas and Agriculture (Polska wies i rolnictwo) carried out in 2014-2016 and commissioned by the Ministry of Agriculture and Rural Development and subordinate institutions (Agency for Restructuring and Modernization of Agriculture, Rural Property Agency, Agricultural Market Agency, Agricultural Social Insurance Fund) and carried out by a consortium of Grupa BST and EU-Consult. The study involved personal interviews of two types: where the interviewer inputs data on paper (PAPI) and where data are input directly to a computer (CAPI). In 2016, the study involved 1.563 residents of rural areas from all over Poland, including 902 farmers. This opinion poll serves the purpose to monitor socio-economic changes taking place in rural areas, evaluate the activities of institutions working for the development of agriculture and rural areas as well as monitor the availability and use of media information sources (Ministry of Agriculture and Rural Development, 2017).

The study uses secondary sources and a descriptive and analytical approach. Detailed data are presented in a tabular format.

### **Characteristics of content delivered by traditional media and new media**

Information society relies on media as the key information source, and new media are becoming increasingly important. Media are broadly perceived as a source of information and entertainment, although initially the idea of media creation was guided by the purpose of using modern technology to generate profit, and media expansion was driven by advertising (Sorlin P., 2001).

Since the 20th century, media have been developing very fast and expanding their reach, starting from local press, through national press, to the rise of electronic media, i.e. the radio, television and the Internet. The reach and impact of media have had the effect of making us all, to some extent, dependent on access to information they provided. The on-going transformations in this area have been described by three basic media conventions: broadcasting, narrowcasting and ego-casting (Sosnowska J., 2014). In the first convention, content is delivered to the broader public at-large, which meant that the same message was sent to diverse recipients, while in the case of narrowcasting a more profiled message, converging with the expectations of recipients, is aimed at specific segments of the audience. Nowadays the phenomenon of ego-casting is proliferating where individual recipient selects and focuses only on content that they find interesting. Such extremely personalized reception becomes the viewer's limitation because the recipient does not take advantage of the content, which in their opinion is uninteresting (Szpunar M., 2014).

Media have achieved a very high degree of flexibility. All kinds of thematic press, radio and TV channels have been tailored to specific recipients' needs. Therefore, everyone, independently of their interests, can find information or entertainment that will appeal to them. What is more, media mold our attitudes and influence behaviour towards specific situations. Usually, the audience does not realize that. Passive recipients of media sent messages submit to what is conveyed to them. This is, among other things, the result of the characteristics of media messages themselves, which are designed to attract the attention of as many people as possible. Consequently, various entities

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of social and economic life use media not only to provide information but also to influence the attitudes and behaviour of the recipients (Goban-Klas T., 2004).

The aim of media content, in particular the advertising message, is to reach the recipient, be remembered and finally generate the expected reaction of the potential client. Depending on the content of the message, feedback from the recipient may take a long time, may be very quick or may never reach the sender. Feedback, and frequent problems with receiving it, is one of the main problems faced by message senders who use traditional media (Golka M., 2008). In contrast, new media users are significantly more active and do not present exclusively passive attitudes. Users of new means of social communication participate in creating information and opinions. Through easy access to the Internet, recipients become co-creators of the media content.

M. Jezinski lists four dimensions of new media interactivity. The first one, spatial, is defined as establishing bilateral or multilateral communication. The second, the time dimension, is the ability to communicate in any place and time of convenience. The third is the behavioural dimension, i.e. the ability to exchange roles, between the recipient and the sender and exercise control over what happens during the interaction. The fourth - intellectual dimension - is defined as the ability to understand the meanings and contexts of the interaction (Jezinski M., 2009).

When traditional and new media are compared, nine communication features need to be considered: speed, reach, storage capacity, accuracy, selectivity, interactivity, stimuli richness, complexity and privacy protection (Van Dijk J., 2010). Both new media and some of traditional media (TV, radio) have a similar speed of contact around the world. Using a telephone or e-mail, we are able to contact instantly any person anywhere in the world. Reach has both geographical and social dimension. In the case of new media, reach is very large, because all countries are connected to integrated telecommunications networks enabling data exchange via telephone lines and the Internet. In turn, storage capacity in the case of new media is much larger than in traditional media. You can store almost unlimited amount of information in digital memory. Accuracy of information is a category that also distinguishes new media, because messages sent through new media are more precise compared to often ambiguous messages conveyed through e.g. telephone lines. Selectivity of messages and recipients is a crucial communication feature. In new media, recipient groups are precisely defined and it is through them that specific people can be contacted. A very special feature of new media is their interactivity; however, the exchange does not reach the level of a direct conversation, because we do not send emotions and non-verbal cues. Similarly, when it comes to the richness of stimuli, new media are unable to provide the same amount of stimuli as a real experience, and that is why, for example, online shopping cannot live up to direct shopping in a store. Also the complexity of new media is still rather low, it is difficult to make decisions or negotiate over a computer network. Privacy protection in the case of new media is either difficult, or even entirely impossible. The radio, press and television can be used anonymously, while on the Internet users' profiles are created and all their activities are recorded.

Interactive new media have played a crucial role in stimulating changes in the accessibility and reception of media content. The main manifestations of these changes include:

- recipients continuously flow between various broadcasts, channels or media, (audience flows);
- audience is changing in terms of size, intensity of contact and composition, (fluid audience), and thus the auditorium is increasingly diversified and fragmented;

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- content is more accessible due to the greater number of networks, i.e.: terrestrial TV, cable TV, satellite TV, Internet TV, mobile TV, mobile telephony, the Internet and wider use of multifunction devices (computer, tablet, mobile phone);
- time-shifted viewing has become an alternative to broadcast transmission - non-linear use of recorded content or on-demand services are increasingly popular;
- multi-screening, the phenomenon of simultaneous use of several electronic devices to receive media content, is on the rise.

The above comparison demonstrates that new media offer much more communication possibilities than traditional media. However, despite many unquestionable advantages, new media have also their drawbacks and limitations. The most important is definitely the lack of privacy and anonymity on the Internet, as well as the enormous scale of communicated content often leading to information noise and the absolute necessity to select the content reaching the recipient.

### The use of information and communication technologies in households (ICT) in rural areas - research results

In 2017, nearly 82 % of households in Poland had access to a computer, and in rural areas it was 79 % (Table 1). In the same year, 22.0 million people in Poland used a computer regularly, which is an increase by 10.4 percentage points compared to 2013. While the total for Poland was 71.2 % of regularly computer users, in rural areas it was 64.8 %.

Table 1

#### Household access to a computer and the Internet in total and in rural areas in years 2013 - 2017 (in %)

Specification		2013	2014	2015	2016	2017
<b>Households possessing a computer</b>	Rural areas	71.7	73.6	75.0	77.0	78.8
	Total	74.7	77.1	77.9	80.1	81.8
<b>Regular computer users</b>	Rural areas	51.4	54.8	56.8	62.3	64.8
	Total	60.8	63.5	64.8	69.1	71.2
<b>Households with Internet access</b>	Rural areas	67.8	71.5	72.0	77.8	78.6
	Total	71.9	74.8	75.8	80.4	81.9
<b>Households with broadband Internet access</b>	Rural areas	63.0	66.7	64.7	71.3	74.1
	Total	68.8	71.1	71.0	75.7	77.6

Source: authors' elaboration based on: *Information Society in Poland. Statistics from the years 2013 - 2017. Central Statistical Office (GUS) Statistical Office in Szczecin. Information and Statistics, Warszawa - Szczecin 2017, pp. 108-120.*

As for the access to the Internet, in 2017, 78.6 % of households in rural areas had Internet access compared to 81.9 % of households nationwide. In comparison to 2013, the biggest increase in the Internet access rate was recorded in rural areas and in areas with low urbanization (respectively 10.8 and 11.6 percentage points). Also access to broadband Internet needs to be mentioned here. Rural households were much less likely to have broadband Internet access than households in cities. In 2017, this proportion was 74.1 % in rural areas, and 81.5 % in big cities. Compared to 2013, the biggest increase in the proportion was recorded in rural areas (11.1 percentage points), while in smaller and big cities, it was respectively 9.2 and 6.4 percentage points.

It is worth noting that the biggest growth in the proportion of regular Internet users compared to 2013 was recorded in the group of farmers (20.4 percentage points). Rural areas also recorded the biggest increase (by 14.2 percentage points) in the proportion of regular Internet users in the

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analysed period. In the population of pupils and students, this increase was insignificant. Obviously, the indicator was already high at the beginning of the analysed period.

The most-often-declared reason for not having Internet access at home is still the lack of such a need. In comparison to 2016, this indicator has decreased by 3 percentage points and in 2017 it was 67.6 % of households with no access to the Internet. It turns out that this reason was most frequently declared by the residents of smaller cities, less often by the residents of rural areas, and the least frequently by the residents of big cities. However, the disproportions between the aforementioned groups are not big and in the case of rural areas it was 67.1 % of responses, and in big cities - 65 %. The second declared reason was the lack of adequate skills (54.2 %), although in recent years respondents have been more likely to indicate Internet aversion as the reason for not having access to it at home. It is therefore important to recognize the crucial role of competences to use new technologies to one's benefit.

Internet communication is the most popular among pupils and students and residents of big cities. In 2017, the most popular form of Internet communication was electronic mail and social networking sites. The same tendency was observed in years 2013 - 2017, both nationwide and in rural areas. The highest growth dynamics was recorded in the group of rural residents using social networking sites, and in comparison to 2013 it increased by 13.6 percentage points. Sending and receiving e-mail is still the most popular form of Internet use. In the analysed period, an increase in e-mail use of 9.2 percentage points was recorded in rural areas and 8.3 percentage points nationwide (Table 2).

Table 2

**Use of online communications services in the past three months (in %)**

<b>Online communications services</b>		<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>
<b>Instant messaging</b>	Total	21.3	16.4	8.8	20.6	29.7
	Rural areas	17.7	14.2	7.3	16.6	26.1
<b>Using social networking sites</b>	Total	35.3	36.8	41.4	44.2	48.0
	Rural areas	30.9	32.9	37.8	40.3	44.5
<b>Telephoning via the Internet</b>	Total	24.1	27.5	27.6	28.2	31.7
	Rural areas	18.6	21.4	21.1	22.0	26.3
<b>Sending and receiving e-mail</b>	Total	51.5	52.9	54.0	57.8	59.8
	Rural areas	41.3	43.6	42.8	48.3	50.5

**Source: authors' elaboration based on: Information Society in Poland. Statistics from the years 2013 - 2017. Central Statistical Office (GUS) Statistical Office in Szczecin. Information and Statistics, Warszawa - Szczecin, pp. 134 -135.**

In 2017, the survey was supplemented by a new question concerning the respondents' participation in sharing economy - using websites or applications that act as intermediaries between private persons offering accommodation or transport services and private individuals who want to use these services. The study showed that it is more popular to use shared accommodation than transport (15.0 % and 6.2 %, respectively). The websites or applications in the field of sharing economy are more often used by younger people with higher education and self-employed (Table 3). In the groups of rural residents and farmers, these rates are the lowest, but it undoubtedly results from the nature of the profession and needs in this area.

Table 3

**Using websites or applications for sharing economy in 2017  
 ( % of total individuals in a group)**

Specification	Arranging accommodation	Arranging transport services
<b>Total</b>	<b>15.0</b>	<b>6.2</b>
<b>Employment situation</b>		
<b>Students</b>	14.6	11.8
<b>Persons employed</b>	20.4	7.6
<b>Employees</b>	21.5	7.9
<b>Self-employed</b>	29.6	11.3
<b>Farmers</b>	1.9	1.3
<b>Unemployed</b>	6.7	3.3
<b>Retired or other not in the labor force</b>	5.0	1.5
<b>Domicile</b>		
<b>Big cities</b>	26.8	11.2
<b>Small cities</b>	13.9	5.1
<b>Rural areas</b>	7.6	3.4

*Source: authors' elaboration based on: Information Society in Poland. Statistics from the years 2013 - 2017. Central Statistical Office (GUS) Statistical Office in Szczecin. Information and Statistics, Warszawa - Szczecin 2017, p. 137.*

The Internet was also used for contacts with public administration bodies. In 2017, the respondents showed increased interest in downloading official forms and sending them. In comparison to 2013, the percentage of people using the service of sending completed forms has almost doubled. In previous years, the most popular form of using e-government services was searching for information on public administration websites, also in rural areas. Residents of big cities were more likely to use E-government services than the residents of rural areas. In the case of downloading forms or sending completed ones, the two groups differed by approx. 20 percentage points.

**The media sources of information about rural development and agriculture preferred by Polish farmers - research results**

The analysis of the reports Polish Rural Areas and Agriculture from years 2014-2016 demonstrates that the main source of information on available EU funds for the development of agriculture and rural areas is television. In 2016, this was the opinion of 48 % of farmers participating in the study, similarly to preceding years (Table 4). In the survey, respondents were asked which TV station provided the aforementioned information, and almost half of the farmers indicated Channel 1 of TVP S.A. For rural residents, television is also the main source of information on certificates confirming the quality of foodstuffs and agricultural products (55 % of respondents). Information on this subject was also obtained from press articles (36 %), family and friends (35 %) and websites (35 %). Television remained the key information source for over half of the respondents regardless of their age (Ministry of Agriculture and Rural Development, 2017).

It is worth noting that the number of farmers obtaining information from the radio decreased from 21 % in 2014 to 13 % in 2016. Over a quarter of radio listeners indicated Polish Radio 1 as the main information source. As for the Internet, the role of this information source increased in the analysed period of time. The website most frequently visited by farmers (24 %) was arimir.gov.pl run by the Agency for Restructuring and Modernization of Agriculture. The farmers

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were also asked to what extent they found the information on Rural Development Programme 2014-2020 posted on the Internet ([www.minrol.gov.pl](http://www.minrol.gov.pl), [www.arimr.gov.pl](http://www.arimr.gov.pl), [www.arr.gov.pl](http://www.arr.gov.pl)) understandable. The best understanding of this information was declared by farmers who were the beneficiaries of direct payments, 8 % of them answered that this information is 'definitely understandable' and 45 % - 'rather understandable'.

Table 4

**Main media sources of information about changes taking place in rural areas and agriculture as well as the possibility of obtaining EU funds in 2014-2016 ( % of respondents in the group of farmers)**

Information source	2014 N=866	2015 N=682	2016 N=772
Television	45 %	49 %	48 %
Radio	21 %	15 %	13 %
Internet	18 %	27 %	30 %
Daily press	13 %	20 %	13 %
Specialized trade press	11 %	19 %	20 %
Publications of institutions acting for the development of rural areas and agriculture	6 %	9 %	24 %

Source: authors' elaboration based on the report *Polish Rural Areas and Agriculture (Polska wies i rolnictwo) 2014-2016*, <http://www.minrol.gov.pl/opracowania-ekspertyzy-publikacje> (Retrieved on 7 Jan 2018)

In the category of daily press, the respondents most frequently looked for information in regional newspapers and national titles: *Gazeta Wyborcza* and *Dziennik Polski*. In the category of specialized trade press, it was *Poradnik Rolniczy* and *Farmer*. However, daily press, just like radio, was mentioned in 2016 only by 13 % of the surveyed farmers. When analysing the significance of particular media information sources, it is worth noting that farmers showed increased interest in publications of institutions acting for the development of rural areas and agriculture.

Another two important information sources included: ads placed on notice boards in commune (gmina) offices or county (powiat) offices as well as neighbours, family and friends (in both cases more than 40 % of respondents indicated these sources).

The respondents were also asked for suggestions regarding improvements and changes in the scope of activities promoting Rural Development Programme 2014-2020 (RDP). In the group of RDP beneficiaries, the majority of respondents (53 %) suggested wider use of the Internet and other forms of electronic communication as the most urgent change in this area. Half of the surveyed beneficiaries of the RDP were of the opinion that it is also necessary to provide more information and broadcasts on the radio and television, and 34 % were in favour of the press. The respondents also suggested other forms of disseminating useful information such as meetings (46 %), extended activities of agricultural advisors and the need to simplify the language of provided information. The latter was indicated by 26 % of RDP beneficiaries, notably, it was the group who declared the best understanding of information compared to other respondents

## Conclusion

1) In Poland, residents of rural areas, including farmers, are still categorized as the social group with lesser access to modern information sources, although in recent years this gap has been decreasing. The data presented in this paper show that:

- differences in the proportion of households equipped with a computer and access to the Internet are diminishing - the most significant increase was recorded in the access to broadband Internet;
  - the number of regular internet users increased among farmers and rural residents;
  - the highest growth rate in the proportion of people using social networking sites was recorded in the group of rural residents;
  - rural residents are less likely to use e-government services;
  - the awareness of the role of competences to use new technologies increases;
  - farmers still consider television the main source of information on EU funds for the development of agriculture and rural areas, although they also suggest that the Internet should be used more widely.
- 2) In order to close the still existing gap, actions should be taken to increase social awareness of the role that information technologies play in the modern world. That is why initiatives enabling continuous education of people in this field are so important, both in the perspective of an individual and social groups. The amount of knowledge to which we have access, thanks to widespread information, with appropriate use, can bring numerous benefits in the form of better standard of living and chances to catch up with the economic level of more developed regions both on the national and global scale

### **Bibliography**

1. Goban-Klas, T. (2004). Media i komunikowanie masowe: teorie i analizy prasy, radia, telewizji i Internetu (Media and mass communication: theories and analyzes of the press, radio, television and the Internet.). Warszawa: PWN. p. 325.
2. Golka, M. (2008). Bariery w komunikowaniu i społeczeństwo (dez)informacyjne (Barriers in communication and (dis)information society). Warszawa: PWN. pp. 55-60.
3. Information Society in Poland. Statistics from the years 2013 - 2017. Central Statistical Office (GUS) Statistical Office in Szczecin. Information and Statistics, Warszawa 2017.
4. Jezinski M., Nowe media a media tradycyjne: prasa, reklama, internet (New media and traditional media: press, advertising, internet), Wydawnictwo Adam Marszałek, Torun 2009, pp. 308-310.
5. Ministerstwo Rolnictwa i Rozwoju Wsi, 2017, Biuletyn Informacyjny 5/2017, Polska wieś i rolnictwo 2016 (Polish Rural Areas and Agriculture), Warszawa: p. 14.
6. Polska wieś i rolnictwo z lat 2014-2016 (Polish Rural Areas and Agriculture 2014-2016), <http://www.minrol.gov.pl/opracowania-ekspertyzy-publikacje> (Retrieved on 7 Jan 2018)
7. Sorlin, P.(2001). Mass media. Wrocław: Wydawnictwo Astrum. p. 11.
8. Sosnowska, J. (2014). Widz spersonalizowany – z problematyki odbioru telewizji tematycznej w Polsce (A personalized viewer - the reception of thematic television in Poland), „Media i społeczeństwo” 4/2014. Bielsko Biala: Wydawnictwo Naukowe Akademii Techniczno – Humanistycznej w Bielsku – Białej. pp. 39-41.
9. Szpunar, M. (2014). Internet – nowa sfera publiczna czy kabina pogłosowa?( Internet - a new public sphere or a reverberation chamber?).[In:] Media i polityka. Relacje i współzależności (Media and politics. Relationships and interdependencies), M. Adamik-Szysiak (Ed.). Lublin: Wydawnictwo Uniwersytetu Marii Curie-Skłodowskiej. Lublin: p. 75.
10. Van Dijk, J. (2010). Społeczne aspekty nowych mediów. Analiza społeczeństwa sieci (The Network Society: Social Aspects of New Media ). Warszawa: PWN. pp. 16-19.

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## IMPACT OF EU FUNDS ON CURRENT STATUS AND PROSPECTS OF ORGANIC FARMING IN POLAND

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**Abstract:** The analysis of the status of organic farms in Poland in the period of 2003-2016 showed an increase in both the number and the acreage of agricultural holdings. As of 2004, high dynamics of growth was observed, which was related to Poland's accession to the EU and implementation of the CAP and the national Environmental Management Scheme. The aim of this paper is to present growth tendencies in and aid measures for organic farming. The analysis demonstrates the dynamics in the number organic farms and the acreage of organic crops on the basis of the data of the Central Agricultural and Food Quality Inspection (GIJHARS) and the Agency for Restructuring and Modernisation of Agriculture (ARMA). The conclusions that can be drawn from the studies demonstrate that the development of organic farming is highly dependent on the amount of EU funds. Financial support coming from the budget of the European Community is effectuated through consecutive RDP editions (2004-2006, 2007-2013 and 2014-2020). The dynamics of growth in organic farming during the CAP implementation stage indicates that the level of support from the EU is the major determinant of growth in organic farming in Poland. The period of 2003-2016 was characterized by a ten-fold increase in the number of organic farms (from 2.286 to 23.375) and the acreage of organic crops (from 61.2 thousand ha to 537 thousand ha).

**Keywords:** organic farms, funds EU, RDP, Poland

**JEL code:** O13, Q10

### Introduction

Organic farming is nowadays one of the fastest growing branches of agriculture in the world, particularly in the European Union (EU). The term 'organic farming' was acknowledged in the EU legislation as a synonym of older terms deriving from historic names of agricultural production models: bio-dynamic agriculture (Koepfi Plato, 2001; Grykien, 2005) organic agriculture (Vogt, 2000; Goklany, 2002), *agriculture biologique* (Yussefi, 2010). Moreover, there appear also other terms, such as alternative and non-conventional agriculture (Seufert, Ramankutty, Foley, 2012). The growth of organic farming is connected to a destructive impact of conventional agriculture on the environment (Lamine, 2011), e.g. pollution of ground and subterranean water with nitrogen compounds, and over-production of food in developed countries. Whereas the aim of organic production is to protect the environment – soil, water and landscape – and to obtain high-quality crops (Tilman et al., 2001). This should be done by eliminating chemical technologies from agricultural production (Lairon, 2010; Kozłowski, 2009). Maintaining the balance between resources and economic demands (Stawicka, Szymczak-Piatek, Wieczorek, 2004) subscribes into the concept of sustainable development (Goldberger, 2011) and brings a great many benefits for the natural environment and society (Pearce, Turner, 1990). Organic farming in Poland is growing very dynamically. In the period of 2003-2016, the number of organic farms grew by more than 10 times: from 2.286 to 23.375. Similar intensity of growth is noted for the agricultural acreage (AA) under organic crops: from 61.2 thousand ha to 537 thousand ha. At present, they constitute about 4 % of the total agricultural acreage in Poland (Jezierska-Thole, Rudnicki, Kluba, 2016). The growth of organic farming is affected by natural, social and economic conditions, including – first and foremost – financial instruments available in form of EU funds. Financial support coming from

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the budget of the European Community is effectuated through consecutive RDP editions (2004-2006, 2007-2013 and 2014-2020<sup>1</sup>).

The aim of this paper is to present growth tendencies in and aid measures for Polish organic farming in the period of 2003-2016. It applies both to the number of organic farms and to the agricultural acreage (AA) dedicated for organic crops. The analysis was based on the materials and data by the Central Agricultural and Food Quality Inspection (GIJHARS) (number of organic farms and crops acreage) and the Agency for Restructuring and Modernisation of Agriculture (data related to the EU programmes). The period of time which has been covered by the research shows the state of organic farming in the run-up to Poland's accession to the EU (2003) and after the financial closure of the 2007-2013 perspective. Therefore, it can be clearly noticed how the EU instruments affect the growth of Polish organic farming.

### **Material and methodology of research**

The analysis presents the state and possibilities of development of organic farms in Poland. The basic administrative unit accepted for the study was the region (region). The research period concerned the years 2003-2016. This is the time to adapt national agricultural policy to EU standards. Since 2004, the implementation of the Common Agricultural Policy (CAP) has begun, mainly through RDP (2004-2006, 2007-2013, 2014-2020). Therefore, there were large possibilities of co-financing organic farming.

This publication is "resultant statistical information" containing data on organic farms. Statistical material was obtained on the basis of reports of the Main Inspectorate of Trade Quality of Agriculture and Food (IJHARS), ARMA data and own empirical research. Descriptive and comparative studies were used and the results are presented in graphical form. The analysis covered the following research stages:

- presentation of the development of organic farms and the possibility of subsidizing organic farms from EU funds and the national budget;
- showing the state and changes in the number and area of organic farms in 2003-2016;
- an attempt to assess the impact of EU funds (RDPs) on the increase in the number and area of organic farms;
- In order to determine the correlation between the allocation of EU funds and the increase in the number of organic farms, Pearson's linear correlation coefficient was applied.

### **Support for Polish organic farming in the periods of 2004-2006 and 2007-2013**

The first organic farm in Poland was set up in the 1930s. The bio-dynamic method of land cultivation was introduced by Stanislaw Karlowski, a Senator of the 2<sup>nd</sup> Republic of Poland, in his estate in Szelejewo near Gostyn. In socialism, organic farming did not matter much. Only in 1986-1987 a pioneering group of farmers started to transform their agricultural holdings into organic farms. In the 1990s, the first Association of Organic Food Producers was founded; it granted 27 certificates in 1990 (Jeziarska-Thole, Biczkowski 2013). Organic farming was first subsidised by the state in 1998. Initially, there were only subsidies to the costs of organic farm management, but in 2000, subsidies to the acreage of organic crops were introduced. Currently, financial support for organic farming comes from two sources, i.e. from the national budget and the EU budget (Golinowska, Adamska, 2014). The procedures for granting and paying state subsidies

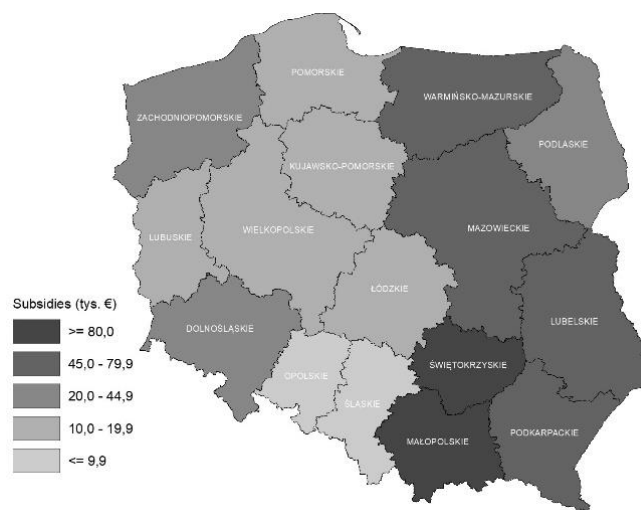
<sup>1</sup> According to the procedures of implementing the financial support policy of the EU, the actual implementation time span is 2 years („n+2”) after the completion of a particular perspective (e.g. the settlement of the RDP 2007-2013 funds was in fact finished in 2016)

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are provided for by the Regulation of the Ministry of Agriculture (Regulation of the Ministry of Agriculture and Rural Development of 30 May 2010). Until 2014 the state support for organic farming included: subsidies to costs of farm management, research into organic farming, coordination of consulting and running an exemplary organic farm, publication of training materials, analysis of the amount of prohibited substances (pesticides) in crops (Jeziarska-Thole, Biczkowski, 2017).

Since Poland's accession to the European Union (2004) – thus, since becoming subject of the Common Agricultural Policy (CAP) – organic farmers have been able to participate in the Environmental Management Scheme, while since 2007, they have been able to take advantage of the RDP 2007-2013 measure 'organic farming'. Both forms of support offer applicants subsidies to organic production. In 2004, 3.654 agricultural holdings applied for subsidies to cost management. The amount paid for this purpose was 2.813 thousand PLN, whereby the largest sum was granted to the Malopolskie voivodship (Fig. 1).



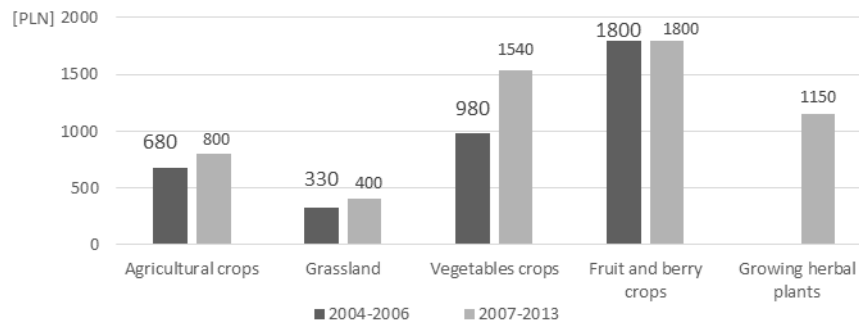
Source: authors' construction based on the data of *Rolnictwo ekologiczne...*, ARMA

Fig. 1. The amount of subsidy to control costs (tys. €)

In the implementation period of the RDP 2007-2013, organic farmers could obtain support from two axes (Rural..., 2007).

- 1) **Axis I** 'Improving the competitiveness of the agricultural and forestry sector' with the following measures:
  - Participation of farmers in food quality scheme. The support was available only to producers of agricultural products dedicated for consumption (maximum of ca. € 240 a year for a producer). In 2011, the European Commission agreed to increase the amount (up to ca. € 720) for agricultural producers within the common system of food quality in organic farming.
  - Information and promotion. It was supposed to improve the competitiveness of the agricultural and forestry sector and to give it more competitive advantage in the market. For financing information on and promotion of the products participating in food quality systems there were about € 10 mln. The scope of support covered not only agricultural yields but also comestibles.
- 2) **Axis II** 'Improving the environment and countryside' – measure 'Environmental Management Scheme', package 2 – 'organic farming'. The package included 12 feasible variants (Regulation by the Ministry of Agriculture and Rural Development of 28 February 2008). Generally, the budget available within the measures of the RDP 2007-2013 equalled € 39 mln (Losz, 2014).

In both of the completed programming periods (2004-2006 and 2007-2013), financial aid oscillated between 260 PLN/ha and 1.800 PLN/ha, depending on the kind of crops and cultivation stage. Larger support was granted to farmers when their holdings were being adapted to organic farming, while lower support was given to holdings already with the certificate. Also, the RDP 2007-2013 introduced the support for cultivation of herbal and orchard plants (labour-intensive - 1,800 PLN/ha and other - 1,540 PLN/ha) (Fig. 2).



Source: authors' construction based on the data of *Szanse i zagrożenia...*, 2013, ARMA

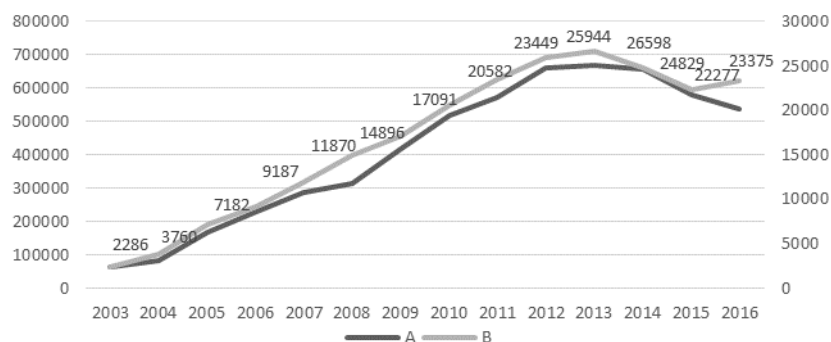
Fig. 2. Subsidies (PLN) of organic farming (during conversion) in RDP 2004-2006 and 2007-2013

On account of the significant influence of organic farming on economic growth, social and cultural development, in 2004 the European Action Plan for Organic Food and Farming was created; it included the main instruments for growth of the pan-European organic sector (Action Plan..., 2007). One of its measures referred to CAP instruments and recommended full utilisation of the funds within the RDP 2007-2013 for the support of organic farming in the EU Member States. These aims covered, e.g. an increase in the number of organic farms and in the acreage under organic farming.

### Research results and discussion

The development of organic farming in Poland may be divided into four stages (Fig. 3):

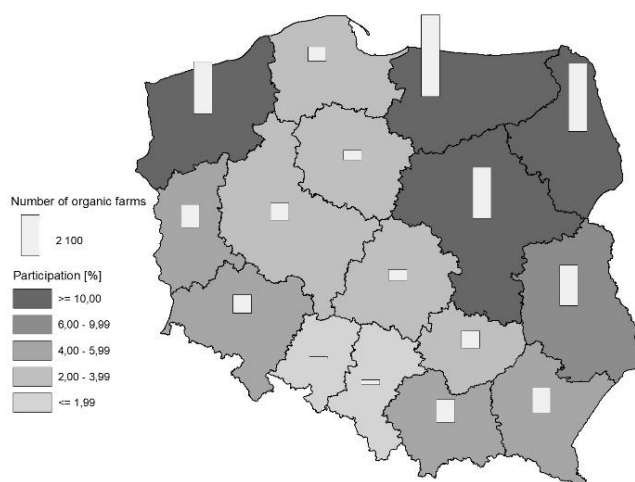
- initial period until 1998, when organic farming did not benefit from any financial support; with about 500 organic farms;
- period of 2000-2003, when the state budget reimbursed part of the costs of organic farm certification and insubstantial supplementary payments were made to agricultural acreage (AA). That led to a four-fold increase in the number of organic farms and agricultural acreage. Despite that, at the end of 2003 organic farms made merely 0.11 % of all agricultural holdings and their acreage represented only 0.3 % of the total AA in Poland (Jeziarska-Thole, 2016);
- dynamic growth from 2004 to 2013, i.e. after Poland's accession to the EU and implementation of the CAP, as well as implementation of the national Environmental Management Scheme. This period saw a dynamic increase in the number of organic farms (from 3.760 to 26.598) and in their agricultural acreage (from 83 to 606 thousand ha) (Klos, 2001);
- period of 2014-2016 characterised by fluctuations related to the temporary reduction in the support for organic farming from the EU funds, as a result of which the number of farms fell slightly (down to 22.3 thousand) but bounced back later (23.4 thousand in 2016).



Source: authors' studies based on GIJHARS

Fig. 3. Number and agricultural area of organic farms in Poland in 2003-2016  
 A-number, B-agricultural area (ha)

The analysis of the ratio of organic farms at the regional level demonstrated that they appeared in high percentage in voivodships characterised by difficult natural conditions and agrarian fragmentation, i.e.: Malopolskie (18.5 %), Swietokrzyskie (14.6 %), Podkarpackie and Mazowieckie (11 %, respectively). Such a pattern proves that the financial support from the EU funds is particularly important for farmers operating in unfavourable natural conditions. It is further substantiated by a low value of the agricultural production area quality index<sup>1</sup>, much below the Polish average (67 points). In these areas, organic farming, besides being responsible for production, is also important owing to its protective function, i.e.: maintenance of environmental assets, biodiversity and cultural values. Recently the number of organic farms has grown in regions featuring a higher ratio of large holdings: Warminsko-Mazurskie (17.8 %), Podlaskie (14.8 %) and Zachodniopomorskie (11.5 %) voivodships (Fig. 4).



Source: authors' studies based on GIJHARS

Fig. 4. Number and participation of organic farms in by voivodeships in Poland in 2016

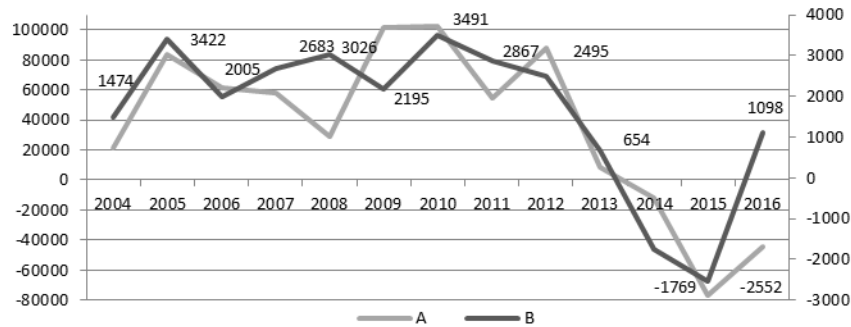
The largest increase in the number of organic farms was in 2005 and 2010 when, in relation to the previous year, the increment was of more than 3 thousand. These changes also bore on the acreage of organic farming. The years of 2009 and 2010 recorded the highest annual growth of agricultural acreage (by ca. 100 thousand ha). The years of 2014 and 2015 indicated the first decreases in the number of organic farms (by approx. 4 thousand) and their acreage. It was due to formal-legal criteria, changes in certification procedures, stricter requirements for organic food production processes, and discontinued subsidizing of new ventures from the EU funds (RDP 2007-2013 funds had already finished and PROW 2014-2020 had not been launched yet). In 2016,

<sup>1</sup> Agricultural production area quality index (APAQI) – takes into account major elements of the natural environment: soil quality, agroclimate, landform and hydrographic conditions. It qualifies the area in terms of agricultural development.

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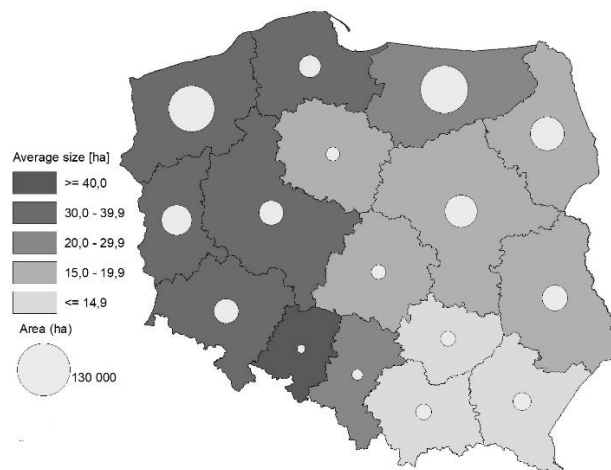
negative tendencies were stopped and the situation was stabilised; nowadays, we are witnessing a rising trend again (Fig. 5). An important objective of the study was to examine the strength of the relationship between the increase in the number of organic farms and the size of EU subsidies (under RDP 2007-2013) for farms conducting organic production. Analysis of interdependencies (carried out with the Pearson's linear correlation method for 2004 and 2016) between features showed a very strong relationship (0.902308) for amounts paid for organic farming, with the R<sup>2</sup> determination coefficient (0.847).



Source: authors' studies based on GIJHARS

Fig. 5. Growth in the number (A) and agricultural area in ha (B) of organic farms compared to the previous year in Poland in 2004-2016

At the regional level, the agricultural acreage under organic crops oscillates between 3 and 10 thousand ha (Opolskie, Slaskie and Lodzkie voivodships) and 100 thousand ha in the Zachodniopomorskie voivodship (Fig. 6). The average size of an organic farm equals 26.1 ha (an increase by 4.1 ha when compared with 2003) and is higher than that of a conventional farm (10.7 ha) by ca. 15 ha. A spatial analysis demonstrated that the highest ratio of large (50-100 ha) and very large (>100 ha) holdings was recorded in the following voivodships: Wielkopolskie (29.4 %), Opolskie (26.7 %), Lubuskie and Slaskie (24 %, respectively). On the other hand, a high ratio of small (below 10 ha) holdings was found in the following voivodships: Malopolskie (40 %), Swietokrzyskie and Lubelskie (20 %, respectively).



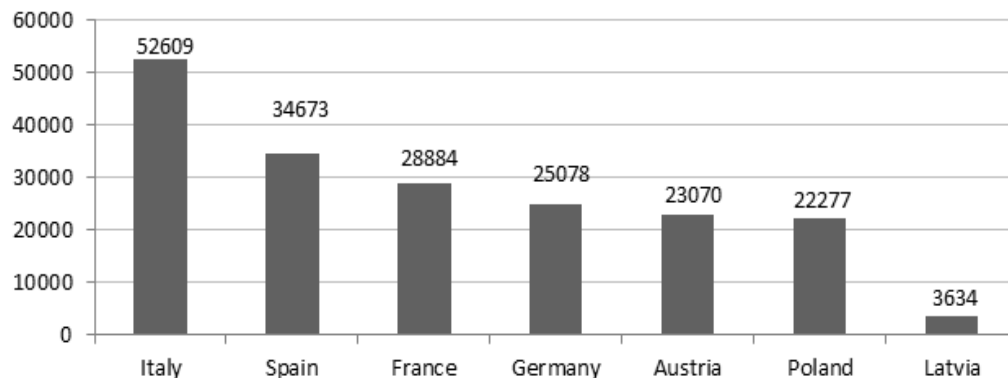
Source: authors' studies based on GIJHARS

Fig. 6. Agricultural area and average size of organic agricultural land in Poland in 2016 (hectare)

Thanks to organic farming being supported with the EU financial instruments, in recent years Poland has been maintaining high dynamics of growth in organic farms. Taking into account the whole period under analysis (2003-2016), Poland is on the second position in the world when it comes to the dynamics of growth in the acreage of organic crops. As a result (according to the



EUROSTAT data), in 2013 Poland was ranked third in the EU in terms of the number of organic farms. However, after the collapse of 2014 and 2015, it fell to the sixth position (Fig. 7). Italy is the leader, followed by Spain, France and Germany.



**Source:** authors' studies based on Eurostat and GIJHARS

Fig. 7. **Number of organic farms in Europe in 2016**

Although organic farming, as a new form of agricultural production, has already appeared in the 1920s, the period of its dynamic development is currently coming into existence. This is due to the fact that nature is changing. It is not currently perceived only as a reservoir of raw materials and a subordinate tool for people to achieve their goals, but as a holistic system in which people are one of its elements. Organic farming perfectly fits into the model of eco-development, becoming at the same time, the premise of multifunctional rural development.

## Conclusions

- 1) The support for organic farming from the EU funds and the national Environmental Management Scheme largely contributed to the increase in the number and acreage of organic farms. The dynamics of growth in organic farming during the CAP implementation stage indicates that the level of support from the EU is the major determinant of growth in organic farming in Poland.
- 2) The period of 2003-2016 was characterized by a ten-fold increase in the number of organic farms and the acreage of organic crops. These farms are the most numerous in the following voivodships: Malopolskie, Podkarpackie, Lubelskie and Mazowieckie. In total, they made 50 % of all organic farms in Poland. In the same time the agricultural acreage of organic farms surged from 61 thousand ha to 537 thousand ha, which is approx. 4 % of the total agricultural acreage. The downward trend of 2014-2015 proves that if the level of support from the EU funds is lower, farmers reduce the acreage under organic crops.
- 3) The average size of an organic farm in Poland in 2016 exceeded 26 ha AA, with about 10.7 ha for conventional farms. In some voivodships, the size of an organic farm ranged from 10 ha (Malopolskie voivodship), through 43 ha (Wielkopolskie voivodship), up to 65 ha (Zachodniopomorskie voivodship).
- 4) Organic farms grow mostly in regions with unfavourable agri-technical conditions and a larger percentage of areas valued for their natural assets. In spite of the substantial increase in the AA and the number of organic farms, the volume of organic production in the Polish market is still insufficient.
- 5) The conclusions that can be drawn from the research demonstrate that the growth of organic farming is primarily dependent on the amount of EU funds. Therefore, it would be necessary to

consider diversification of financial support systems in order to suit them to specific purposes, i.e. conservation of environmental assets or production of organic food.

### Acknowledgement.

This paper was written in the framework of the research project of the National Science Centre [Narodowe Centrum Nauki] (no. DEC-2012/07/B/HS4/00364).

### References

1. Goklany, I.M. (2002). The Ins and Outs of Organic farming. *Science*. Volume 298, 1889-1990.
2. Goldberger, J.R. (2011). Conventionalization, Civic Engagement, and the Sustainability of Organic Agriculture, *Journal of Rural Studies*, Volume 27, Issue 3, pp. 288-296.  
<https://doi.org/10.1016/j.jrurstud.2011.03.002>.
3. Golinowska, M., Adamska, H. (2014). Support for Organic Farming in Poland after 2004, *J. Agrib. Rural Devel.*, 1(31), p. 31.
4. Grykien, S. (2005). Barriers to the Development of Organic Farming in Poland. In: E. Palka E. (Eds.) *The functions of rural areas*. Kielce: Publisher of the Swietokrzyska Academy, 63-71.
5. Jezierska-Thole, A., Biczkowski, M. (2013). The Importance and Determinants of innovation in agriculture in Poland. *Association of Agricultural and Agribusiness Economists*, Volume 15, Issue 2, 124-131.
6. Jezierska-Thole, A. (2016). Spatial diversity of farms by size and region in Poland and Germany. *Proceedings of the 2016 International Conference "Economic Science for Rural Development" No 42*, Jelgava: LLUESAF, 21-22 April 2016, 235-243.
7. Jezierska-Thole, A., Rudnicki, R., Kluba, M. (2016). Development of energy crops cultivation for biomass production in Poland. *Renew Sust. Energ. Rev.*, Volume 62, 534-545.
8. Jezierska-Thole, A., Biczkowski, M. (2017). Financial Funds from European Union funds as a chance for the development of the sector of organic farms in Poland. *Association of Agricultural and Agribusiness Economists*, Volume 19, Issue 2, 95-102.
9. Klos, L. (2011). Organic farming as an element of sustainable and sustainable agriculture, *Economics and the Environment*, No 1(39), 122-123.
10. Koepf, H., Plato, B. (2001). Die biologisch-dynamische Wirtschaftsweise im 20. Jahrhundert. Die Entwicklungsgeschichte der biologisch-dynamischen Landwirtschaft. Dornach: Verlag am Goetheanum, 56-67.
11. Kozłowski, J. (2009). Ecological approach in the planning methodology - a safe solutions space. *Problems of Urban Development* 4, 23-38.
12. Lairon, D. (2010). Nutritional quality and safety of organic food. A review. *Agronomy for Sustainable Development* 30, 33-41.
13. Lamine, C. (2011). Transition pathways towards a robust ecologization of agriculture and the need for system redesign. Cases from organic farming and IPM. *Journal of Rural Studies*, Volume 27, Issue 2, 209-219. <https://doi.org/10.1016/j.jrurstud.2011.02.001>.
14. Losz, K. (2014). How much money for farmers? Retrieved: <http://www.naszdziennik.pl/ekonomia-polskawies/65388,ilepieniedzy-dla-rolni-kow.html> [Access: 16.01.2015].
15. Main Inspectorate of Trade Quality of Agricultural and Food Products (GIJHARS). (2004). *Organic farming in Poland in 2004*. (2004). Warsaw, 6-14.
16. Ministry of Agriculture and Rural Development. (2007). *Rural Development Program (RDP) 2007-2013*. Warsaw: MRiRW, Retrieved: <http://www.minrol.gov.pl/Wsparcie-rolnictwa/Program-Rozwoju-Obszarow-Wiejskich-2007-2013>. Access: 12.03.2017. Warsaw, Poland.
17. Ministry of Agriculture and Rural Development. (2008). *Regulation of the Ministry of Agriculture and Rural Development of 28 February 2008 on detailed conditions and procedure for granting financial aid under the measure "Agro-environmental program" covered by the Rural Development Program for 2007-2013*, Dz. U. No. 34, item 200. Warsaw, Poland.
18. Ministry of Agriculture and Rural Development. (2010). *Regulation of the Council of Ministers of 30 May 2010 on detailed conditions and procedure for granting financial aid for supporting agri-environmental undertakings and improvement of animal welfare covered by the Rural Development Program*, U. No. 174, item 1809. Warsaw, Poland.
19. Ministry of Agriculture and Rural Development. (2011). *Action Plan for Organic Food and Farming in Poland for 2011-2014*. Warsaw, Poland.
20. Pearce, D., Turner, K.R. (1990). *Economics of Natural Resources and the Environment*. New York, 35-42.
21. Seufert, V., Ramankutty, N., Foley, J.A. (2012). Comparing the fields of organic and conventional agriculture. *Nature*, 229-232.
22. Stawicka, J., Szymczak-Piatek, M., Wieczorek, J. (2004). Selected ecological issues. Opportunities and threats of Polish organic farming in the perspective of 2014-2020. *Opinions and Expertises of the OE-210*. Warsaw: SGGW. Analysis and Documentation Office Analysis and Thematic Studies Team of the Chancellery of the Senate of the Republic of Poland, 12-35.

23. Tilman, D., Fargione, J., Wolff, B., Antonio, C., Dobson, A., Howarth, R., Schindler, D., Schlesinger, W.H., Simberloff, D. Swackhamer, D. (2001). Forecasting agriculturally driven global environmental change. *Science*, Volume 13, Issue 292, 281.
24. Vogt, G. (2000). Entstehung und Entwicklung des ökologischen Landbaus. In: *Ökologische Konzepte*, Bad Durkheim: SOL, 6-14.
25. Yussefi, M. (2010). The World of organic agriculture: statistics and emerging trends 2008. *Earthscan*, 38-42.

## **QFD FOR SERVICES PROVIDED BY GRAIN PRE-PROCESSING COMPLEXES IN THE LATVIAN MARKET**

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**Abstract.** An analysis of the grain industry in Latvia reveals that crop yields and the cropped area tended to increase in recent years. The most popular crops grown were wheat, barley and rapeseed.

The research aim is to examine the characteristics of services provided by a grain pre-processing complex in the Latvian market based on the example of Amazone Ltd. The research compared the requirements of customers against the characteristics of grain pre-processing services by using a quality function deployment matrix, and direct competitors were compared by means of the point method.

Grain pre-processing is a very specific industry; for this reason, experience and a workforce of high quality play an essential role in competing with market leaders.

**Key words:** grain farming, grain pre-processing complex, *Quality Function Deployment*

**JEL code:** M11, Q11, Q16

### **Introduction**

Crop farming is the key agricultural industry that produces food, feed and commodities for other industries. To perform an in-depth examination, it is necessary to identify and analyse trends in the production of crops supplied to grain pre-processing complexes. In Latvia, any kind of grain is pre-processed (wheat, barley, oats, rye etc.), industrial crops (rapeseed) and pulses (faba beans and common peas).

In human diets, an increasing role is played by grain in particular. In developed countries, the diets are reviewed, with more focus being placed on all kinds of grain. Nutrition specialists believe that in human diets grain products have to make up approximately 40 % of the total food consumed.

Grain is an important source of nutrition, and grain farming has always been one of the national priorities in Latvia. To promote the development of grain farming, Latvia has to perform several strategic tasks:

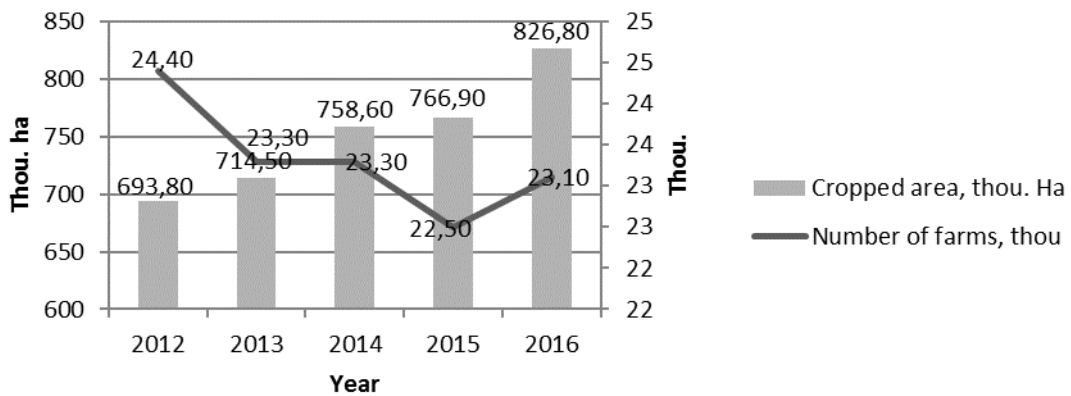
- national independence in relation to grain production, which ensures the development of other agricultural industries and secure food supply;
- the rural population is employed and earn guaranteed incomes;
- the rural environment is maintained in good condition.

The research aim is to examine the characteristics of services provided by a grain pre-processing complex in the Latvian market based on the example of Amazone Ltd. Specific research tasks:

- 1) To characterise the situation in and projections for the grain industry in Latvia.
- 2) To examine the voice of the consumer for grain pre-processing services.
- 3) To construct a QFD matrix for potential grain pre-processing services provided by Amazone Ltd based on the examined voice of consumers.

### **Research results and discussion**

An aggregation of data on the number of farms in Latvia that are engaged in grain production reveals that the number of farms tended to decrease, whereas the total area cropped with grains increased (Figure 1).

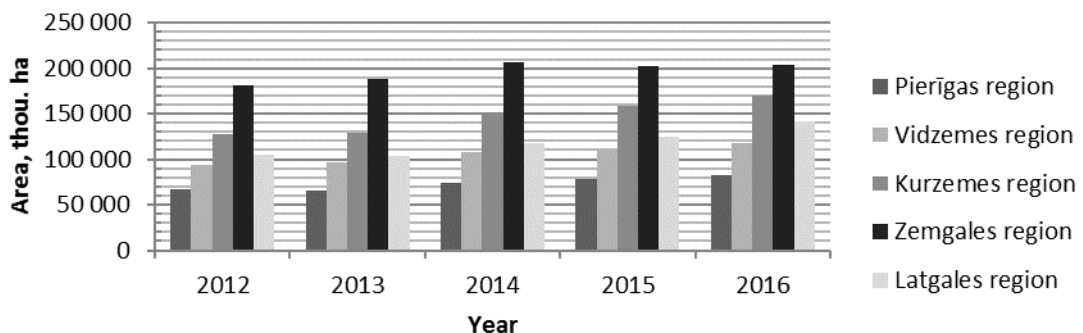


Source: authors' construction based on Latvijas statistikas..., 2017

Fig. 1. Number of grain farms and the cropped area in Latvia in the period 2012-2016

This trend could be explained by the fact that small grain farms could not survive and changed their field of economic activity. In the result, large farms bought more agricultural land and made their position in the market stronger.

Grain farming is not homogenously developed in the entire territory of the country (Figures 2 and 3).

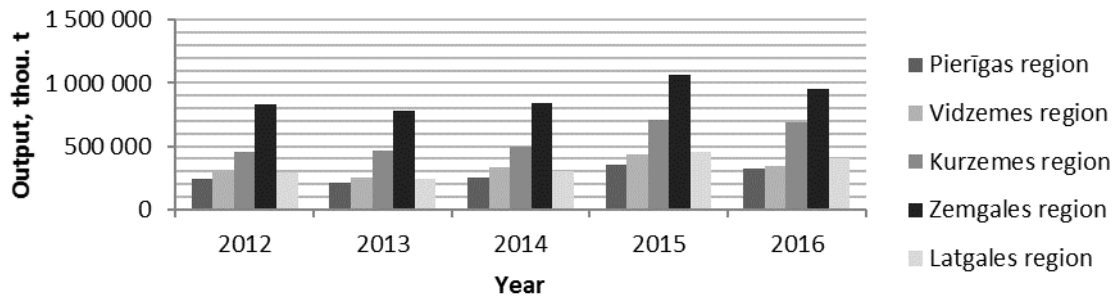


Source: authors' construction based on Latvijas statistikas..., 2017

Fig. 2. Grain area in the regions of Latvia in the period 2012-2016, thou. ha

An analysis of the data of Figure 2 reveals that the smallest grain areas were reported in the regions of Pierīga and Vidzeme. Pierīga is densely populated (population density – 36 people per km<sup>2</sup>, while the national average was 30 people per km<sup>2</sup>), hence opportunities to use land for agricultural production are limited, while Vidzeme region has a hilly terrain that makes land tillage difficult; besides, the land is less fertile. The largest area under grains is reported in Zemgale region, which could be explained by very fertile agricultural land, an appropriate terrain for land tillage as well as more favourable climatic conditions for farming.

As shown in Figure 3, the smallest grain output was reported in Pierīga region as well as in Latgale region that has a hilly terrain. The output of grain in the regions of Vidzeme and Kurzeme was quite large, yet the largest grain output was reported in Zemgale region because the region has fertile soils, a flat terrain and a well-developed agricultural sector, the grain industry in particular.

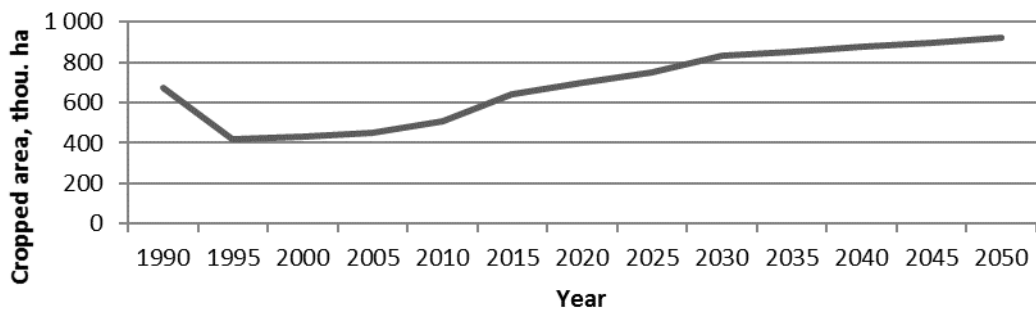


Source: authors' construction based on Latvijas statistikas..., 2017

Fig. 3. Grain output in the regions of Latvia in the period 2012-2016, thou. t

### Trends in the development of the industry of cereals, legumes and industrial crops

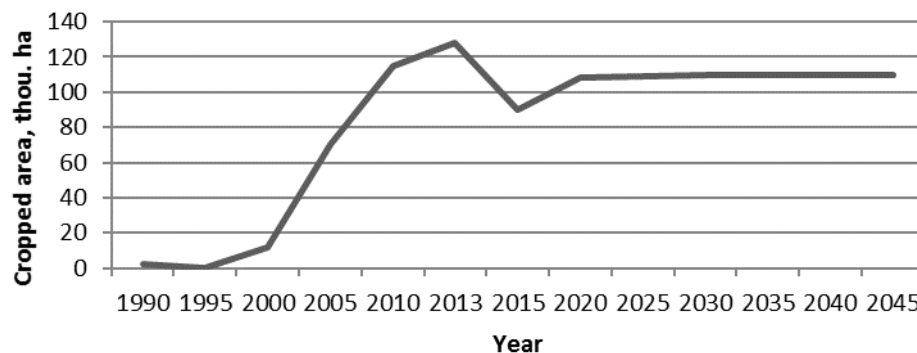
The output of grain considerably increased in 2004 when Latvia joined the EU. In 2015, the area cropped with grains approached the historically highest level that was reached in the early 1990s. The successful development of the grain industry was due to a number of factors: direct and indirect EU financial support for farmers, attractive grain prices, easy access to the EU market and consolidation processes in the agricultural sector that involved production intensification and the use of the latest technologies.



Source: authors' construction based on Latvijas attistibas..., 2017

Fig. 4. Grain area and a projection of the area in Latvia for the period 1990-2050, thou. ha

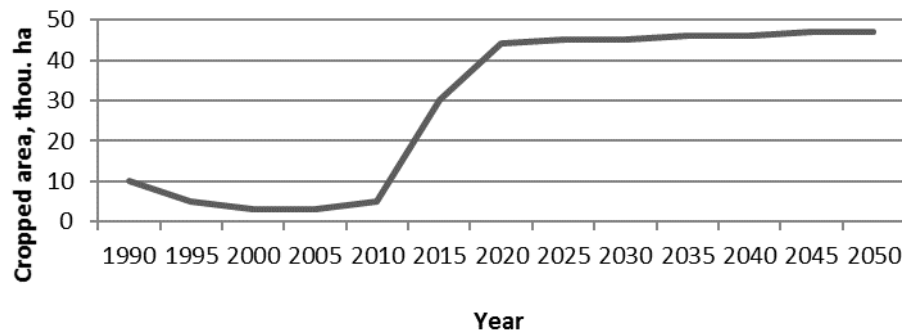
As shown in Figure 4, in the period 1990-2015 the area cropped with grains varied, reaching 716.0 thou. ha in 2016. By 2050 compared with 2030, the area is projected to increase by 37 % to 918.4 thou. ha; compared with 2015, the area is projected to increase by 23 % to 829.1 thou. ha. In the opinion of the authors, a projection through to 2030 is more reliable, as it represents a shorter period and the situation in 2030 might not be much different from the current situation.



Source: authors' construction based on Latvijas attistibas..., 2017

Fig. 5. Rapeseed area and a projection of the area in Latvia for the period 1990-2050, thou. ha

As shown in Figure 5, rapeseed production began from zero in the middle of the 1990s; in 2013 the rapeseed area reached 128 thou. ha, while in 2015 it decreased to 89 thou. ha. In 2016 compared with 2015, the rapeseed area increased by 13.6 % (to 101 thou. ha). It is projected that the rapeseed area might increase to 113.3 thou. ha by 2050, which is 27 % more than in 2015.



Source: authors' construction based on Latvijas attistibas..., 2017

Fig. 6. Area cropped with legumes and a projection of the area in Latvia for the period 1990-2050, thou. ha

The area under legumes considerably increased owing to agricultural policy stimuli, which are part of the greening programme. At present, legumes occupy 3.5 % of the total cropped arable land area. As shown in Figure 6, the largest increase is projected in the period through to 2020, while in the period until 2050 an increase might be minimal. Compared with 2015 when the area under legumes was 31.6 thou. ha, the area is projected to increase by 51 % to 47.6 thou. ha by 2050.

Table 1.

**Projection of crop yields in Latvia for the period 2015-2050**

Crop	2015	Projection of crop yields, t*ha <sup>-1</sup>							Increase from the base year, %
		2020	2025	2030	2035	2040	2045	2050	
Wheat	4	4.4	4.7	5.3	5.5	5.9	6.4	7	75
Barley	2.5	2.7	2.9	3.1	3.3	3.5	3.7	4	60
Rye	2.5	2.7	2.9	3.1	3.3	3.5	3.8	4	60
Oats	2	2.1	2.2	2.4	2.6	2.7	2.8	3	50
Pulses	2.2	2.5	2.7	3	3.3	3.5	3.8	4	82
Rapeseed	2.3	2.6	2.8	3.1	3.3	3.5	3.8	4	74

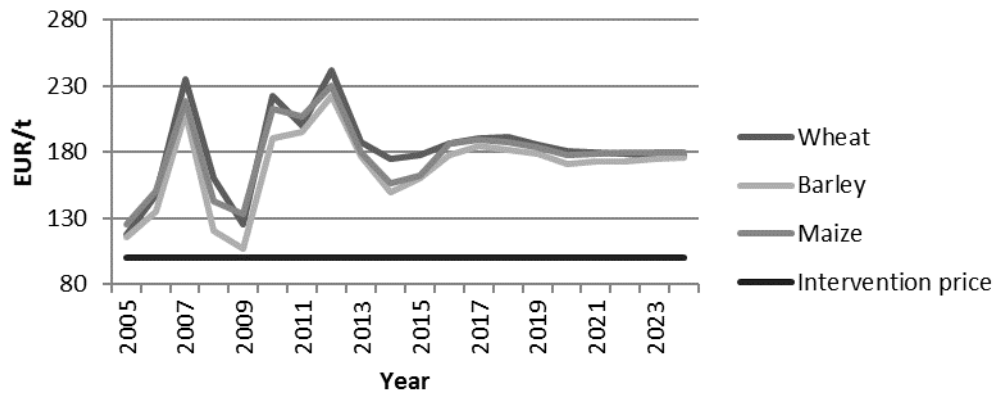
Source: authors' construction based on Latvijas attistibas..., 2017

According to some experts, crop yields will tend to increase in the period through to 2050. It might be due to the use of new crop varieties that both provide higher yields and withstand unpredictable weather conditions. The largest increase in absolute terms is projected for wheat: from 4 t/ha in 2015 to 7 t/ha by 2050, while in relative terms it might be for legumes with an 82 % increase in the yield.

In the period 2005-2016, grain prices in the EU were very volatile, reaching the maximum price in 2012 and fluctuating in the range of 220-240 EUR/t, while the lowest price was in 2009, reaching 105-130 EUR/t. This could be explained by the global crisis. However, the prices have gradually recovered year by year. The prices have been in the range from 180 to 190 EUR/t up to 2017. In a long-term, the prices might stabilise at approximately 180 EUR/t.

Harvesting grain by agricultural machinery (grain harvesters), the grain could contain various impurities: chaff, weed seeds, other kinds of grain, damaged grains and inorganic substances.

Grain is used as food, feed as well as a raw material for industry; therefore, the grain has to be cleaned off the mentioned impurities. The second problem is grain moisture, which often exceeds the level to be stored for a long period. For both reasons, grain (seed) has to be pre-processed – the grain is cleaned off any impurities, sorted and dried – to be stored or processed further.



Source: authors' construction based on Pilvere...,2016

Fig. 7. Grain prices in the European Union in the period 2005-2024, EUR/t

The situation and projections indicate that the grain industry could continue growing in Latvia, thereby increasing the demand for construction of grain pre-processing complexes. For this reason, it is important to identify the needs of potential customers (consumer voices) that affect the demand.

The research interviewed representatives of four farms (Vidini MS Ltd, Ansites, Upeskalni AB Ltd and Raucini Ltd). It was a partly structured interview with 11 questions, which aimed at identifying whether the construction of new grain pre-processing complexes is sufficiently efficient and the investment pays off.

The key crop that is pre-processed at such complexes is winter wheat; according to statistics too, it is a crop that is pre-processed in the largest quantities. Winter rapeseed and winter barley are dried at complexes in smaller quantities, followed by spring grains (barley, wheat, oats and rapeseed). This means that service providers, before advising a potential customer on the construction of a grain pre-processing complex, have to stress that the equipment is tailored particularly for crops grown in Latvia. Service providers have to supply a technology to a customer that is ideally suited for **climatic conditions in Latvia and typical crops**.

As regards grain pre-processing and storage, the research found out that most of the farms did grain pre-processing already before the construction of a complex, transporting all their harvested crop from fields to a pre-processing facility, as most farms were not able to purchase and maintain grain pre-processing complexes in Latvia in the late 1990s.

The opinions of the interviewees on grain drying capacity and quantities slightly differed, yet each of them admitted that if using the latest technologies, costs are considerably lower – up to twofold. The research identified that each farm could dry and store a sufficient quantity of grain, yet they gradually faced the need to enhance their grain pre-processing complexes. It confirms one more time that the demand for this service is going to increase in future.

It is important to identify whether it is necessary to construct a grain pre-processing complex. Each farm admitted that costs are considerably lower if drying grain themselves at their facility instead of taking the grain to another grain pre-processor or to a seaport. A slightly different



opinion was expressed by Raucini Ltd that did not intend to reconstruct its pre-processing complex because its capacity and the quality of their grain for feed and seed were completely sufficient.

The interviews revealed that the key criteria for a grain pre-processing complex were **storage and processing capacity**. Of course, the **quality of equipment** was essential in order not to make additional investments in the equipment after a few seasons. The farm representatives revealed that they chose a producer that their neighbours or acquaintances cooperated with, as it gave them an opportunity to see and question about the particular solution. This means that person-to-person advertising is important for the promotion of this service in the market.

It was also important to find out what was a better option for the farms – to use their existing grain pre-processing complexes, to take the grain to another grain pre-processor or to construct a new complex. The results were surprising, as the cost for each farm would decrease by half if using the newest solutions. By using the newest technologies, it is possible to save a lot because there is no need for doing repairs and it is easy to control the pre-processing process. This allows doing grain pre-processing at high quality and gives an opportunity to expand farm business.

The construction of a grain pre-processing complex is quite a large investment; therefore, farms prefer submitting a project proposal to get EU financial support.

The opinions of the farms about providing pre-processing services to other farms were different, and most of them believed that it was not profitable to do it because they had a sufficient quantity of their own grain to be processed. Nevertheless, Upeskalni AB Ltd planned to serve some customers because their grain dryer operated at half capacity if pre-processing only their own grain, thereby making the investment payoff period longer.

The farms used various technological solutions, yet the most popular one was **continuous flow dryers** that ensured the highest efficacy factor, according to their technical characteristics. Farms usually choose a pre-processing capacity that is sufficient for their current grain production quantities, yet experience shows that a better idea is to construct a complex that has some extra capacity. The most popular source of energy for drying grain is **natural gas**, which ensures the highest thermal capacity, lower maintenance costs and occupies a smaller area.

Grain pre-processing always involves some shortcomings and imperfections. The interviews revealed that the largest shortcomings were as follows: necessity for extra storage containers, corrections needed in technological solutions and the control system with pre-set options for grain quality. The grain dryers of the farms have been constructed with no overhangs, yet an overhang would be necessary in case precipitation can reach the moving systems of equipment, even though the equipment is hermetic.

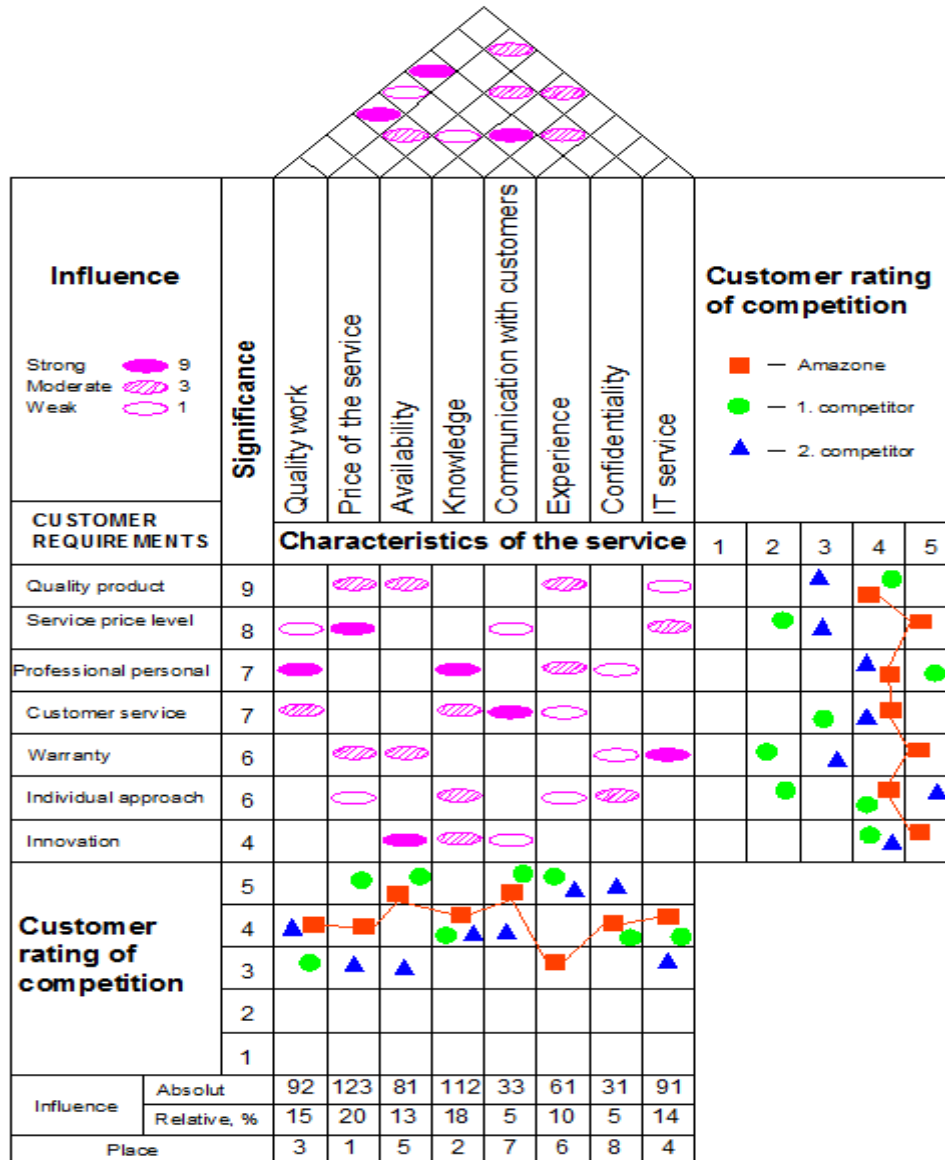
Based on the findings made in the research, a quality function deployment matrix was constructed for pre-processing services provided by Amazone Ltd (Figure 8).

Amazone Ltd is located in Kurzeme region and was founded in 1993 as an official representative of the German company Amazonen-Werke in Latvia.

Amazone Ltd supplies various agricultural machinery and is an official importer in Latvia for the following foreign companies: Amazone, Krone, Grimme, Annaburger, Tanco, Lechler, Fortuna and Walterscheid. It also supplies soil tillage equipment, feed preparation equipment, potato planting and harvesting equipment, power-take-off shafts, suspension systems and sprayer nozzles. Amazone Ltd also represents Mepu, a company which supplies grain dryers, and Ducker, a producer of specific machinery.

### Amazone Ltd serves about 1000 farms throughout Latvia.

Amazone Ltd supplies the following high-quality grain pre-processing equipment produced by Mepu in Finland, a company with 60-year experience in the grain industry: grain dryers, grain towers and grain conveyers. It also persistently conducts studies and develops its products, following the newest innovations and supplying modern technological solutions to customers.



Source: authors' construction

Fig. 8 Quality function deployment (QFD) matrix for grain pre-processing services provided by Amazone Ltd

QFD is a technique employed to develop a product based on customer wishes. Two competitors: Competitor 1 (Voka Ltd) and Competitor 2 (Graintech Ltd), which were larger in terms of the number of employees and customers than Amazone Ltd, were evaluated using a QFD matrix.

The most essential criteria, based on which service prices are set for the customers of Amazone Ltd, are as follows:

- individual approach;
- high quality product;
- professional personnel;
- establishment of long-term relations.

The customer ratings of Amazone Ltd revealed that the customers consider Amazone Ltd a new company providing grain pre-processing services, yet it is a strong competitor because has operated in the agricultural industry for more than two decades, supplying quality products, providing equipment maintenance services and guaranteeing the operation of grain dryers. Unlike the competitors, the prices of services of Amazone Ltd are relatively high, thereby presenting itself in the grain pre-processing market as a stable, development-oriented company.

### **Conclusions, proposals, recommendations**

- 1) In the period 2012-2016 in Latvia, the number of grain farms decreased, while the area cropped with grains increased, and the area is going to continue increasing in the future. The largest grain harvest and the largest area under grains is reported in the fertile and flat region of Zemgale.
- 2) The key customer requirements (voice of the consumer) for a grain pre-processing complex is (1) technologies appropriate for the climatic conditions and crops grown in Latvia, (2) adequate equipment capacity for pre-processing and storage, (3) adequate equipment quality and technologies necessary for customers.
- 3) Farms that are engaged in grain pre-processing reveal that the construction of a new complex or the reconstruction of the existing one reduce processing costs up to two-fold and ensure a high efficiency factor of the equipment.
- 4) The key characteristics of services provided by a potential grain pre-processing complex of Amazone Ltd have to be as follows: reasonable price, an advanced employee knowledge and high-quality services.
- 5) To contribute to the development of grain pre-processing complexes in future too, support of the Ministry of Agriculture is necessary, as the Agricultural Development Programme is available to farmers only until 2020. It is necessary to establish an additional national support fund for agricultural enterprises that are engaged in pre-processing.

### **Bibliography**

1. Balodis O. (2016) Graudkopības nozares apskats par 2016.gadu (Grain Farming Industry Overview for 2016) Retrieved :[http://new.llkc.lv/sites/default/files/baskik\\_p/pielikumi/graudkopiba.pdf](http://new.llkc.lv/sites/default/files/baskik_p/pielikumi/graudkopiba.pdf) Access: 07.10.2017.
2. Central Statistical Bureau of Latvia. (2017). Area, Population Density and Resident Population by Statistical Region, City and County. Retrieved: [http://data.csb.gov.lv/pxweb/en/Sociala/Sociala\\_\\_ikgad\\_\\_iedz\\_\\_iedzskaits/IS0010.px/?rxid=cdb978c-22b0-416a-aacc-aa650d3e2ce0](http://data.csb.gov.lv/pxweb/en/Sociala/Sociala__ikgad__iedz__iedzskaits/IS0010.px/?rxid=cdb978c-22b0-416a-aacc-aa650d3e2ce0)
3. Latvijas lauksaimniecība 2017 (Latvian Agriculture 2017) (2017). ZM lauksaimniecības gada ziņojums par 2016. gadu (Agriculture Annual Report 2017), 46.p. Retrieved: [https://www.zm.gov.lv/public/files/CMS\\_Static\\_Page\\_Doc/00/00/01/10/04/fs-01usersLinda.BirinaDesktopAA2017\\_lauksaimniecibasgadazinojums.pdf](https://www.zm.gov.lv/public/files/CMS_Static_Page_Doc/00/00/01/10/04/fs-01usersLinda.BirinaDesktopAA2017_lauksaimniecibasgadazinojums.pdf) Access: 07.10.2017.
4. Lauksaimniecības attīstības prognozesana un politikas scenariju izstrāde līdz 2050. gadam (Forecasting Agricultural Development and Developing Policy Scenarios up to 2050) (2016) pp. 77-78. Retrieved: [https://www.zm.gov.lv/public/ck/files/Lauksaimniecibas\\_%20attistibas\\_%20prognozes\\_%202050.pdf](https://www.zm.gov.lv/public/ck/files/Lauksaimniecibas_%20attistibas_%20prognozes_%202050.pdf) Access: 08.10.2017.
5. Pilvere I. (2016) Latvijas attīstības prognozesana un politikas scenariju izstrāde līdz 2050. gadam (Prognosis of Latvia's Development and Development of Policy Scenarios up to 2050) [tiessaiste] Retrieved: [http://www.llka.lv/f/latvijas\\_graudu\\_nozares\\_attistibas\\_tendences\\_rigonda\\_krievina\\_22102015.pdf](http://www.llka.lv/f/latvijas_graudu_nozares_attistibas_tendences_rigonda_krievina_22102015.pdf) Access: 10.10.2017.

## DIRECTIONS OF DEVELOPMENT AND THE ROLE OF LOGISTICS IN POLISH ECONOMY

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**Abstract.** One of the most important sectors currently determining the economic situation of countries, regions, including rural areas, and businesses is logistics. The study shows the directions of changes in supplying Poland with the most important elements of logistic infrastructure, i.e. transport and stock infrastructure. It presents the position of logistics sector in the national economy measured by the share of transport, storage, information and communication activities against the background of industry, trade and construction sectors' activity in the creation of a net domestic product. The study also indicates the highly competitive position of Poland in logistics in comparison to other neighbouring countries and establishes that logistics can be an important factor in the country's development.

**Key words:** logistics, transport infrastructure, storage, Logistic Performance Index (LPI).

**JEL code:** O11, O18

### Introduction

In each historical period, there were elements influencing development processes in the economy and society. Science and its effects in the form of development of IT and usage of biological and market laws proved to be the driving force of the social and economic progress of the recent years. Nowadays, logistics is one of the most dynamically developing segments of the national economy. An increasing scale of flow of people, goods, financial capital and information can be observed. Elements of point infrastructure (ports, airports, railway junctions, railway and bus stations, warehouses, logistic centres etc.) and linear infrastructure (roads, railways, waterways, airways, pipelines etc.) are being expanded. This is of great importance for creating various logistic chains and reducing the costs of their operation in every industry. It contributes to the development of entire countries, including rural areas.

The aim of this study is to recognise the direction of changes in supplying Poland with the most important elements of logistic infrastructure (transport and stock infrastructure), the meaning of logistics in the economy, especially its role in creating gross national product and to indicate Poland's competitive position in comparison to its neighbouring countries.

Materials used for the study include information from the reporting of Central Statistical Office of Poland, Eurostat and World Bank data and the results of research available in the specialist literature on the subject. Both vertical and dynamic analysis (changes of studied values in time) and horizontal (international comparisons) were used.

### Reasons for development of logistics on a global scale

Logistics is in most cases defined as a method for managing a supply chain, thus it includes planning, realisation and controlling an operational and effective flow of resources, production materials and finished products, as well as proper information from the point of origin to the point of consumption in order to satisfy the needs of a client. Logistics is also described as managing the processes of transporting goods and people, together with actions which support those processes in the systems in which they occur (Slownik..., 2006). The main objective of logistics is to minimise costs of transporting products in a supply chain, increasing a company's (chain's link) profit and preserving the standards of customer's service expected on the market, all at the same time.

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Logistic activities may include many stages (actions), such as: customer's service, demand prognosis, flow of information, stock control, manipulative activities, realisation of orders, reparative activities, supplying spare parts, locating production plants and warehouses, supply processes, packing, service of returns, waste management, transport activities and storage.

Every economic phenomenon, especially the ones reaching global scale, has many causes. A similar situation concerns logistics which, as an element of a human activity, has been functioning since ancient times. However, it used to have mainly a local dimension, but with a tendency to expand, mainly because of merchant, armed (war) or missionary voyages. Today, there are numerous reasons for this phenomenon, however the most significant ones include (Klepacki, 2014):

- savings reserves of costs in the area of production technology have already been depleted considerably;
- the offer for customers is continuously widened which is the result of a wide introduction of the marketing concept, i.e. offering customers whatever they wish, whenever they wish it and in what form,
- there has been a change in proportions in the scope of maintaining stocks between retailers and wholesalers and producers; producers and retailers want to stock as few products as possible,
- service providers and tradesmen minimise their storage activities by ordering goods only when providing services,
- transport costs have increased significantly, e.g. because of increasing prices of energy, thus traditional distribution systems have become too expensive;
- there has been a fast development of IT, which made it easier to register much data necessary in logistics such as location of customers, size of orders,
- there is a growing number of enterprises introducing advanced methods of organisation and production,
- companies' actions are becoming more globalised, which is connected with a growing competitiveness among producers and suppliers on a global scale.

### **Significance of transport infrastructure in the social and economic development**

Transport infrastructure covers roads of all branches, transport points which include e.g. airports, ports etc., as well as a number of auxiliary devices. Transport infrastructure provides convenient conditions for transferring cargo and people. The most important tasks of the transport infrastructure include (Szymonik., 2013): satisfying the needs of societies and economies, realising tasks and activities formulated in transport policies, as well as shaping the past heritage. The most important functions fulfilled by the transport system include (Rydzkowski, Wojewodzka- Krol, 1997): consumption, production and integration.

Ensuring accessibility to transport infrastructure and to its proper capacity level enables the occurrence of so called diffusion of economic growth between regions (from well-developed regions to those still developing, particularly from agglomeration to rural, farming areas) (Zimny, 2016).

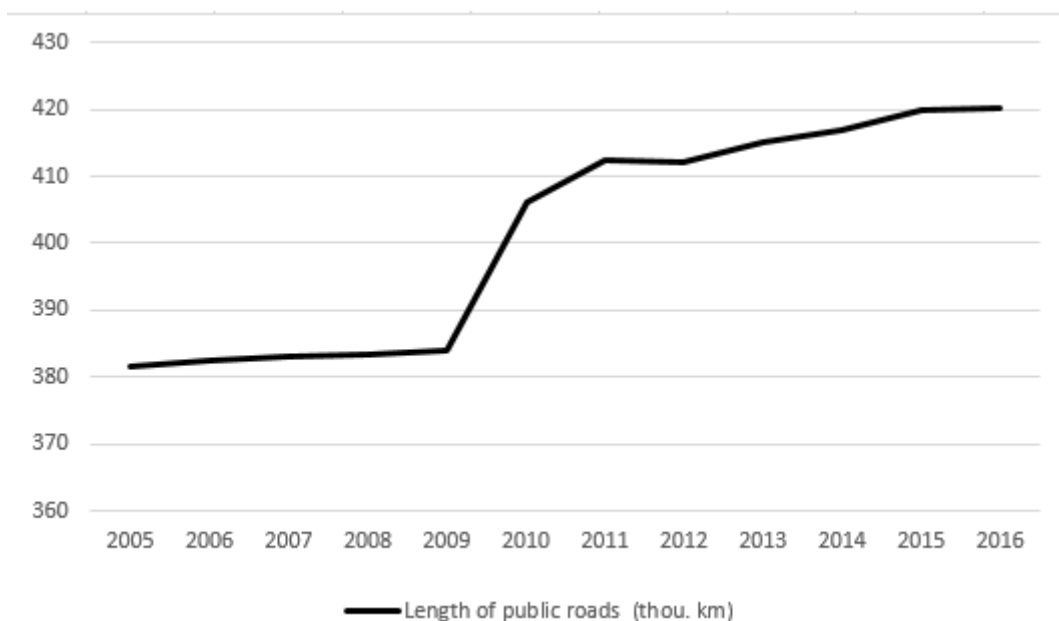
Building new infrastructure elements demonstrates both advantages and disadvantages. The former includes fast and safe transport and travelling for long geographical distances. An area supported by rich infrastructure is attractive for investors and tourists. New workplaces are being created and local residents have the possibility to search for jobs outside their place of residence. On the other hand, infrastructure may have a negative impact on the natural environment. Building

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new roads causes the necessity to allocate large amounts of land for it. Furthermore, fumes coming from various vehicles are also a threat, causing irreversible changes in the flora and fauna. Due to deforestation, animals lose their natural living conditions, plants are damaged. Topography of a given area, its landscape and the optimum level of soil water are changed and because of that accidents e.g. road accidents take place (Chrabaszczyk, 2012).

### The status of the road network in Poland and in selected EU countries

According to data of the Central Statistical Office (CSO), there were 420 200 km of public roads in Poland in 2016. The majority of them were the municipal roads – 58.8 %, district roads constituted 29.7 %, voivodship roads – 6.9 %, while state roads had the smallest share in all the roads with 4.6 % (Local Data Bank, CSO 2016). The length of public roads has been increasing steadily since then (Figure 1).

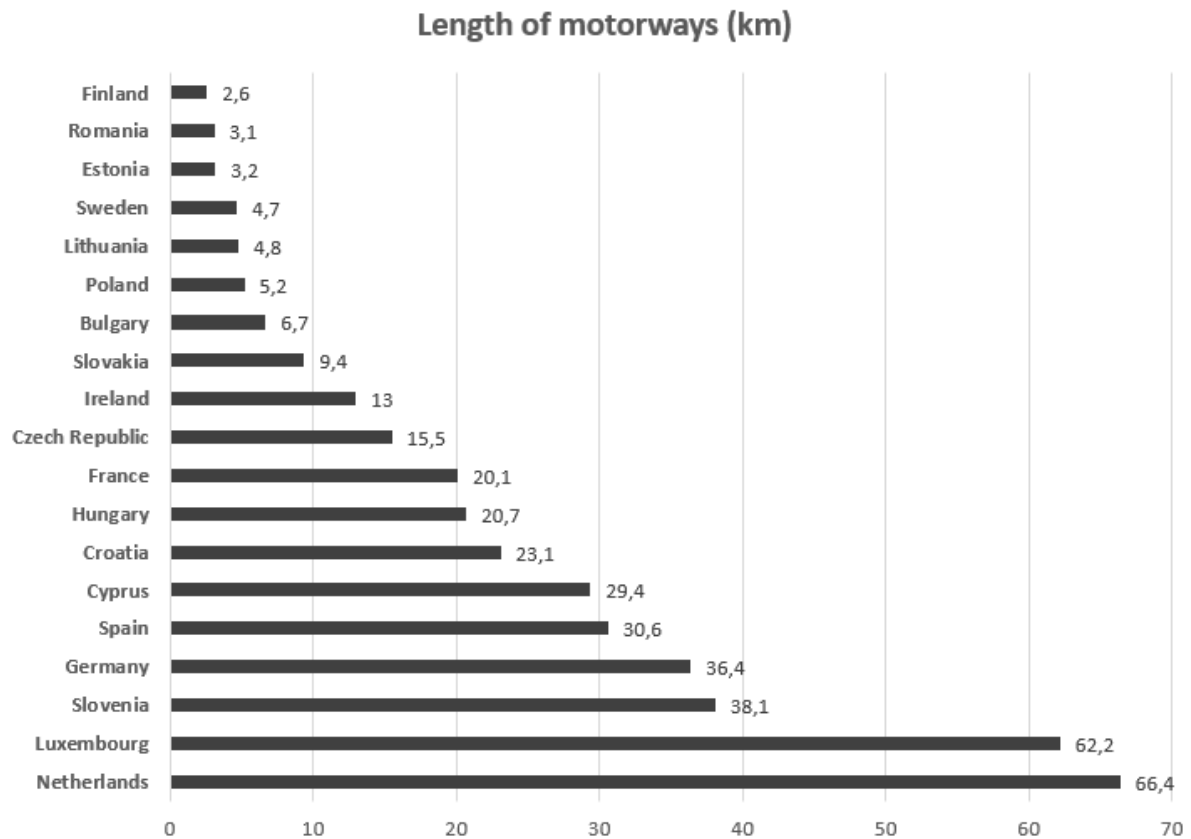


Source: Local Data Bank, CSO

Fig. 1. Length of public roads in Poland in the years 2010-2016

Motorways and expressways are categorised as state roads. At the end of 2016 there were 3.170,80 km of both motorways and expressways, out of which the former constituted 51.6 % (1.636,9 km), and the latter – 48.4 %. In comparison to 2010, the length of motorways increased by 90.9 % and the length of expressways was extended by 127.3 %. On every 1000 km<sup>2</sup> there was 10.1 km of expressways and motorways, i.e. 106.9 % more than in 2010 (4.9 km). Most motorways and expressways were built in 2011 and 2012 due to the European Football Championship organised in Poland in 2012.

In terms of density of motorways, Poland's performance is poor in comparison to other EU countries. In 2016, there were 5.24 km of motorways per every 1000 km<sup>2</sup>. In the European Union, the highest indicators of motorways (per every 1000 km<sup>2</sup>) were recorded in the Netherlands – the number over 13 times bigger than the one concerning Poland (66 km) and Luxembourg (58 km). The lowest indicator was recorded in, among others, Estonia, Finland and Romania – 3 km per 1000 km<sup>2</sup> (Picture 2).



Source: authors' study on the basis of: Eurostat  
[http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=road\\_if\\_motorwa&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=road_if_motorwa&lang=en) [access 21.06.2017]

Fig. 2. Length of motorways in selected EU countries in 2016 calculated by 1000 km<sup>2</sup> of area

The following tendencies have occurred in Poland in the last decade in the scope of transportation:

- 1) in the railway transport, routes have been shortened, especially on less populated and poorly industrialised territories; on the other hand, usage of "major" routes have increased;
- 2) the velocity of road infrastructure development as a whole is low; a sort of positive aspect is the building of motorways and expressways;
- 3) the last decade has not brought any change in the scope of pipeline transport and inland water routes;
- 4) after the social and economic transformation in Poland (1989-1990) there was an economic breakdown of seaports and cargo shipping; today their steady growth is taking place;
- 4) air transport is clearly developing, although its position in the scope of mass shipping is still of a marginal character.

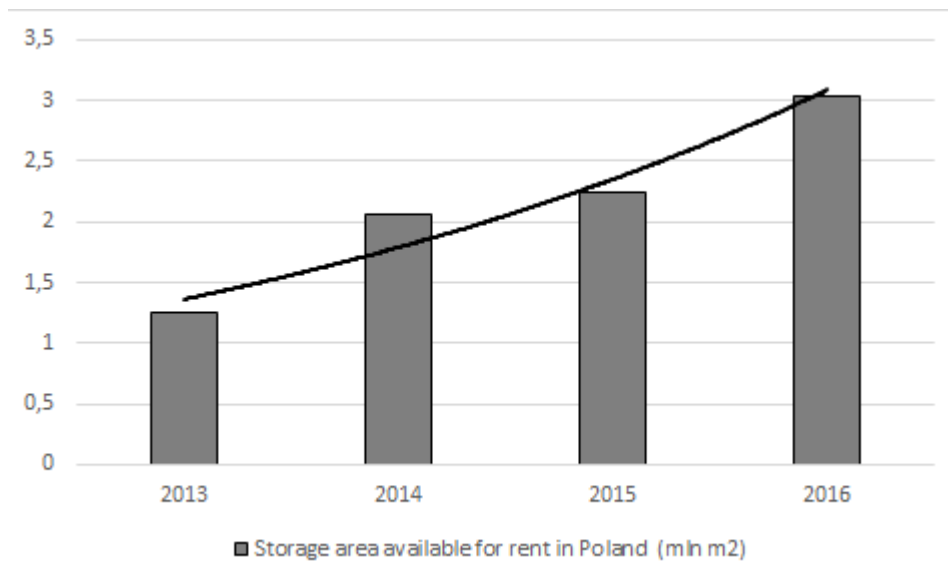
In general, it can be said that when it comes to transport infrastructure, Poland is less advanced than Western European countries. However, a significant progress is happening and in the near future, after completing the already started road and railroad investments, it will no longer be a barrier limiting the development of logistics and other economic activity.

### Changes in the storage economy

The second most important element of logistics is warehousing. A warehouse is a separated closed accommodation, a space covered by a roof, an open outdoor landfill or a device for special purposes or a complex of such accommodations, spaces and devices, appropriately secured and equipped with devices designed for storing materials, semi-finished products and finished products.

Storage market constitutes a part of the logistics market, being composed of three elements. The first one includes infrastructure: trade and industrial warehouses and other warehouses. The second element covers investments: warehouses for rent and warehouses for own purposes. The last element accounts for services: renting storage areas and providing storage services.

In the recent years, the Polish storage market has been developing dynamically. It concerns both the demand, as well as the supply. The supply of storage area available in Poland is presented in Figure 3. At the end of 2017 there was nearly 13.4 million m<sup>2</sup> of storage area available (Olszewski, Mika, 2016), while in 2007 it was only 4,7 mln m<sup>2</sup>. It proves the unusual increase in its supply and its dynamic development in Poland.



Source: authors' study on the basis: T. Olszewski, T. Mika, *Rynek magazynowy w Polsce 2014, 2015, 2016 [Storage market in Poland 2014, 2015, 2016]. Report: www.magazyny.pl, Warszawa 2016, p. 2* and T. Olszewski, T. Mika & others., *Rynek nieruchomości magazynowych w Polsce w 2017r. [Market of storage real estate assets in Poland in 2017], Report: www.magazyny.pl, 2017 p. 6.*

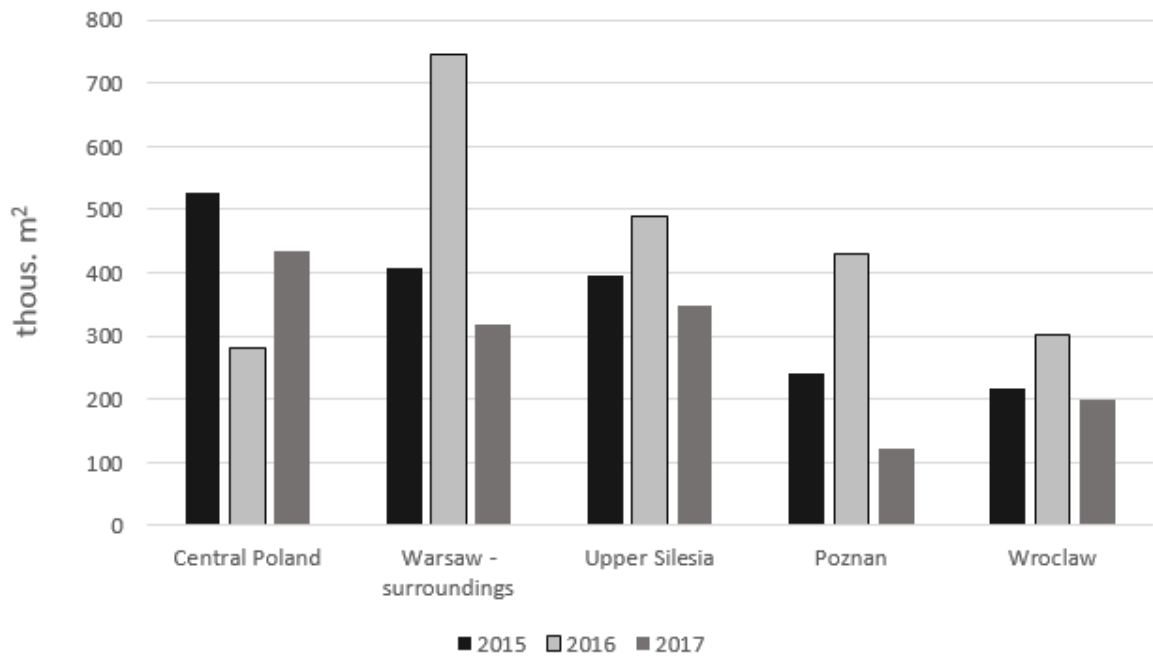
Fig. 3. **Storage area available for rent in Poland in the years 2013-2016**

In terms of the regional section, the biggest demand for storage areas occurs in central Poland, in the region surrounding Warsaw, Upper Silesia, in Poznan and Wroclaw (Figure 4). Activity of investors and rent payers who decide on the location of warehouses depends mainly on the quality of transport infrastructure and economic potential of surrounding areas. Investors locate storage areas in the close vicinity of motorways and expressways. It can be stated that the tenants betting on the local markets choose the central part of Poland for their investments, meanwhile those who invest on a global scale – southern areas (Fechner, Szyszka 2014).

The warehouses in operation indicate various stages of technological advancement. A modern storage area is to be construed as an area located in a storage facility characterised by the following parameters (Logistyka w Polsce. Report 2009):

- storage height – minimum 9 metres;
- at least one gate per 1000 m<sup>2</sup> of area;
- dust-free floor, with the minimum resistance of 5 tons/m<sup>2</sup>;
- anti-fire system in the form of sprinklers and smoke dampers;
- 5-8 % of office area.

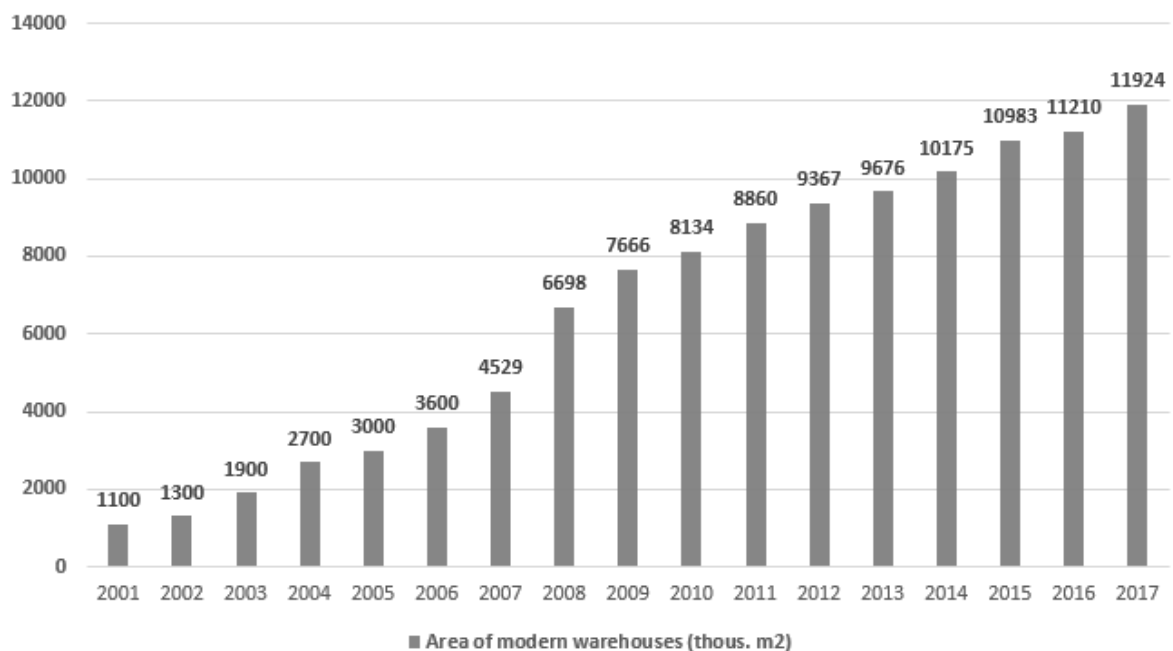




Source: authors' study on the basis: T. Olszewski, T. Mika, *Rynek nieruchomości magazynowych w Polsce w 2016r.*[Market of storage real estate assets in Poland in 2016], Report: [www.magazyny.pl](http://www.magazyny.pl), 2016 and T. Olszewski, T. Mika, *Rynek magazynowy w Polsce 2017.*[Storage market in Poland 2017]. Report: [www.magazyny.pl](http://www.magazyny.pl), Warszawa 2017.

Fig. 4. Location of main storage markets in Poland in the years 2015-2017

Modern storage area in Poland covered nearly 12 million m<sup>2</sup> at the end of 2017. Its stages in the years 2001-2017 are presented in Figure 5.



Source: *Logistics in Poland. Reports 2007, 2009. Biblioteka Logistyka. Poznan, Statistical Yearbooks of Central Statistical Office 2002-2016, data of CSO*

Fig. 5. Area of modern warehouses in the years 2001-2017 in thousand m<sup>2</sup>

A significant progress has occurred in terms of modern storage area. In the period of the last 16 years, it has expanded its surface nearly ten times. Important fact is that this surface increased every year without any downfall periods, being mainly realised by international companies. This leads to the conclusion that Poland's position as an attractive place for locating logistic investments has been moving upwards.

## **Economic significance of logistics in the Polish economy**

Significance of particular sectors in the national economy can be measured in various manners. Most often it is their input in generating the Gross Domestic Product (GDP) that is taken into account. In 2015 selected sectors participated in the GDP structure in the following shares (in %):

- industry - 23.5
- car sales and repair - 15.4
- building industry - 6.3
- transport and storage economy - 5.8
- IT and communication - 3.6

Classifying purely logistic sectors (transport, storage economy, IT, communication) as elements of logistics, it can be stated that they have generated 9.4 % GDP. However, logistics is not recognised in complete separation in statistical data. It constitutes a considerable part of trade and industrial activities, as well as many other activities. Solely by adding car sales and repairs to the above value, the result increases to nearly 25 %. Thus, it can be assumed that logistic activity generates at least every fourth unit of GDP in the national economy.

Logistics is also crucial for employment ratings. The general employment rate, which equalled 15.4 million people in 2015, comprised of 5.3 % of them working in the transport and storage economy sector and 2.2 % working in the IT and communication sector. Logistics also engaged 15.5 % of all fixed assets (transport and storage economy – 12.7 %, IT and communication – 2.8 %). Logistics is also characterised by higher working efficiency - every person employed in transport and storage economy scored 110.5 % of GDP (of total national average value), meanwhile IT and communication generated 163.8 % per employee.

## **Competitive position of the Polish Logistics in terms of selected neighbouring countries**

The level of competitiveness of logistic companies can be measured in various manners. The most frequently used method is called Logistics Performance Index (LPI). It is calculated for 163 countries. LPI is measured by taking into account six characteristics, that is:

- 1) efficiency of the clearance process by order control agencies, including customs,
- 2) quality of trade and transport related infrastructure,
- 3) easy of arranging competitively priced shipments,
- 4) competence and quality of logistic services,
- 5) ability to track and trace consignments,
- 6) timelessness of shipments in reaching destination within a schedule or expected delivery time.

Table 1 presents Poland's position in comparison to its neighbouring countries, by assessing situations from 2007, 2010, 2012, 2014 and 2016.

By taking LPI into consideration, it can be assumed that Poland is relatively well prepared for providing logistic services. Although its assessment is worse than the one of Germany, which is the world's logistic leader, on the regional scale it is located on the level similar to the one of its neighbours. In comparison to 2007, a significant progress has been made up to this day, pushing Poland up to 30<sup>th</sup> position from 40<sup>th</sup> in the world ranking. However, this position has dropped to 33<sup>rd</sup> in the recent period. It means that Polish logistic companies are capable of adjusting themselves to actual requirements of clients, even though they do this a little slower than companies in a few neighbouring countries.

Table 1

**Competitive position of the Polish logistics in comparison to selected Central Europe countries in the years 2007-2016**

Country	LPI by year					Position in the global ranking in 2016
	2007	2010	2012	2014	2016	
Poland	3.04	3.44	3.43	3.49	3.43	33
Germany	4.10	4.11	4.03	4.12	4.23	1
Czech Rep.	3.13	3.51	3.14	3.49	3.67	26
Slovakia	2.92	3.24	3.03	3.25	3.34	41
Ukraine	2.55	2.57	2.85	2.98	2.74	80
Lithuania	2.78	3.13	2.95	3.18	3.63	29
Hungary	3.15	2.99	3.17	3.46	3.43	31
Latvia	3.02	3.25	2.78	3.40	3.33	43

Source: Arvis J.F., Mustra M.A., Panzer J., Ojala L., Naula T., 2007: *Connecting to Competence. Trade Logistics in the Global Economy. The Logistics Performance Index and Its Indicators. The International Bank for Reconstruction and Development. The World Bank, Washington and Logistic Performance Index (LPI). 2010, 2016.* <http://web.worldbank.org/>

### Conclusions

- 1) Poland is an important region for providing logistic services. The international exchange rate is growing e.g. due to its central location in Europe. Poland's accession to the European Union in 2004 offered a possibility to overcome economic barriers which had been hindering infrastructural investments similar to those realised in other EU countries. It means that the condition of the Polish logistics will be an important factor in the country's development, both on the macroeconomic and local levels. Infrastructure development is a factor influencing location of industrial and service facilities, especially logistic centres which can be a determinant for activation of rural areas, provide jobs and be a source of income for the population.
- 2) Polish logistic companies are developing fast, the area of modern warehouses is increasing. Companies are improving their offers which then boosts their international competitiveness. Logistics activity is becoming a sort of Polish specialty increasingly affecting GDP and the state of national economy.
- 3) Central Europe is becoming one of the most important regions in terms of logistics development. That is due to geographical location and the fact that Central European countries became members of the European Union, but also because of the anticipated development of the Eastern European countries – the former members of the Soviet Union.

### Bibliography

1. Arvis, J.F., Mustra, M.A., Panzer, J., Ojala, L. and Naula, T. (2007). *Connecting to Competence. Trade Logistics in the Global Economy. The Logistics Performance Index and Its Indicators.* The International Bank for Reconstruction and Development. Washington: The World Bank.
2. Bank Danych Lokalnych, (2018). *Bank Danych Lokalnych.* [online] Available at: <https://bdl.stat.gov.pl/BDL/start#> (Accessed 28 Mar. 2018)
3. Chrabaszcz, K. (2012). *Cechy regionalne a rozwój krajowej infrastruktury drogowej na przykładzie autostrady A4. T 20, No. 1.* [pdf] Tarnow: Zeszyty Naukowe Malopolskiej Szkoły Ekonomicznej w Tarnowie. Available at: <http://zn.mwse.edu.pl/ebooki/20/39-47.pdf> (Accessed 20 June 2017).
4. Eurostat (2018). *Length of Motorways and E-roads.* [online] Available at: [http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=road\\_if\\_motorwa&lan=%C2%A0=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=road_if_motorwa&lan=%C2%A0=en) (Accessed 21 June. 2017)
5. Fechner, I. and Szyszka, G., (red.) (2014) *Logistyka w Polsce. Raport 2013.* Poznan: Biblioteka Logistyka.
6. Fertsch, M. (red.) (2006). *Słownik terminologii logistycznej.* Poznan: Instytut Logistyki i Magazynowania.
7. Klepacki, B. (2014). *Concept and Importance of Agrolistics for Development of Agribusiness.* Conference: Carpathian Logistics Congress (CLC): Cracow, DEC 09-11, 2013 . VSB Tech Univ Ostrava; Technical Univ Kosice; TANGER Ltd. pp: 14-17.

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8. The World Bank, (2018). *Logistic Performance Index (LPI). 2010. 2016.* [online] Available at: <http://web.worldbank.org/> (Accessed: 28 Mar. 2018)
9. *Logistyka w Polsce. Raport 2007. 2009.* (2009, 2010) Poznan: Biblioteka Logistyka.
10. Mierzwiak, B. and Klepacki, B. (2018). Rekordowe wyniki rynku magazynowego w Polsce - *początek czy koniec dynamicznego rozwoju.* Retail Summit, Warsaw, 13.03.2017. pp. 1
11. Olszewski, T, Mika, T. (2016). *Rynek powierzchni magazynowych w Polsce 2016.* Raport. Warszawa: [www.magazyny.pl](http://www.magazyny.pl), p. 2.
12. Olszewski, T. and Mika, T. (2017) *Rynek nieruchomości magazynowych w Polsce w 2015r.* Raport: [www.magazyny.pl](http://www.magazyny.pl), 2016 p.
13. Roczniki Statystyczne Rzeczypospolitej Polskiej 2006, 2010, 2016 Warszawa.
14. Rokicki, T. (2014). *Organizacja i ekonomika transportu.* Warszawa: Wydawnictwo SGGW.
15. Rydzkowski, W. and Wojewodzka-Krol, K. (red) (1997). *Transport.* Warszawa: PWN.
16. Szymonik, A. (2013). *Ekonomika transportu dla potrzeb logistyki (I) Teoria i Praktyka.* Warszawa: Wydawnictwo Diffin.
17. Zimny, A. (2016). *Wskaźniki rozwoju transportu w ogólnopolskich i regionalnych dokumentach strategicznych* [in:] Vol. 2. Konin: Koninskie Studia Społeczno-Ekonomiczne. Available at: [http://ksse.pwsz.konin.edu.pl/wp-content/uploads/2017/03/KSSE-23.final\\_.pdf](http://ksse.pwsz.konin.edu.pl/wp-content/uploads/2017/03/KSSE-23.final_.pdf).

## ASSESSMENT OF THE USE OF SERVICES IN AGRICULTURE OF THE EU COUNTRIES BASED ON INPUT-OUTPUT TABLES

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**Abstract.** As a general economic pattern, the importance of services grows as the economy develops. This is also true for economic processes inside the agricultural sector. The use of services is a measure of modernity, and may substitute capital expenditure. Both the basic research task and the purpose of this paper is to identify the extent of differences in accessing services in the agriculture of EU countries. The study was based on input-output tables with a spatial distribution of services by type at country level. As regards the timeframes for this study, the most recent available data from 2000, 2005 and 2010 was used. Over that period, most of the EU countries reported growth of the service sector's contribution to the supply of agricultural materials, which is consistent with the progressive evolution of the agri-food sector. However, between 2005 and 2010, some countries saw a decline in the share of services. This could be caused by the decisions to purchase more efficient, state-of-the-art machinery and equipment which enabled substituting purchased services with own labor. The key services delivered to the agricultural sector were financial, insurance, professional, scientific, technical and veterinary services and, in EU-10 countries, transport services.

**Key words:** agriculture, services, supply of materials, input-output table.

**JEL code:** L89, Q16

### Introduction

As a general economic pattern, the importance of services grows as the economy develops. This was already noted by the authors of the three sectors theory: List F. (1922), Fisher A. G. B. (1935), Clark C. (1957), Fourastié J. (1954) and Wolfe M. (1955). This is also true for the processes taking place inside the industrial and agricultural sectors, and is reflected by a gradual growth in importance of supporting services for production processes. Also, the use of services is a measure of modernity (as it becomes the starting point for knowledge, new technology and know-how transfer), and may be a substitute for capital expenditure (e.g. by allowing to discontinue investments in expensive machinery) and for labour inputs (delivered by farm owners and employees). Therefore, the extent of service use in specific EU countries should be compared to identify the progress of servitization processes in their economies. This paper focuses on the agricultural sector whose condition and structure conditions the continent's capacity to generate food. Also, in broader terms, it strongly affects the use of labour resources throughout the economy and the competitiveness of specific countries. Because services are the determinant of changes taking place in the agricultural sector, they should play an essential role in material flows destined to the agriculture (Mrowczyńska-Kaminska, A., Szuba E., 2015), especially having in mind the growing importance of the sustainable growth paradigm.

Both the basic research task and the purpose of this paper is to identify the extent of differences in accessing services in the agriculture of EU countries. The study was based on input-output tables where services are considered as a national economy section<sup>1</sup>. The study on the development of service demand was based on a spatial approach, by service type at country level.

<sup>1</sup> This study was based on Input-Output Tables data because in the published supply accounts, the supply and use of services are not in balance. A square matrix, the Input-Output Table describes these processes with a product-to-product (or industry-to-industry) mapping, always using the same base. Therefore, a single table includes both the supply and use figures. The essential difference between the definitions of supply-use tables and the Input-Output Table is that the supply-use tables associate products with industries while the Input-Output Table deals with products only. The subject matter of the input-output analysis are the flows between all sectors of the national economy, i.e. the entire process of creating and distributing the national income in quantitative terms over a short term (Mrowczyńska-Kaminska A., 2015). Therefore, the Input-Output Table allows to determine, for instance, the volume of services purchased for the agricultural sector from other sectors of the national economy. Input-Output Tables are made every five years in the System of National Accounts (SNA) where production means any activity related to the creation of tangible goods and services (both material and intangible). Until 1995, Input-Output Tables were made each year in the Material Product System (MPS) where production was defined as any activity related to the creation of tangible goods (material production and tangible services) (Kujaczynski T., 2009, Mrowczyńska-Kaminska A., 2015).

As regards the timeframes for this study, the most recent available data<sup>1</sup> from 2000, 2005<sup>2</sup> and 2010<sup>3</sup> were used.

## Research results and discussion

Today's agriculture could not exist without material productive inputs or services such as transport, veterinary and construction services or the machinery and equipment industry (Czyzewski A., Grzelak A., 2009). Each time, production growth contributes to strengthening the following interrelation: on the one hand, the agriculture delivers an increasingly greater volume of raw materials, whereas on the other, it demands increasingly more industrial productive inputs and various types of services (Poczta W., Mrowczyńska-Kaminska A., 2004).

The complexity of processes between specific sectors and industries of national economy implies the generation of various types of receivables and liabilities (Czyzewski A., Grzelak A., 2009). Products delivered by specific industries are used as inputs in other ones which otherwise would be unable to perform production activities (Leontief W., 1936, Vos A., 1975, Dietl J., Gregor B., 1977, Tomaszewicz L., 1994, Czyzewski A., 2001, Czyzewski A., 2013, Mrowczyńska-Kaminska A., 2015, Poczta W., Mrowczyńska-Kaminska A., 2004, Czyzewski A., Grzelak A., 2009, 2012). Therefore, the existence of product flows between industries generates demand for an analysis of inputs and outputs in specific industries and in the economy as a whole (Czyzewski A., Grzelak A., 2009). Agricultural inputs are products manufactured in other sectors of the national economy. Also, agricultural production processes are supported with various types of services, including: logistics, coordination, financing, human labour, technology, information, policies, programs and initiatives (Custodio H. C. Jr., 2003).

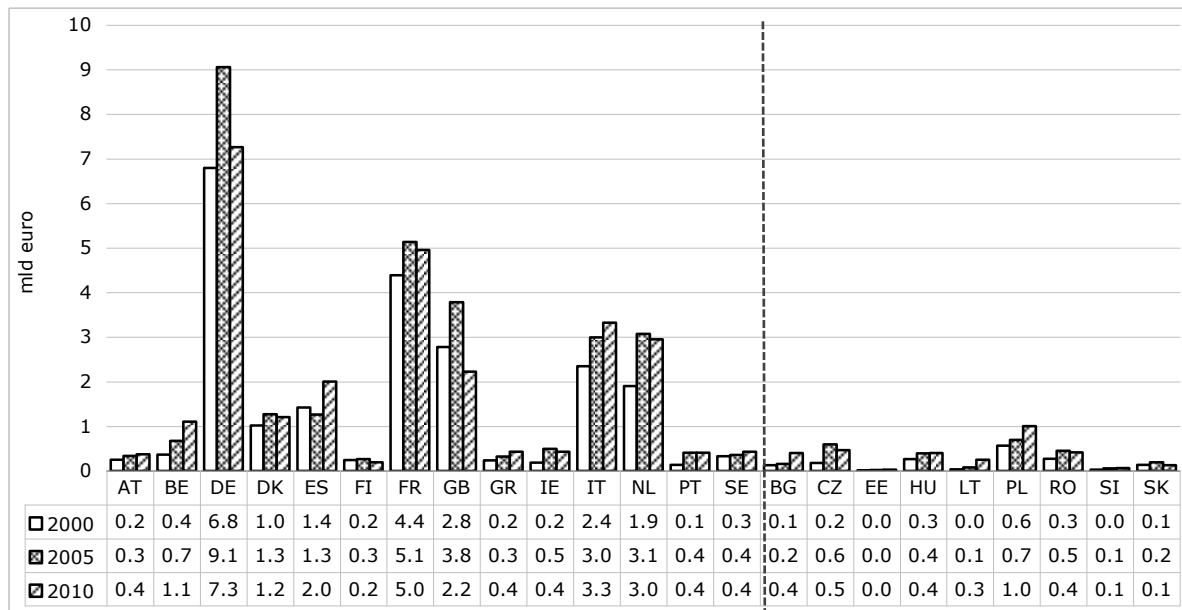
The volume of materials supplied to the agriculture primarily depends on the agriculture's importance for the national economy in terms of production capacity and production and income performance (Mrowczyńska-Kaminska A., 2009, 2015). This can be noticed by analysing the data shown in Fig. 1. In 2000-2005-2010, the greatest flows from the service sector to the agriculture were recorded in Germany (EUR 6.8-9.1-7.3 billion), France (EUR 4.4-5.1-5.0 billion), UK (2.8-3.8-2.2) and Italy (EUR 2.4-3.0-3.3 billion), followed by the Netherlands and Spain. One-and-a-half times greater than in France, service flows to the German agriculture accounted for around 30 % of total EU-wide material flows from the service sector to the agriculture.

Services, as a determinant of changes taking place in the agri-food sector, play an essential role in material flows destined to the agriculture (Mrowczyńska-Kaminska, A., Szuba E., 2015), and are an indirect reflection of its modernity. The service sector had a high share in the flows delivered to the agriculture (Fig. 2) mainly in highly developed countries: Germany, Belgium, Denmark, UK and the Netherlands (18-21 %). In all of these countries, except for Belgium, that share reduced from 2000 (which was largely caused by a certain decline in the use levels of financial services due to the 2007-2008 crisis). Meanwhile, in Belgium, the share of services in material flows to the agriculture more than doubled. Over the period considered, the smallest flows of services to the agriculture were reported in Estonia and Slovenia. In terms of value, they doubled from 2000 to 2010, with a share in the structure of material flows to the agriculture ranging from 8 % to 10 %, which is more than in the Polish agriculture. Poland, next to Romania and Finland, demonstrated the smallest share of services in material flows to the agricultural sector.

<sup>1</sup> Croatia, Cyprus, Luxembourg, Latvia and Malta are not covered by this study due to lack of comparable data.

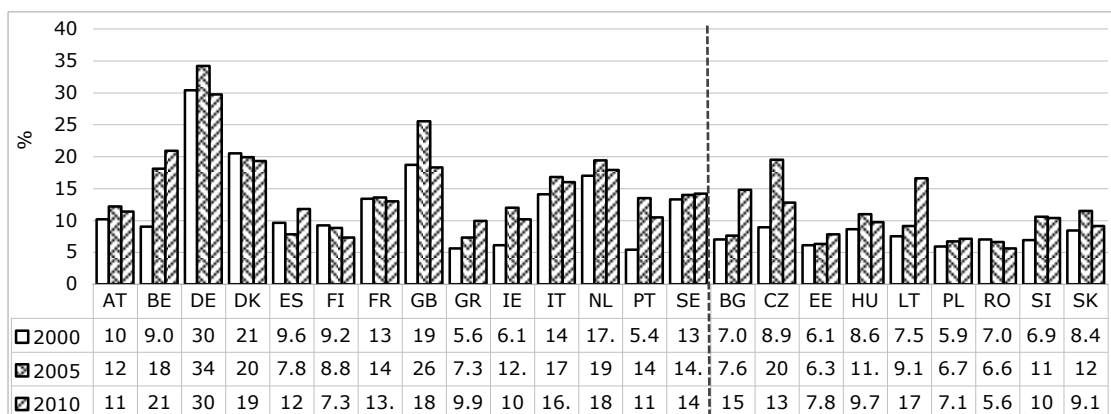
<sup>2</sup> Data from 2007 are used in the case of the Czech Republic, Denmark, Finland, France, the Netherlands, Germany and Portugal.

<sup>3</sup> Data from 2009 are used in the case of Bulgaria and Spain.



<sup>a</sup> Country symbols: AT – Austria, BE – Belgium, DE – Germany, DK – Denmark, ES – Spain, FI – Finland, FR – France, GB – United Kingdom, GR – Greece, IE – Ireland, IT – Italy, NL – Netherlands, PT – Portugal, SE – Sweden, BG – Bulgaria, CZ – Czech Republic, EE – Estonia, HU – Hungary, LT – Lithuania, PL – Poland, RO – Romania, SI – Slovenia, SK – Slovakia.  
**Source: author's calculations based on Input-output table (2012, 2017)**

**Fig. 1. Material flows from the service sector to the agriculture in EU countries in 2000, 2005 and 2010<sup>a</sup>.**



<sup>a</sup> Country symbols: see Fig. 1  
**Source: author's calculations based on Input-output table (2012, 2017)**

**Fig. 2. Share of services in the structure of material flows to the agricultural sector in EU countries in 2000, 2005 and 2010<sup>a</sup>.**

Because of different sizes of economies in countries covered by this study, it is more appropriate to extend the analysis to the internal structure of material flows. Considering the value of service flows to the agriculture sector, three service groups may be identified.

- The first one demonstrates the highest absolute and relative values. It includes financial, insurance, professional, technical and veterinary services.
- The second one is a group of services related to the real estate market, rental and lease, administration services, supporting activities and transport services.
- The third group is composed of all services not listed above.

The highest share of financial and insurance services in the structure of material flows (Table 1) from the service sector to the agriculture was reported in Greece (74 %), Denmark (52 %) and Sweden (45 %). A large share (above 30 %) was also recorded in Spain, France, Poland, Finland, Bulgaria and Austria while Romania and Slovakia saw the lowest levels (below 10 %). In turn, the

highest shares of professional, scientific, technical and veterinary services were found in Slovenia, the UK, Ireland and Belgium, with Lithuania reporting the smallest shares (6 %). Transport services, services related to the real estate market, rental and lease, administration services and supporting activities had a medium share in the structure of material flows from the service sector to the agriculture. The largest share of transport services of all the countries considered was recorded in Romania and Lithuania (40 %) and in Hungary and Italy (over 30 %), whereas low levels were characteristic of highly developed Western European countries (e.g. 1.6 % in Denmark). The largest share of services related to the real estate market, rental and lease was recorded in Slovakia and (when combined with administration services and supporting activities) in Germany where the total share of the above services in the structure of material flows from the service sector to the agriculture was 65 %. Other service groups were less significant in the mix of services intended for the agriculture. Only the share of information and communication services in Portugal, Estonia, Ireland, UK and Lithuania reached around 10 % (Table 1).

Thus, the key services delivered to the agricultural sector (both in Western European countries and in Central and Eastern European countries) were financial, insurance, professional, scientific, technical and veterinary services and, in EU-10 countries, transport services. The least important set were healthcare and social care services, followed by cultural, entertainment and leisure services, as well as education, accommodation and catering services<sup>1</sup>.

Over that period, most of the European Union countries reported growth of the service sector's contribution to the supply of agricultural materials, which is consistent with the progressive evolution of the agri-food sector. Obviously, that fact does not provide any grounds for making conclusive judgments about the reasons or durability of such changes. At the same time, between 2005 and 2010, some of the countries covered by this study saw a decline in the share of services. Especially as regards Central and Eastern European countries, this could result from extending the Common Agricultural Policy to their agricultural sectors which contributed to increasing the subsidies (payments)<sup>2</sup> responsible for the growth of the farms' incomes. Another contributing factor was the support in the form of subsidizing certain investment types. As a consequence, the farms started to co-finance the upgrade of their assets with their own funds (including as the required own contribution in investments financed under EU programs). It also resulted in improving occupational safety and enhancing environmental protection. This, in turn, translated into purchases of more sophisticated and more efficient machinery and equipment<sup>3</sup> which may substitute some services (while stimulating the reduction of overstaffing). At the same time, as noted by Jozwiak W. (2012), the area of intensive crops (which require large quantities of labour and productive inputs per unit area) was reduced, and the downward trend of extensive farming was stopped<sup>4</sup>. Thus, it is not easy to look for reasons which explain the levels of material flows from the service sector to the agriculture and affect their evolution over time. Undoubtedly, service use levels largely depend on the agriculture development level. However, more specifically, both the volume and the structure of material flows from the service sector are developed by multiple measurable and non-measurable variables proper to the economic, natural, social and

<sup>1</sup> According to Mrowczynska-Kaminska A., Szuba E. (2015), the increasing importance of financial and insurance services may result from the growing number of the largest farms who rely on external accountancy services.

<sup>2</sup> Jozwiak W., Kagan A., Mirkowska Z. (2012).

<sup>3</sup> Cf. Jozwiak W. (2012).

<sup>4</sup> The decline in the number of livestock was also stopped. In 2005-2009, an increase in livestock population was recorded. Jozwiak W. (2012) also states that: *a slight increase in intermediate consumption costs indicates yet another striking development. For the agricultural producers, the growing gross margin was a poor incentive to increase their expenditure as a part of intermediate consumption (...) the farming population allocated a large part of funds derived from the gross value added (...) to increased consumption. This was especially true for small farms owned by natural persons.*



cultural specifics of each country, and by the related decision-making patterns, production structures and agricultural production management methods.

Table 1

**Structure of material flows from the service sector to the agriculture  
 in European Union countries in 2010 by types of activity ( %)**

Countries	Transport services	Accommodation and catering services	Information and communication services	Financial and insurance services	Services related to the real estate market, rental and lease	Professional, scientific, technical and veterinary services	Administration services and supporting activities	Public administration and national defence services	Educational services	Healthcare and social care services	Cultural, entertainment and leisure services	Other services
Austria	8.7	1.0	3.5	30.1	17.2	35.9	2.6	0.3	0.4	0.0	0.0	0.4
Belgium	14.5	0.8	0.5	17.9	5.3	43.5	15.1	0.1	0.0	0.1	0.9	1.2
Bulgaria	11.1	0.1	1.5	31.6	8.3	34.3	11.8	1.0	0.0	0.1	0.0	0.2
Czech Republic	21.2	4.6	5.9	25.2	6.4	25.1	4.7	5.7	0.8	0.1	0.1	0.3
Denmark	1.6	0.3	2.4	52.0	4.1	35.5	3.3	0.6	0.1	0.0	0.0	0.2
Estonia	25.8	0.1	8.4	17.8	10.5	29.8	1.0	1.2	0.7	0.0	0.0	4.7
Finland	8.1	2.5	4.2	32.9	15.1	22.1	4.3	6.8	0.6	0.0	0.4	2.9
France	19.0	0.6	3.2	36.7	6.9	29.4	2.1	0.0	2.1	0.0	0.0	0.0
Germany	4.2	0.0	0.6	13.9	32.7	11.4	32.1	2.9	0.2	0.2	0.0	1.7
Greece	7.5	0.0	1.6	74.1	3.2	11.7	0.1	0.0	0.0	0.0	0.0	1.7
Hungary	31.2	0.2	4.7	26.6	8.2	18.7	5.3	1.4	0.5	0.0	0.2	2.9
Ireland	7.8	0.6	8.2	28.1	4.0	45.7	0.7	0.7	0.1	0.2	1.4	2.6
Italy	30.4	1.8	2.1	27.8	4.9	25.0	2.0	0.0	0.0	0.0	0.3	5.7
Lithuania	39.4	0.0	7.5	16.1	18.0	6.4	7.7	0.0	0.0	0.0	0.0	4.9
Netherlands	15.7	0.3	3.3	22.7	7.2	38.1	8.0	1.9	0.5	0.0	0.1	2.1
Poland	24.7	0.3	3.0	33.5	6.0	24.7	2.7	2.6	0.2	0.6	0.1	1.4
Portugal	21.4	2.0	9.1	26.3	4.1	26.4	3.8	1.1	0.2	0.3	0.0	5.3
Romania	40.5	2.9	5.8	8.3	1.1	35.9	3.7	0.0	1.0	0.3	0.2	0.3
Slovakia	18.4	0.1	5.7	9.1	41.0	17.6	4.6	0.3	0.1	1.9	0.2	1.0
Slovenia	7.9	0.4	0.6	28.6	1.4	59.1	0.0	0.7	0.9	0.1	0.0	0.2
Spain	15.3	0.6	2.6	38.2	0.8	22.5	16.0	0.1	1.8	1.4	0.0	0.8
Sweden	11.7	0.9	2.4	45.3	2.6	29.0	2.3	3.7	0.0	1.0	0.0	1.1
United Kingdom	9.4	2.0	7.8	22.7	7.9	46.5	1.0	0.4	0.4	0.1	1.9	0.0

Source: author's calculations based on Input-output table (2012, 2017)

**Conclusions, proposals, recommendations**

- 1) Over that period, most of the European Union countries reported growth of the service sector's contribution to the supply of agricultural materials, which is consistent with the progressive evolution of the agri-food sector.
- 2) Between 2005 and 2010, some of the countries covered by this study saw a decline in the share of services. Especially as regards Central and Eastern European countries, this could result from extending the Common Agricultural Policy and support measures (which mean co-financing certain investment types) to their agricultural sectors. This helped making decisions to purchase more efficient, state-of-the-art machinery and equipment which enabled substituting purchased services with own labour.
- 3) The key services delivered to the agricultural sector (both in Western European countries and in Central and Eastern European countries) were financial, insurance, professional, scientific,

technical and veterinary services and, in EU-10 countries, transport services. In turn, the least important set were healthcare and social care services, followed by cultural, entertainment and leisure services, as well as education, accommodation and catering services.

- 4) Undoubtedly, service use levels largely depend on the agriculture development level. However, more specifically, both the volume and the structure of material flows from the service sector are developed by multiple measurable and non-measurable variables proper to the economic, natural, social and cultural specifics of each country, and by the related decision-making patterns, production structures and agricultural production management methods.

## Bibliography

1. Input-output table (2012). Retrieved: <http://www.epp.eurostat.europa.eu> Access: 20.06.2012.
2. *Input-output table (2017)*. Retrieved: <http://www.epp.eurostat.europa.eu> Access: 30.09.2017.
3. Clark, C. (1957). *The Conditions of Economic Progress*. MacMillan, St. Martin's Press, London-New York, p. 720.
4. Custodio, H. C. Jr. (2003). *Agribusiness Concepts and Dimension: Some Applications*. From C. V. Velasco. Agribusiness Management Course Module. AB 710. Central Luzon State University.
5. Czyzewski, A. (2001). *Współczesne problemy agrobiznesu w Polsce (Today's agribusiness problems faced by Poland)*. Wydawnictwo Akademii Ekonomicznej w Poznaniu, Poznań, pp. 5-8. p. 161.
6. Czyzewski, A. (2013). *Przepływy międzygaleziowe jako makroekonomiczny model gospodarki (Input-output tables as a macroeconomic model)*. Wydawnictwo Uniwersytetu Ekonomicznego w Poznaniu, Poznań. p. 25.
7. Czyzewski, A., Grzelak, A. (2009). *Możliwości oceny rozwoju rolnictwa w warunkach globalnych z zastosowaniem tabeli przepływów międzygaleziowych (Ability to assess the agricultural development level in a global environment with the use of input-output tables)*. *Zeszyty Naukowe SERIA* Volume 11, Issue 2, pp. 43-48.
8. Czyzewski, A., Grzelak, A. (2012). *Możliwości wykorzystania statystyki bilansów przepływów międzygaleziowych dla makroekonomicznych ocen w gospodarce (Ability to use the balance statistics of input-output tables for macroeconomic assessments)*. *Przegląd Statystyczny*, no 1, pp. 173-184.
9. Dietl, J., Gregor, B. (1977). *Dysproporcje w rozmieszczeniu produkcyjno-handlowej obsługi rolnictwa (Disproportions in the distribution of production and commercial services for agriculture)*. *Przegląd Geograficzny*, Volume XLIX, Issue 4, pp. 657-676.
10. Fisher, A. G. B. (1935). *The Economic Implications of Material Progress* *International Labour Review* no 32, pp. 5-18.
11. Fourastié, J. (1954). *Die grosse Hoffnung des zwanzigsten Jahrhunderts (The great hope of the twentieth century)*. Bund-Verlag, Köln-Deutz, p. 320.
12. Jozwiak, W. (2012). *Polskie rolnictwo i gospodarstwa rolne w pierwszej i drugiej dekadzie XXI wieku. Konkurencyjność polskiej gospodarki żywnościowej w warunkach globalizacji i integracji europejskiej (Competitiveness of the Polish food economy in the context of globalization and European integration)*. Program Wieloletni 2011-2014, Warszawa, pp. 119-132.
13. Jozwiak, W., Kagan, A., Mirkowska, Z. (2012). *Innowacje w polskich gospodarstwach rolnych, zakres ich wdrażania i znaczenie (Innovations, their implementation scope and importance in Polish farms)*. *Zagadnienia Ekonomiki Rolnej*, no 3, pp. 3-27.
14. Kujaczynski, T. (2009). *Wykorzystanie bilansu przepływów międzygaleziowych do analizy zmian struktur gospodarczych na przykładzie Polski (Using the input-output table balance to analyze the evolution of economic structures as illustrated by the example of Poland)*. *Roczniki Ekonomiczne Kujawsko-Pomorskiej Szkoły Wyższej w Bydgoszczy*, no 2, pp. 93-100.
15. Leontief, W. (1936). *Quantitative input and output relations in the economic system of the United States*. *The Review of Economics and Statistics*, no XVIII, pp. 105-125.
16. List, F. (1910). *Das nationale System der politischen Oekonomie (The National System of Political Economy)*. Gustav Fischer-Verlag, Jena, 550.
17. Mrowczyńska-Kaminska, A. (2015). *Wykorzystanie modelu przepływów międzygaleziowych do badania zależności w agrobiznesie w krajach Unii Europejskiej (Using the input-output table model to assess the agribusiness relationships in European Union countries)*. (In:) *Problemy rozwoju rolnictwa i gospodarki żywnościowej w pierwszej dekadzie członkostwa Polski w Unii Europejskiej*. A. Czyzewski, B. Klepacki (red.), *IX Kongres Ekonomistów Polskich*, Wydawnictwo PTE, Warszawa, pp. 80-90.
18. Mrowczyńska-Kaminska, A., Szuba, E. (2015). *Zmiany przepływów międzygaleziowych w rolnictwie nowych krajów członkowskich po integracji z Unią Europejską (Evolution of the input-output table in the agriculture of new member countries following their integration into the European Union)*. (In:) *Polska – 10 lat w członkostwa w Unii Europejskiej*. E. Maluszyńska, G. Mazur, I. Musiałkowska (red.). Wydawnictwo Uniwersytetu Ekonomicznego w Poznaniu, Poznań, pp. 143-155.
19. Począta, W., Mrowczyńska-Kaminska, A. (2004). *Agrobiznes w Polsce jako subsystem gospodarki narodowej (Agribusiness in Poland as a sub-system of the national economy)*. Wydawnictwo Akademii Rolniczej im. Augusta Cieszkowskiego w Poznaniu, Poznań, p. 113.

20. Tomaszewicz, L. (1994). *Metody analizy input-output* (Input-output analysis methods). Wydawnictwo Naukowe PWE, Warszawa, p. 178.
21. Wolfe, M. (1955). The Concept of Economics Sectors. *The Quarterly Journal of Economics*. no 69, pp. 402-420.
22. Wos, A. (1975). *Związki rolnictwa z gospodarką narodową* (Relationships between agriculture and national economy). PWRiL, Warszawa, p. 303.

## LABOUR FORCE IN POLISH RURAL AREAS AFTER POLAND'S ACCESSION TO THE EUROPEAN UNION

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**Abstract.** The size and usage level of labour resources co-determine the economic potential and strength. The above aspect is particularly important in Polish rural areas, which remain affected by side effects of the economic transformation. The purpose of this paper is to analyse the evolution of the size and usage levels of labour resources related to Polish rural areas after Poland's accession to the EU, compared to earlier figures. The subject matter of this study is labour resources in Polish rural areas seen in the context of demographic trends and economic developments over the 2002-2050 period. Polish rural areas have a significant population potential and strong labour resources. Over time, their potential will become increasingly important for the entire country, especially considering the progressing urban depopulation. Later in the study period, the population's professional situation was steadily improving on a year-to-year basis. This was reflected by the consistent increase of the economic activity rate and employment rate, and by the declining unemployment rate.

**Key words:** labour force, rural areas, rural population, economic activity of the population, EU accession.

**JEL code:** J21, J11.

### Introduction

The size and usage level of labour resources co-determine the economic potential and strength. In addition to land and capital, labour is one of the three classic productive inputs. Therefore, what matters for economic growth and development is the size as well as the quality and usage level of labour resources. That problem becomes particularly important in less developed areas, which often remain affected by side effects of the economic transformation and by the resulting surplus of unused labour resources: the unemployed, inactive and inefficient employees (which means those formally employed whose labour fails to provide economic benefits: this situation is referred to as 'hidden unemployment').

Polish countryside is one of these areas. This results from the historical background, which is different from any other European country. Polish rural areas continue to be adversely affected by the fragmentation of farmland and by the absorption of overstaffing originating from non-agricultural sectors. The rural population is less educated than their urban peers; and the distance from economic and industrial centres makes it difficult for them to compete in the non-agricultural labour market (Kolodziejczak and Wysocki, 2015). Therefore, the agriculture sector remains the primary employer for the Polish rural population. Another difference between Polish and other European rural areas is the important size of labour resources.

The purpose of this paper is to analyse the evolution of the size and usage levels of labour resources related to Polish rural areas after Poland's accession to the EU, compared to earlier figures.

The analysis was based on data from the Central Statistical Office of the Republic of Poland, the EUROSTAT database and the relevant literature. The subject matter of this study is labour resources in Polish rural areas seen in the context of demographic trends and economic developments. The study period extends from 2002 to 2050.

### Research results and discussion

In Poland, 1989 marked the start of dynamic structural changes to the economy, which particularly impacted the agricultural sector. At the same time, the demographic and social

situation was also changing. New labour resources started to emerge in the market (as the 1980s baby-boomers reached the age of economic activity). That process coincided with a considerable reduction of jobs on a countrywide basis. It resulted in a wave of redundancies and professional deactivation while making it difficult to find a job for the most disadvantaged population: young inexperienced persons living outside the largest cities and those approaching retirement (Socha i Sztanderska, 2002; Tyrowicz, 2011; Sobolewska-Wegrzyn, 2012; Karwat-Wozniak and Chmielinski, 2013; Kolodziejczak and Wysocki, 2015). The unused surplus of labour was deactivated with institutional tools (early retirement, bridging programs for the elderly, especially those employed in mining and industry). Also, the young population was encouraged to continue their education rather than look for a job. Those who could not be permanently or temporarily deactivated as described above remained unemployed after losing their jobs. Because the number of jobs either decreased or grew slowly, structural unemployment became the dominating type of unemployment. This was an almost insurmountable obstacle, decreasing slightly in periods of higher GDP growth and growing over economic downturn periods (Socha and Sztanderska, 2002). Having lost their jobs due to winding-up of restructured industrial plants, some of the rural population who had migrated to cities in the 1970s and 1980s returned to their family farms located in rural areas. This exacerbated the pre-existing overstaffing of individual farms while strengthening their social function (Kolodziejczak and Wysocki, 2015).

From 2000 until Poland's accession to the EU in 2004, the labour market was in the worst condition since the early 1990s. High open unemployment, low economic activity rates and high surpluses of inefficient employment in the agricultural sector were the factors that slowed down the economy while perpetuating the structural nature of labour market disadvantages. By joining the EU in 2004, Poland became eligible for aid under structural programmes. Also, the accession enabled a growth of exports and helped attracting foreign investors (Pawlak et al., 2015). The Western European labour markets became progressively available to Polish employees and absorbed a large part of labour surplus. The employment of Polish citizens in foreign countries was a relief for the national labour market, enabling an increase in the households' incomes. However, those who found jobs abroad were young, mobile and skilled persons which, in turn, resulted in difficulties to hire employees in some industries. While the opening up of frontiers had a considerable impact on unemployment figures, it failed to remove its core component: the structural unemployment. The next years open a new perspective for the analysis of labour resources and labour market. New problems emerge because of the forecasted population reduction and ageing. In the long run, the key thing is no longer to use the surplus labour but rather to look for ways to offset the shortfalls in labour (Kolodziejczak and Wysocki, 2015).

The rural population has always had a significant (though varying over time) share in the Polish population. In 1946, the rural population was a majority, with a share of 68.2 % in the total Polish population (Table 1). In 2002, it was the opposite: the rural population had a share of 38.2 % in the total country's population. In 1946-2002, the Polish population grew by 59.8 %, from 23 930 000 to 38.230.000. Over that period, the rural population decreased by 1 489 000 (9.2 %). However, in 2017, the rural population (15 317 000) was greater than in 2002 and represented 39.9 % of the total national population. As forecasted by the Central Statistical Office, the Polish population will reduce by 1 892 000 over the 2017-2035 period. This will be particularly noticeable in urban areas, which will lose 2 107 000 inhabitants (9.1 %). Over that period, the rural population will grow by 127 000 (0.8 %) to represent 42.3 % of the national population. In

the next period, by 2050, the Polish population will reduce by 4 418 000 compared to 2017 (11.5 % of the 2017 population). The depopulation will mainly affect the cities, which will lose 4 226 000 inhabitants (18.2 %), compared to a population loss of barely 192 000 (1.3 %) in rural areas. In 2050, 44.5 % of the Polish population will live in rural areas; because of a higher fertility rate, the rural population will be younger and more mobile than urban residents (Population projection, 2014). Therefore, it should be concluded that Polish rural areas demonstrate a high population potential, which means large labour resources. Over time, their potential will become increasingly important for the entire country, especially considering the progressing urban depopulation.

Table 1

**Share of the rural and urban population (thousand) in the total Polish population in 1946, 2002, 2017 and 2035<sup>a</sup>**

Year	Total	Urban areas		Rural areas	
		in thousands	%	in thousands	%
1946	23626	7517	31.8	16109	68.2
2002	38230	23610	61.8	14620	38.2
2017	38369	23052	60.1	15317	39.9
2035	36477	20945	57.4	15444	42.6
2050	33951	18826	55.5	15125	44.5

<sup>a</sup>As regards the shares of the urban and rural population, the 1946 census failed to take account of 304.000 individuals (Statistical Yearbook of the Republic of Poland, 2003).

Source: author's study based on Statistical Yearbook of the Republic of Poland (2003); Population projection 2008-2035 (2007); Population projection 2014-2050 (2014)

Table 2 shows the characteristics of the population aged 15 or more, i.e. individuals included in actual (economically active) and potential (economically inactive) labour resources<sup>1</sup>. What should be noted first, is the fact that the size of this group decreases in urban areas while growing in rural areas, as a natural consequence of demographic trends presented in Table 1. Throughout the 2002-2016 period, the reasons for these developments were the higher demographic growth rate in rural areas compared to cities, and the increasingly noticeable suburbanization of areas located next to big urban centres. Thus, the general growth of the rural population did not mean the perpetuation of a typically rural and agricultural nature of these areas. Neither did it protect the country's poorest and remotest territories against depopulation. Note also that because of suburbanization, some of the rural residents are commuters professionally linked to cities. For them, rural areas mean a place of residence where they can find peace and better quality of living than in cities they migrated from (Kajdanek, 2011).

In the initial years of the study period, the economy was still severely affected by the reduction of jobs due to economic transformation and restructuring of many activities, primarily including the industry, mining and state-owned agricultural land. Later, the urban and rural population's professional situation was steadily improving. This was reflected by the consistent increase of the economic activity rate and employment rate, and by the declining unemployment rate (Table 2). The economically inactive population was declining in urban areas while slightly growing in rural areas. Poland's accession to the Table 2

<sup>1</sup> The relevant literature usually assumes that the economically active population represent the labour resources while the inactive population remain outside these resources (Begg et al., 1992). When adopting a slightly different approach, it may be assumed that the economically active population are the active labour resources while the inactive population are inactive (potential) resources (which, however, could become active under specific circumstances) (Kolodziejczak and Wysocki 2015). Also, the group of potential labour resources could be identified which consists of unemployed and economically inactive people. In turn, Krynska (2006) defines potential labour resources as the entire working-age population.

Economic activity of the population aged 15 and more by sex and place of residence in the years 2002-2017

Speci- fication	Total	Economically active population					Eco- nomi- cally inac- tive per- sons	Activi- ty rate	Em- ploy- ment rate	Unem- ploy- ment rate
		total	employed persons			Unem- ployed per- sons				
			total	working						
			full- time	part- time						
<b>Urban areas</b>										
<b>2002</b>	19537	10711	8432	7734	698	2279	8826	54.8	43.2	21.3
<b>2003</b>	19479	10545	8353	7695	658	2191	8934	54.1	42.9	20.8
<b>2004</b>	19540	10544	8453	7763	690	2090	8996	54.0	43.3	19.8
<b>2005</b>	19586	10621	8632	7925	707	1989	8965	54.2	44.1	18.7
<b>2006</b>	19587	10471	8964	8279	685	1507	9116	53.5	45.8	14.4
<b>2007</b>	19554	10445	9416	8723	694	1029	9109	53.4	48.2	9.9
<b>2008</b>	19506	10546	9788	9093	695	758	8960	54.1	50.2	7.2
<b>2009</b>	19516	10689	9803	9083	721	885	8827	54.8	50.2	8.3
<b>2010</b>	19103	10549	9503	8780	724	1046	8555	55.2	49.7	9.9
<b>2011</b>	19046	10561	9534	8842	692	1026	8485	55.4	50.1	9.7
<b>2012</b>	19001	10585	9527	8828	699	1058	8417	55.7	50.1	10.0
<b>2013</b>	18941	10572	9487	8789	698	1085	8369	55.8	50.1	10.3
<b>2014</b>	18853	10603	9682	8948	734	921	8251	56.2	51.4	8.7
<b>2015</b>	18804	10578	9815	9096	719	763	8226	56.3	52.2	7.2
<b>2016</b>	18538	10420	9803	9121	681	618	8117	56.2	52.9	5.9
<b>Rural areas</b>										
<b>2002</b>	11526	6502	5350	4564	786	1152	5024	56.4	46.4	17.8
<b>2003</b>	11473	6401	5263	4494	769	1137	5073	55.8	45.9	17.8
<b>2004</b>	11583	6481	5342	4538	804	1140	5102	56.0	46.1	17.6
<b>2005</b>	11672	6540	5483	4669	814	1056	5132	56.0	47.0	16.1
<b>2006</b>	11778	6467	5630	4890	739	837	5311	54.9	47.8	13.0
<b>2007</b>	11838	6414	5824	5114	711	590	5424	54.2	49.2	9.2
<b>2008</b>	11867	6465	6012	5365	647	453	5402	54.5	50.7	7.0
<b>2009</b>	11945	6591	6065	5451	614	526	5354	55.2	50.8	8.0
<b>2010</b>	11852	6575	5970	5394	576	605	5277	55.5	50.4	9.2
<b>2011</b>	11957	6660	6028	5469	559	632	5297	55.7	50.4	9.5
<b>2012</b>	12037	6755	6064	5528	536	692	5281	56.1	50.4	10.2
<b>2013</b>	12096	6789	6081	5564	517	708	5307	56.1	50.3	10.4
<b>2014</b>	12131	6826	6180	5680	500	646	5306	56.3	50.9	9.5
<b>2015</b>	12159	6810	6269	5796	472	542	5348	56.0	51.6	8.0
<b>2016</b>	12166	6840	6395	5926	468	446	5325	56.2	52.6	6.5

Source: Labour force survey in Poland 1Q 2017 (2017)

The European Union in 2004 was the starting point for improvements in the labour market. What also should be noted is the gradual equalization of the economic activity rates and employment rates in urban and rural areas. At the beginning of the study period, the rural population was characterized by slightly higher economic activity rates. However, as time went by, in line with improving economic situation and in relation to the gradual reduction of inefficient employment in the agriculture, that difference (which was 2.4 percentage points in 2002) was brought down to zero. The same is true for the employment rate: initially, the level recorded in rural areas was by 3.2 percentage points higher compared to urban areas; but afterwards,

conversely, the urban employment rate was by 0.3 percentage points higher than the level recorded in rural areas. The matter of major importance for the growth of employment and reduction of unemployment was the growing number of jobs resulting from economic development. The 2003-2005 period marked the beginning of improvements to employment figures, which is seemingly related to the economic recovery that accompanied Poland's accession to the EU. In parallel, economic deactivation levels continued to follow a slight upward trend until 2008 (this was due to demographic factors and legislative measures, which allowed the employees to retire before regular retirement age). However, in 2009, the economic activity rate also started to grow, despite the parallel increase of the population's average age (Kolodziejczak and Wysocki, 2015).

One of the major problems affecting the rural labour resources is the excessive employment in agriculture (Frenkel, 2003; Kolodziejczak, 2011; Frenkel, 2013). In Poland, the share of agricultural employees in the total population employed in the national economy was 11.5 % in 2014, which is more than twice as high as the EU-27 average level (5 %). As regards this ratio, worse results were reported only in Romania (29.4 %), Bulgaria (19.4 %) and Greece (12.4 %), with a comparable level recorded in Portugal (11.3 %). The historical background and the economic development level are of vital importance for the agricultural employment level. Other countries with the highest share of agricultural employees demonstrate a high share of mountainous terrains, which determined the natural development of farm structures. In Poland, the decisive factors were the traditional attachment to private land property and the economic transformation after 1989. However, what should be noted is the considerable reduction of employment in the Polish agriculture: in 2002, as much as 19.4 % of the total employee population were agricultural employees ([www.europa.eu](http://www.europa.eu), accessed on January 20, 2018).

Usually, the farming population demonstrated higher employment ratios and lower unemployment levels. Also, they were less vulnerable to economic deactivation than non-farmers (Table 3). Note, however, that a part of the farming population could stop their work with no detrimental effects on production outcomes. This means hidden unemployment, which tends to decrease over time as the number of non-agricultural jobs grows (Frenkel, 2003, Kolodziejczak, 2016). In 2002, with a share of 58.5 %, the farming population represented the majority of economically active rural residents (11.512.000). By 2017, that share decreased to 31.4 % (3.826.000; by 27.1 percentage points) of the total farming population. This significantly impacted the professional situation of both the farming and non-farming population. As it may be noticed, in 2017, there was less non-farming unemployed and much more employed people than in 2002. This could primarily result from economic deactivation (in the study period, the economically inactive non-farming population increased by 2 061 000 individuals; this was largely caused by the impact of demographic factors and by the retirement of farmers). At the same time, the rural farming population improved their professional situation. In this group as well, the unemployment figures went down and (unlike in the non-farming population) so did the number of economically inactive individuals.

In the study period, women had a lower share in the employed group than men (Table 3). No considerable changes in this respect occurred between 2002 and 2016. The general improvement of the labour market situation on a countrywide basis enabled a clear increase of the number and share of employed persons. However, as regards women, economic inactivity continued to be the main problem. This could be partially explained by: the nature of farming work (men usually



handle physically demanding tasks and operate the machinery); the option not to declare farming employment by women

Table 3

**Population aged 15 and more in rural areas by connection with agricultural farm, sex and economic activity**

Specification	Total			Population connected with agricultural farm			Population not connected with agricultural farm		
	total	males	females	total	males	females	total	males	females
<b>2002a</b>									
<b>Total</b>	11.512	5.692	5.820	6.729	3.396	3.333	4.783	2.296	2.487
<b>Economically active population</b>	6.329	3.552	2.777	4.035	2.269	1.766	2.294	1.283	1.011
<b>Employed</b>	5.078	2.892	2.187	3.495	1.971	1.523	1.584	920	663
<b>Unemployed</b>	1.251	660	590	540	298	243	710	363	348
<b>Economically inactive</b>	4.916	2.012	2.904	2.589	1.077	1.512	2.326	935	1.392
<b>1Q 2017</b>									
<b>Total</b>	12.171	6.030	6.142	3.826	1.973	1.853	8.345	4.056	4.289
<b>Economically active population</b>	6.883	3.967	2.915	2.581	1.502	1.079	4.301	2.465	1.836
<b>Employed</b>	6.472	3.735	2.737	2.493	1.457	1.035	3.979	2.278	1.701
<b>Unemployed</b>	411	232	179	89	45	44	322	188	135
<b>Economically inactive</b>	5.289	2.062	3.227	1.245	471	774	4.043	1.591	2.453

<sup>a</sup> The distribution does not take account of people with an undefined status in the labour market.

Source: Labour force survey in Poland (2003); Central Statistical Office, Warsaw; Labour force survey in Poland, 1Q 2017 (2017); Central Statistical Office, Warsaw

who manage the farmers' households (despite their actual involvement in farm management); the women's longer average life expectancy (i.e. their higher share in the group of persons of retiring age); and the popularity of the traditional family model in rural areas where women run the households and raise children while the responsibility of men is to earn a livelihood for their families (Kolodziejczak and Wysocki, 2015). Note also that for many women, it is economically unviable to take up a job. This means cases where the expected income is lower or slightly higher than the costs involved in taking up the job. After considering the increase of living costs related to employment; children care; time lost; and the partial loss of social benefits, it may turn out that the woman's job fails to provide any material benefits for the household.

## Conclusions

- 1) Polish rural areas have a significant population potential and strong labour resources. Over time, their potential will become increasingly important for the entire country, especially considering the progressing urban depopulation.
- 2) The reasons behind the growth of rural population were the higher demographic growth rate in rural areas compared to cities, and the progressive suburbanization of areas located next to big urban centres. The above does not mean the perpetuation of a typically rural and agricultural nature of rural areas. Neither does it protect the country's poorest and remotest territories against depopulation. Because of suburbanization, some of the rural residents are commuters professionally linked to cities. For them, rural areas mean a place of residence where they can find peace and better quality of living than in cities they migrated from.

- 3) In the next years covered by this study, the urban and rural population's professional situation was steadily improving. This was reflected by the consistent increase of the economic activity rate and employment rate, and by the declining unemployment rate.
- 4) At the beginning of the study period, the rural population demonstrated slightly higher economic activity rates than the urban population. Over time, as the economy was getting better, that difference was reduced to zero. A similar reduction of disparities may be observed when it comes to employment rates. The matter of major importance for the growth of employment and reduction of unemployment was the growing number of jobs resulting from economic development following Poland's accession to the European Union.
- 5) Usually, the farming population demonstrated higher employment ratios and lower unemployment levels. Also, they were less vulnerable to economic deactivation than non-farmers. Note, however, that a part of the farming population could stop their work with no detrimental effects on production outcomes. This means hidden unemployment which tends to decrease over time as the number of non-agricultural jobs grows.
- 6) In the study period, women had a lower share in the group of employed rural residents than men. No considerable changes in this respect occurred between 2002 and 2016. The general improvement of the labour market situation on a countrywide basis enabled a clear increase of the number and share of employed persons. However, as regards women, economic inactivity continued to be the main problem.

### **Acknowledgments**

The paper is funded by National Science Centre within the MINIATURA research project No. NCN DEC-2017/01/X/HS4/00565, titled "Determinants of Economic Activity of the Rural Population in Poland. Opportunities to reduce hidden unemployment in agriculture" ("Determinanty aktywności ekonomicznej ludności wiejskiej w Polsce. Możliwości redukcji bezrobocia ukrytego w rolnictwie").

### **Bibliography**

1. Aktywnosc ekonomiczna ludności Polski (Labour force survey in Poland) (2003). GUS, Warszawa.
2. Aktywnosc ekonomiczna ludności Polski I kwartał 2017 (Labour force survey in Poland 1 quarter 2017) (2017). GUS, Warszawa. p. 180.
3. Begg, D., Fischer S., Dornbusch R. (2002). *Ekonomia (Economics)* t.2. PWE, Warszawa.
4. EUROSTAT. Retrieved: <http://www.europa.eu> Access: 20.01.2018.
5. Frenkel, I. (2003). Ludność, zatrudnienie i bezrobocie na wsi. Dekada przemian (Population, employment and unemployment in the countryside. A decade of changes). Inst. Rozw. Wsi i Roln. PAN, Warszawa.
6. Frenkel, I. (2013). Zatrudnienie i struktura dochodów w gospodarstwach rolnych w latach 2005-2010 (Employment and structure of income in farms in 2005-2010). Inst. Rozw. Wsi i Roln. PAN, Warszawa.
7. Kajdanek, K. (2011). Suburbanizacja w Polsce – pejzaz społeczno-przestrzenny (Suburbanization in Poland – a socio-spatial landscape), *Przegląd Socjologiczny*, 2-3(60), pp. 303-320.
8. Karwat-Woźniak, B., Chmielinski, p. (2013). Ludność wiejska oraz jej aktywnosc zawodowa i sytuacja na rynku pracy (Rural population and its professional activity and situation on the labour market). (In:) *Rynek pracy wobec zmian demograficznych* Nr 1/2013. Kielkowska M. (red.). Wyd. Instytut Obywatelski, Warszawa.
9. Kolodziejczak, W. (2011). Sytuacja zawodowa wiejskiej ludności rolniczej i bezrolnej w latach 2002 i 2010 (Professional situation of the agricultural and rural landless population in the years 2002 and 2010). *Roczniki Naukowe SERiA* tom 13, z. 3, Wyd. Wiesz Jutra Warszawa-Poznan-Wroclaw. pp. 133-137.
10. Kolodziejczak, W. (2016). Nadwyżka zatrudnienia w polskim rolnictwie – projekcja na tle państw Unii Europejskiej (The Surplus of Employment in Polish Agriculture - A Simulation Against the European Union Countries). *Zeszyty Naukowe SGGW w Warszawie Problemy Rolnictwa Światowego*, t. 16(31), z. 1, pp. 129-141.
11. Kolodziejczak, W., Wysocki, F. (2015). Determinanty aktywności ekonomicznej ludności wiejskiej w Polsce (Determinants of economic activity of the rural population in Poland). Wyd. UP w Poznaniu, Poznan. p. 199.

12. Krynska, E. (2006). Zasoby pracy w Polsce – stan obecny i perspektywy. Starzenie sie ludnosci i zasobow pracy. Konsekwencje i sposoby ich ograniczania (Labour resources in Poland - current status and prospects. Aging of the population and labour resources. Consequences and ways to limit them). EQUAL, Lodz.
13. Pawlak, K., Standar, A., Kolodziejczak, M., Kolodziejczak W. (2015). Bezposrednie inwestycje zagraniczne w wojewodztwie wielkopolskim, Raport z badania 2015 (Foreign direct investment in the Wielkopolskie voivodship, Research report 2015), Wyd. UP w Poznaniu. p. 55.
14. Prognoza ludnosci Polski na lata 2008-2035 (Population projection for Poland 2007-2035) (2007), GUS, Warszawa.
15. Prognoza ludnosci Polski na lata 2014-2050 (Population projection 2014-2050) (2014). GUS, Warszawa. p. 167.
16. Rocznik Statystyczny Rzeczpospolitej Polskiej (Statistical Yearbook of the Republic of Poland) (2003). GUS, Warszawa.
17. Sobolewska-Wegrzyn, B. (2012). Zmiany aktywnosci ekonomicznej ludnosci wiejskiej w latach 2001-2011 (Changes in Economic Activity of the Rural Population 2001-2011). Barometr Regionalny nr 4(30), pp. 39-52.
18. Socha, M., Sztanderska, U. (2002). Strukturalne podstawy bezrobocia w Polsce (Structural foundations of unemployment in Poland). Wyd. Nauk. PWN, Warszawa. P.339.
19. Tyrowicz, J. (2011). Histereza bezrobocia w Polsce (Hysteresis of unemployment in Poland). Wydawnictwa Uniwersytetu Warszawskiego, Warszawa. p. 239.

## DETERMINANTS OF FARMERS DEMAND FOR SUBSIDIZED AGRICULTURAL INSURANCE IN POLAND

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**Abstract.** Concerns about food security, price volatility along with an increase in frequent unfavourable weather phenomena creates the necessity to make greater efforts to protect and stabilize agricultural income and production capacity. Undoubtedly, one of the main activities is to popularize and increase farmers' access to insurance. Nevertheless, the decision to purchase agricultural insurance depends to a large extent on the characteristics of the farm, as well as the farmers themselves. The purpose of this article is to identify factors and assess role they play affecting the likelihood of farmers purchasing subsidized agricultural insurance. Data were collected in the region of Central Pomerania using a questionnaire. Identification of factors affecting the probability of purchasing subsidized agricultural insurance was made using the logit regression model. The base for the model was a set of independent variables obtained and based on a survey conducted in 2012 amongst owners or managers of an agricultural holding. The analysis showed that the decision to purchase subsidized agricultural insurance depended on the number of people permanently employed on the farm and on the occurrence of damage in the past. The research presented results which suggest that the probability of purchasing subsidized agricultural insurance increased as the number of people permanently employed on the farm grows, and that it is more than eleven times higher in the case of units that in the past suffered damage caused by natural disasters.

**Key words:** demand for insurance, subsidized agricultural insurance, logit model.

**JEL code:** Q14,G22, C38.

### Introduction

Concerns about food security, price volatility and a frequent increase in unfavourable weather phenomena creates the need to make greater efforts to protect and stabilize agricultural income and production capacity. Undoubtedly, one of the main activities is to popularize and increase farmers' access to insurance. Insurance stabilizes farmers' income, helping them in the fight against the loss of crops due to unfavourable weather (Wang K. et al., 2015). They contribute to increasing the efficiency of allocating farm resources (Arias D., Covarrubias K., 2006) and strengthen the sustainable development of agricultural holdings (Kurdys-Kujawska A., 2016; Pawlowska-Tyszko J., Soliwoda M., 2017). Despite the significant role that insurance plays in agricultural activity, the level of its use in Poland is low. To increase the popularity of insurance, the Act on Agricultural Crops and Livestock Insurance was introduced in 2005. It assumed the use of premium subsidies for signing insurance contracts against the risk of occurrence of adverse events and their effects in agriculture. This Act has been amended many times in the past decade, which stemmed the need to adapt national regulations to those in the European Union among other reasons. Currently in Poland, the area of crops covered by insurance is at the level of approximately 3.5 million ha in relation to approximately 0.8 million ha before the introduction of the subsidy system. From year to year, both the area of insured crops and the number of insured farmers increased ([www.gu.com.pl](http://www.gu.com.pl)). As noted by J. Pawlowska-Tyszko et al. (2015), an increase in the popularity of insurance is correlated with the amount of contributions to premiums, which increased from approximately 9.86 million PLN to 164.4 million PLN. Despite the fourfold increase in the insured area of crops, the use of subsidized insurance is still low and is at the level of 20 % of all agricultural land covered by direct payments (without grassland it is less than 10 %) ([www.ppr.pl](http://www.ppr.pl)). Research aimed at identifying the factors affecting the probability of farmers

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purchasing subsidized agricultural insurance may contribute to determining the main reasons for the low level of their use. It is worth noting that the knowledge of factors affecting the probability of purchase of subsidized agricultural insurance is important in assessing the legitimacy and cost-effectiveness of insurance programs based on public support (Goodwin B. K., Smith V. H., 1995). It can also play an important role in creating effective subsidy programs (Zhang R., Fan D., 2016) and enable policy makers to predict farmers' responses to any changes in an already existing system. In addition, the need to engage in research on identifying the determinants of subsidized agricultural insurance results from the growing debate on their importance in the process of adapting to the changing climatic conditions in agriculture. The aim of the study is to identify factors and assess role they play affecting the likelihood of farmers purchasing subsidized agricultural insurance.

### **Factors determining the demand for subsidized agricultural insurance**

The tendency of farmers to use subsidized insurance is influenced by a range of different factors. These factors appear in literature and can be divided into three groups. The first relates to the specific characteristics of farmers (e.g. education, attitude to risk, non-agricultural sources of income), the second group consists of economic factors (e.g. insurance premium, income, debt level), whilst the third consists of factors related to specific features of the region in which the agricultural holding is located (e.g. terrain, soil quality, economic and social infrastructure) (Cabas J. H., Leiva A. J., Weersink A., 2008). Factors determining the participation of farmers in the system of subsidized insurance is the subject of consideration for many scientists. p. Barry et al. (2004) point out that farmers purchasing decisions in the matter of subsidized crop insurance are determined by the size of the farm, the structure of the land, the period of functioning, the level of indebtedness and the degree of exposure of the farm to income risk. M. A. Mohammed and G. F. Ortmann (2005) analyzing the factors affecting the likelihood of obtaining farm animal insurance by Eritrean farmers, showed that the farmer's education level has a positive effect on the probability of buying inventory insurance, whilst the negative effect can be created by factors such as the use of alternative risk management strategies (including diversification of production and undertaking investment activities outside the farm), the breeder's experience, farm location and poorly developed infrastructure, which increases transaction costs. R. Zhang and D. Fan (2016), when assessing the level of farmers' demand for crop insurance in China, prove that income, gender, education level, experience, premium size, a farmer's household size, farm area and previous experience have detrimental effect on the probability of using insurance protection. P.K.R. Dhanireddy and G. Frisvold (2012), examining the factors affecting the purchase of crop insurance and receiving aid payments by US farmers, cite evidence that the factors influencing the probability of participation in federal crop insurance programs include: age of the farmer, level of education, sales value, income from agricultural production and climatic conditions. B. K. Goodwin and R. M. Rejesus (2008) prove that diversification of production, larger share in total animal production and a higher loss ratio have a positive impact on the probability of farmers to use crop insurance, while a higher premium, income from non-agricultural sources and the amount and frequency of ad hoc assistance for disaster victims all have a negative effect. S. Ghazanfar et al. (2015), based surveys conducted amongst farmers in Pakistan, indicate that having credits or loans, the expected rate of return, farm income, farm area, the experience of damage and land ownership structure have a significant impact on farmers' willingness to participate in the crop

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insurance system. G. Santeramo (2015; 2016), analysed farms in Italy, and showed that farmers with higher education and larger farms are more likely to take advantage of insurance. On the other hand, older farmers using irrigation systems and diversifying their production are characterized by lower probability of taking out insurance. According to S. Makki and A. Somwar (1999), the factors determining the farmers' demand for crop insurance include the level of risk, insurance price, the amount of state subsidies, the expected amount of compensation, the availability of alternative insurance products and the nature of the insurance contract. M. G. Ginderai A. D. Spauldinga (2006) confirm the results of other authors, pointing out that in addition to weather hazards, the factor that significantly affects farmers' decisions about buying insurance is its price and the amount of state subsidies. Similarly, Enjolras et al. (2012) who when analysing crop insurance in France and Italy, along with factors that have a significant impact on farmers' insurance decisions mention farm size, crop diversification and insurance premiums. E. Sihem (2017) proves that apart from socio-economic factors (including insurance premium, subsidy amount, farm area, farmer's education level and risk related to yields), religious issues also determine the use of agricultural insurance in the countries of America and Europe. It is also worth noting the results obtained by Polish researchers. According to D. Walczak (2011), the probability of farmers benefiting from subsidized crop insurance is positively influenced by the area of the agricultural holding and sources of agricultural income. In turn, A. Wicka (2013) proves that the size of the farm, the share of plant production in sales and the level of income have a positive impact on the use of crop insurance. P. Sulewski and A. Kloczko-Gajewska (2014) indicate that the likelihood of purchasing subsidized insurance depends on the quality of soils, past losses, having credit obligations and having children. M. Kaczala (2015) proves that the location of the farm, the type of crops, the occurrence of damage events in the past, financing of previous damage from insurance, the size of the farm and arable land, the purpose of running the farm and soil class are also important. J. Pawlowska-Tyszko et al. (2016) state that factors influencing the farmers to purchase subsidized crop insurance may result from macroeconomic and sectoral conditions, including the psychological profile of the person running the farm. However, the most frequent reasons for the purchasing of subsidized crop insurance were the increasingly noticeable changes in the climate, i.e. hazards resulting from weather risk. As indicated by the example of research results from various authors, the issue of farmers' participation in the subsidized insurance system in agriculture is widely analysed. Taking into account the presented research results, factors which are most often mentioned by researchers are the following: area of the farm, the level of education of the farmer, the use of alternative risk management tools and the amount of the insurance premium.

## **Materials and methods**

The study was conducted in the northern part of Poland in the region of Central Pomerania, which is a typically agricultural region. There is a prevalence of rye complex of very good, good and weak type. The share of soils in the very good wheat complex is small. The climate here is mild and humid, and the growing season is very long compared to other regions in Poland. This region is characterized by a high share of commodity farming with a predominance of animal production, and the traditional subsistence farming. The analysed units were the owners or managers of agricultural holdings. The research was carried out using a questionnaire survey in 2012. Answers were obtained based on the acceptance of participation in the study. 256 questionnaires were

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qualified for the study to estimate the likelihood of farmers benefiting from subsidized agricultural insurance, logistic regression was used. The logit model made it possible to describe the relationship between the dichotomous qualitative variable "use of subsidized agricultural insurance" ( $Y$ ) and the set of independent variables ( $X_1, \dots, X_k$ ).

The logistic regression model enables investigating the influence exerted by many independent variables  $X_1, \dots, X_k$  on the dichotomous dependent variable  $Y$ . The values of the dependent variables are coded as follows: 1 – the distinguished value – possessing the feature, 0 – not possessing the feature. In the logit regression, the logistic function is used, having values from the range  $(0;1)$  and curve resembling the stretched S letter, whose analytical form is as follows (Stanisz 2007):

$$f(z) = \frac{e^z}{1+e^z} = \frac{1}{1+e^{-z}}, \quad z \in R \quad (1).$$

The logistic regression model for the dichotomous variable  $Y$  specifies the conditional probability of taking by this variable the distinguished value and it is expressed by the following dependence (Maddala 2001, Stanisz 2007):

$$P(Y = 1 / X_1, \dots, X_k) = \frac{e^{\alpha_0 + \alpha_1 X_1 + \dots + \alpha_k X_k}}{1 + e^{\alpha_0 + \alpha_1 X_1 + \dots + \alpha_k X_k}} \quad (2).$$

where  $\alpha_0, \alpha_1, \dots, \alpha_k$  they are parameters of the model,  $X_1, \dots, X_k$  independent variables that may have both the qualitative and the quantitative character. The logistic regression model coefficients can be searched for with the maximum likelihood method (Dobosz 2004) or with the ordinary least squares method (Gruszczynski, Podgorska, 1996).

Due to the model (2) nonlinearity in relation to the independent variables and parameters, by finding the logarithm the logistic model is transformed into the linear model. For this purpose, the Odds Ratio concept is introduced, which is the ratio of the probability of a given event occurrence to the probability that the said event shall not occur, that is:

$$\frac{P(Y = 1 / X_1, \dots, X_k)}{1 - P(Y = 1 / X_1, \dots, X_k)} = \frac{e^{\alpha_0 + \alpha_1 X_1 + \dots + \alpha_k X_k}}{1 + e^{\alpha_0 + \alpha_1 X_1 + \dots + \alpha_k X_k}} : \frac{1}{1 + e^{\alpha_0 + \alpha_1 X_1 + \dots + \alpha_k X_k}} = e^{\alpha_0 + \alpha_1 X_1 + \dots + \alpha_k X_k} \quad (3).$$

So the Odds Ratio expresses how many times the probability that a given event shall take place increases or decreases, if there shall occur a change of independent variable (at established values of independent variables). Natural logarithm of the Odds Ratio is linear in relation to independent variables and considering the model parameters, which facilitates estimation to a high degree. It is called the logit or the logit form of the logistic model, therefore (Stanisz 2007, Cramer 2003, Kleinbaum, Klein 2002):

$$\text{logit } P = \ln \frac{P(Y = 1 / X_1, \dots, X_k)}{1 - P(Y = 1 / X_1, \dots, X_k)} = \alpha_0 + \sum_{i=1}^k \alpha_i X_i \quad (4).$$

The evaluation of the correctness of the estimated model can be carried out, counting correctly and mistakenly the classified cases (Table 1).

Table 1

**Correctness of classification of cases**

Expected sizes	Observed sizes		Sum
	$y_i = 1$	$y_i = 0$	
$\hat{y}_i = 1$	$n_{11}$	$n_{12}$	$n_{1\bullet}$
$\hat{y}_i = 0$	$n_{21}$	$n_{22}$	$n_{2\bullet}$
<b>Sum</b>	$n_{\bullet 1}$	$n_{\bullet 2}$	n

Source: the authors' elaboration on the basis of Dobosz 2004

For evaluating the degree of the logistic regression model fitting to the empirical data, one can use the measure called *count-R<sup>2</sup>*, which takes values from the range  $\langle 0,1 \rangle$ , defined as follows (Maddala 2008):

$$R^2_{count} = \frac{n_{11} + n_{22}}{n} \quad (5).$$

The more the measure value is approximate to one, the better fit of the logistic model to empirical data of the investigated phenomenon is obtained,  $R^2_{count}$  stands for the percentage of correctly classified cases. The model has turned out to be good in the prediction of the investigated phenomenon, when  $R^2_{count} > 50\%$ . It means that the classification based on the model is better than that being the random one.

The quality of the built up logistic regression model can be also evaluated using other measures e.g.: Hosmer-Lemeshow test (Hosmer et al. 1989, Hosmer et al. 2008) and AUC (*Area Under the Curve*) - area under the ROC curve (*Receiver Operating Characteristic Curves*). The ROC curve is formed by connecting the points in the cartesian coordinate system having the coordinates (sensitivity, 1-specificity). Sensitivity describes the ability to detect units having the distinguished characteristic. It is determined as follows:

$$\text{sensitivity} = \frac{n_{11}}{n_{\bullet 1}} \quad (6).$$

Specificity describes the ability to detect units not having the distinguished characteristic. It is determined according to the following formula:

$$\text{specificity} = \frac{n_{22}}{n_{\bullet 2}} \quad (7).$$

Based on empirical research and the available database, variables were selected that could influence farmers' decisions to purchase subsidized agricultural insurance. A set of explanatory variables was used in the model, in which the use of subsidized agricultural insurance ( $Y$ ) was accepted as the response variable. Explanatory variables created a set of the following diagnostic features: the age of the farm manager (in years) ( $X_1$ ); the level of education of the farm manager (primary - 1, vocational - 2, secondary - 3, higher - 4) ( $X_2$ ); the number of permanent workers on the farm ( $X_3$ ); having a successor on the farm (no - 0, yes - 1) ( $X_4$ ); farm management period (in years) ( $X_5$ ); area of agricultural land (in ha) ( $X_6$ ); area of own land (in ha) ( $X_7$ ); source of farmer's household income at the end of 2012 (from non-agricultural activity - 0, from agricultural activity -



1) ( $X_8$ ); dominant soil class (class I - 1, class II - 2, class III - 3, class IV - 4, class V - 5, class VI - 6) ( $X_9$ ); predominance of plant production (no - 0, yes - 1) ( $X_{10}$ ); predominance of animal production (no - 0, yes - 1) ( $X_{11}$ ); predominance of mixed production (no - 0, yes - 1) ( $X_{12}$ ); the number of fixed assets on the agricultural holding at the end of 2012 ( $X_{13}$ ); the amount of voluntary insurance premium (high - 0, low - 1) ( $X_{14}$ ); the number of natural disasters that occurred on the farm in 2004-2012 ( $X_{15}$ ); the level of farm's exposure to natural risk (scale from 1 to 5, where: 1 - low, 5 - high) ( $X_{16}$ ); the occurrence of damage to an agricultural holding (no - 0, yes - 1) ( $X_{17}$ ); the amount of compensation received by the farmer in the years 2004-2012 ( $X_{18}$ ).

## Research results and discussion

This section consists of two parts. The first one contains the characteristics of the surveyed farms from the Central Pomerania region. The second one presents the results of the logit regression analysis. In the years 2005-2012, from 3.9 % to 7.03 % of the surveyed farmers participated in the system of subsidized insurance, the subsidized crop insurance in particular. The main motive for the purchase of subsidized crop insurance was concern about the future of the agricultural holding. In the majority of farms (83 %), farmers have had previous experience relating to the loss of crops as a result of unfavourable weather phenomena. Compensation was paid to the majority of them, and its sum covered 30-40 % of the losses incurred. The average age of the farm owner was 48. The largest group were respondents with secondary education (56 %), followed by vocational (22 %) and primary (16 %) education, while 6 % had post-secondary education. In the analysed group of farms, none of the respondents had higher education. The farmers were characterized by extensive experience in running a farm, of an average of 19 years. The majority were farms in which two people were employed permanently - usually the owner's relatives, i.e. wife or children. Four people were employed seasonally on average, with the maximum of six. Over 70 % of farmers declared having a successor who could take over the farm in the future. Agricultural activity was the main source of income in all farms. The average area of agricultural land was 68 ha. 50 % of the surveyed farmers specialized in field crops, and the other 50 % conducted mixed production, in which herbivorous animals were predominant. Most of the farms contained arable soils belonging to class IVa and IVb. These are medium-quality superior and inferior soils. Medium yields can be obtained from them, which depend to a large extent on the amount and distribution of atmospheric precipitation, especially during the growing season. Cereal and potato cultivation prevailed in the analysed farms, which was mainly conditioned by the quality of soils. According to the farm owners, their agricultural activity is exposed to the occurrence of drought, freezing and spring frosts to the largest extent, and to a minimal extent to hail, flood and hurricane. In order to find the best combination of variables significantly affecting the purchase of subsidized agricultural insurance, formal selection of variables was made by means of backwards stepwise regression. The obtained results indicate that two factors influence the purchase of subsidized insurance, i.e. the number of people employed permanently on the farm and the occurrence of damage to the farm in the past. These features are poorly correlated with each other and at the same time strongly correlated with other variables eliminated from the set of potential diagnostic features. Evaluation of the parameters of the estimated logit model is presented in Table 2.

Table 2

**Evaluation of logit model parameters**

Variable	Variable name	Parameter evaluation	p-value	Odds ratio
		<b>Constant</b>	<b>-6.16802</b>	-
<b>X3</b>	number of people employed permanently on the farm	0.96123	0.00010	2.61492
<b>X17</b>	occurrence of damage to the farm in the past	2.45210	0.00073	11.61267

**Source: author's calculations**

The estimated logistic model takes the following form:

$$\hat{p} = P(y = 1) = \frac{e^{-6.16802 + 0.96123x_3 + 0.13481x_{17}}}{1 + e^{-6.16802 + 0.96123x_3 + 0.13481x_{17}}}$$

After conversion, the model can be represented as follows (average estimation errors in brackets):

$$\text{logit } \hat{p} = - \frac{6.16802}{(1.00546)} + \frac{0.96123}{(0.24725)} x_3 + \frac{0.13481}{(0.726154)} x_{17}$$

The first important factor that positively affects farmers in the region of Central Pomerania having subsidized insurance is the number of people permanently employed in the agricultural holding. Interpreting the odds ratios at the *i*-th variable (assuming that the remaining variables included in the model will remain unchanged), it can be concluded that if the number of people employed on a permanent basis increases by one person, then the probability of taking advantage of subsidized insurance will increase 2.6 times. This may mean that the need for stabilizing farm income is greater when more people are employed on the farm (mainly relatives of the farm manager) permanently and full-time. In addition, the higher number of people permanently employed in an agricultural holding may result from a larger scale of commodity production, or more labour-intensive directions of production, mainly to strengthen or maintain market position. Therefore, it can be assumed that farmers from farms focused on market production also show greater propensity to have insurance. Another factor is the occurrence of damage to the agricultural holding. In units which incurred damage caused by adverse weather conditions in the past, the probability of using subsidized insurance is more than eleven times higher than for entities where such damage did not occur. This means that previous experiences of loss or reduction of income resulting from damage to agricultural production may result in higher insurance awareness and thus increase the likelihood of benefiting from subsidized insurance. Table 3 presents the accuracy of farm classification based on the designated model.

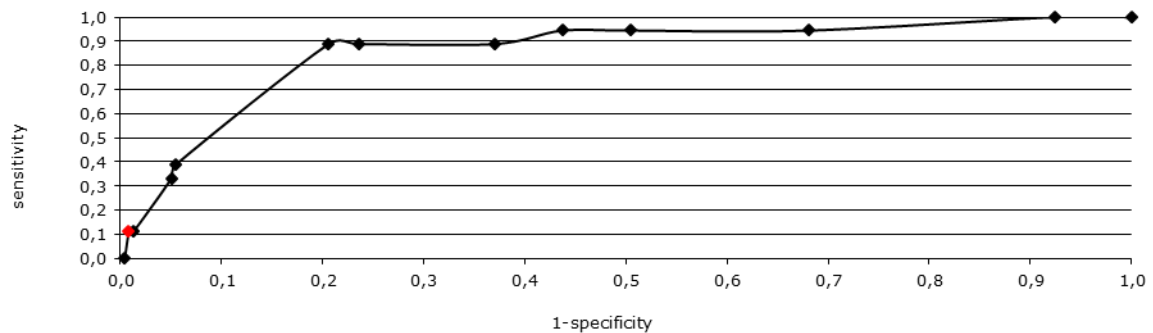
Table 3

**Accuracy of the logit model classification**

Classification of holdings based on the logit model	Actual classification of the farm		Overall accuracy of the classification
	$y_i = 1$	$y_i = 0$	
$\hat{y}_i = 1$	2	2	92.97 %
$\hat{y}_i = 0$	16	236	
<b>Sensitivity, specificity</b>	<b>11.11 %</b>	<b>99.16 %</b>	

**Source: author's calculations**

Classification accuracy was also assessed using an  $R^2_{count}$  coefficient, whose value amounted to 92.19 %, which indicates that the classification based on the model is much better than a random one (Figure 1).



Source: author's calculations

Fig. 1. The ROC curve for model

The results of the Hosmer-Lemen test indicates a lack of significant differences between the empirical and theoretical numbers that result from the estimated logistic regression models ( $\chi^2 = 4.7$ ,  $p = 0.3264$ ). The area under the ROC curve is 0.85 and is significantly higher than 0.5 (at a significance level greater than 0.000001). The cut-off point for the model is equal to 0.5322. The classification determined on the basis of this cut-off point gives almost 93 % of correctly classified cases, of which 11.11 % for "yes" and 99.16 % for "no".

## Conclusions

This article presents a logistic regression model which enabled determination of factors influencing the probability of purchasing subsidized agricultural insurance by farmers from the Central Pomerania region. Econometric results indicate that the model is well-matched and statistically significant. It is characterized by good quality, which is proved by the measures used to assess the quality of the model, i.e.: the  $R^2_{count}$  coefficient, Hosmer-Lemeshow test and ROC curve and its components (area under the curve and cut-off point). In addition, the model has a high accuracy of classification at 92.97 %. The analysis included eighteen variables. It was found that two variables have a significant positive impact on the probability of purchasing subsidized agricultural insurance. These are the number of people permanently employed in the agricultural holding and past experiences of damage to agricultural production caused by unfavourable weather conditions. The presented research results suggest that the probability of purchasing subsidized agricultural insurance by farmers from the Central Pomerania region increases with the number of people permanently employed on the farm; and the chances of farmers participating in the system of subsidized agricultural insurance is over eleven times higher in the case of units with past experience of damage caused by unfavourable atmospheric phenomena. To sum up, the obtained results show that the system of subsidized insurance is mainly utilized by farmers for whom the farm is a workplace, therefore it is a source of income for the farmer's family, and which is characterized by a high level of exposure to natural risk.

## Bibliography

1. Arias, D., Covarrubias, K. (2006). *Agricultural Insurance in Mesoamerica: An Opportunity to Deepen Rural Financial Markets*. Inter-American Development Bank, Washington D.C.
2. Barry, P., Ellinger, P., Schnitkey, G., Sherrick, B. (2004). *Factors Influencing Farmers' Crop Insurance Decisions*. American Journal Agriculture Economics, 1.
3. Cabas, J.H., Leiva, A.J., Weersink, A. (2008). *Modelling Exit and Entry of Farmers in a Crop Insurance Program*. Agricultural and Resource Economics Review, 37/1.
4. Cramer, J. S. (2003). *Logit Models from Economics and Other Fields*. Cambridge University Press, Cambridge.
5. Dhanireddy, P.K.R., Frisvold, G. (2012). *Disaster Assistance and Crop Insurance Participation in US*. Agricultural & Applied Economics Association's Annual Meeting, Seattle, Washington.
6. Dobosz, M. (2004). *Wspomagana komputerowo statystyczna analiza wyników badan (Computer-assisted statistical analysis of test results)*. Akademicka Oficyna Wydawnicza EXIT. Warszawa, p. 260.
7. Enjolras, G., Capitanio, F., Adinolfi, F. (2012). *The Demand for Crop Insurance: Combined Approaches for France and Italy*. Agricultural Economics Review, 1.
8. Ghazanfar, S., Qi Wen, Z., Abdullah, M., Ahmad, J., Khan, I. (2015). *Farmers' Willingness to Pay For Crop Insurance In Pakistan*. Journal of Business, Economics & Finance, 4:2.
9. Ginder, M. G., Spaulding, A. D. (2006). *Factors Affecting Crop Insurance Purchase Decisions in Northern Illinois*. Selected paper prepared for presentation at the American Agricultural Economics Association Annual Meetings, Long Beach, California.
10. Goodwin, B.K., Rejesus, R.M. (2008). *Safety Nets or Trampolines? Federal Crop Insurance, Disaster Assistance, and the Farm Bill*. Journal of Agricultural and Applied Economics, 40.
11. Goodwin, B.K., Smith, V.H. (1995). *The Economics of Crop Insurance and Disaster Aid*. American Enterprise Institute for Public Policy Research, Washington D.C.
12. Gruszczynski, M. (ed), Podgorska, M. (ed). (1996). *Ekonometria (Econometrics)*. Oficyna Wydawnicza Szkoły Główniej Handlowej, Warszawa, pp. 139-141.
13. Hosmer, D. W., Lemeshow, S., May S. (2008). *Applied Survival Analysis: Regression Modeling of Time to Event Data*. WILEY-BLACKWELL.
14. Hosmer, Jr D. W., Lemeshow S. (1989). *Applied Logistic Regression*. John Wiley, New York.
15. <http://www.gu.com.pl/> Concordia (28 kwietnia 2015)
16. <http://www.ppr.pl/wiadomosci/aktualnosci/polska-wies-nadal-nieubezpieczona-176867> (28 kwietnia 2015)
17. Kaczala, M. (2015). *Zawieranie umow ubezpieczenia upraw w przez gospodarstwa indywidualne (Conclusion of crop insurance contract by individual farms)*. [in:] Kaczala, M. Rojewski, K. (ed.), *Ubezpieczenia produkcji roslinnej w Polsce (Crop Insurance in Poland)*. Poltext, Warszawa.
18. Kaczala, M., Wisniewska, D. (2015). *Risks in the Farms in Poland and their Financing - Research Findings*. Research Papers of Wroclaw University of Economics, Volume 381.
19. Kleinbaum, D. G., Klein M. (2002). *Logistic Regression*. Springer, New York.
20. Kumar, R., Indrayan, A. (2011). *Receiver Operating Characteristic (ROC) Curve for Medical Researchers*. Indian Pediatrics, Volume 48.
21. Kurdys-Kujawska, A. (2016). *Ubezpieczenia gospodarcze jako czynnik zapewniajacy zrównoważony rozwój gospodarstw rolnych (Business insurances as a factor to ensure sustainable economic development of farms)*. Research Papers of Wroclaw University of Economics, 436, Wroclaw, pp. 154-173.
22. Maddala, G. S. (2008). *Introduction to Econometrics*. Third Edition. John Wiley & Sons.
23. Makki, S.S., Somwaru, A. (2005). *Demand for Yield and Revenue Insurance: Factoring in Risk, Income and Cost*. Agricultural Outlook, Economic Research Service, U.S. Department of Agriculture.
24. Mohammed, M.A., Ortmann G.F. (2005). *Factors Influencing Adoption of Livestock Insurance by Commercial Dairy Farmers in Three Zoba of Eritrea*. Agrekon, Volume 44, 2.
25. Mozdioch, M., Ploch, A. (2010). *Zmiany klimatyczne a ubezpieczenia upraw rolnych (Climatic changes and crop insurance)*. Wiadomosci ubezpieczeniowe, 3.
26. Pawłowska-Tyszko, J. (ed.), Soliwoda, M., Herda-Kopanska, J., Gorzelak, A. (2016). *Instrumenty zarządzania ryzykiem w rolnictwie – rozwiązania krajowe i międzynarodowe (Instruments of risk management in agriculture - national and international solutions)*, IAFE-NRI, Warsaw.
27. Pawłowska-Tyszko, J. (ed.), Soliwoda, M., Pienkowska-Kamieniecka, S., Walczak D. (2015). *Stan obecny i perspektywy rozwoju systemu podatkowego i ubezpieczeniowego polskiego rolnictwa (Current status and prospects for the development of the tax and insurance system of Polish agriculture)*, IAFE-NRI, Warsaw.
28. Pawłowska-Tyszko, J., Soliwoda M. (2017). *Ubezpieczenia rolne a zrównowazenie ekonomiczne i finansowe gospodarstw rolnych (Agricultural insurance vs. Economic and financial sustainability of farms)*. Research Papers of Wroclaw University of Economics, 478, pp. 337-347.
29. Santeramo, F.G., *Farm-level Decisions and Turnover in Italian Crop Insurance Market*, [https://ag-econ.ncsu.edu/wp-content/uploads/2015/10/Santeramo\\_WP\\_NCSU\\_2015.pdf](https://ag-econ.ncsu.edu/wp-content/uploads/2015/10/Santeramo_WP_NCSU_2015.pdf). (28 April 2015)
30. Santeramo, F.G., Goodwin, B. K., Adinol, F., Capitanio, F. (2016). *Farmer Participation, Entry and Exit decisions in the Italian Crop Insurance Program*. Journal of Agricultural Economics, 67(3).

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31. Sihem, E. (2017). *Economic and Socio-cultural Determinants of Agricultural Insurance Demand across Countries*. Journal of the Saudi Society of Agricultural Sciences. (<https://doi.org/10.1016/j.jssas.2017.04.004>.)
32. Stanisz, A. (2007). *Przystępny kurs z zastosowaniem Statistica PL na przykładach z medycyny (An affordable course using Statistica PL on medical examples)*. Statsoft, Volume 3, Krakow.
33. Sulewski, P., Kloczko-Gajewska, A. (2014). *Determinants of Taking Out Insurance Against Losses in Agricultural Production in Poland*. Roczniki Naukowe Ekonomii Rolnictwa i Rozwoju Obszarów Wiejskich, Volume 101(4).
34. Walczak, D. (2011). *Uwarunkowania funkcjonowania systemu zabezpieczenia społecznego rolników w Polsce (Conditions for the functioning of farmers' social security system in Poland)*. Dom Organizatora, Torun.
35. Wang, K., Zhang, Q., Kimura, S., Akter, S. (2015). *In the Crop Insurance Program Effective in China? Evidence from Farmers Analysis in Five Provinces*. Journal of Integrative Agriculture, Volume 14, Issue 10, pp. 2109-2120.
36. Wicka A. (ed.) (2013). *Czynniki i możliwości ograniczania ryzyka w produkcji roślinnej poprzez ubezpieczenia (Factors and possibilities of risk reduction in crop production through insurance)*. Wydawnictwo Szkoły Głównej Gospodarstwa Wiejskiego, Warszawa.
37. Zhang R., Fan D. (2016). *Evaluating Farm-Level Crop Insurance Demand in China: A Double-Bounded Dichotomous Approach*. Journal of Agricultural Science, Volume 8, 3.
38. Zweig M.H., Campbell G. (1993). *Receiver-operating Characteristic (ROC) Plots: a Fundamental Evaluation Tool in Clinical Medicine*. Clinical Chemistry, 39.

## CHALLENGES FOR THE MECHANICAL ENGINEERING AND METALWORKING INDUSTRY IN LATVIA

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**Abstract.** One of the leading industries in Latvia is the mechanical engineering and metalworking industry; it generates high value added and supplies other industries of the national economy with machinery, technological systems and components. The research aim is to examine challenges for the mechanical engineering and metalworking industry in Latvia. The research found that workforce availability considerably affected mechanical engineering and metalworking enterprises, which was determined by emigration trends and the availability of specialists with adequate education and qualifications, as well as the level of earnings. Average earnings in manufacturing in the country are below the average; besides, they are not competitive with the earnings in the European Union. Nevertheless, the mechanical engineering and metalworking industry is one of the priority export industries to be supported in Latvia, as it contributes most to the GDP. The export volume of mechanical engineering and metalworking products was larger than that of goods of other categories, yet re-exports comprised a considerable proportion in the total exports of Latvia. An examination of the financial attractiveness of the industry revealed that in 2016 the average profit margin among mechanical engineering and metalworking enterprises was 12 %; besides, their net total profit totalled EUR 18 mln., which indicated that the industry was economically strong and attractive to potential entrepreneurs.

**Key words:** mechanical engineering, metalworking, industry.

**JEL code:** O14, L61, O11.

### Introduction

In any developed country, manufacturing employs a considerable portion of the workforce. Moreover, manufacturing largely determines the economic potential of the country, its political and economic independence and the standard of living of the population (Fomins A., 2005); it is an essential source of innovation as well (Santos K., Loures E. et al., 2017; Dilberoglu U. M., Gharehpapagh B. et al., 2017). According to the Association of Mechanical Engineering and Metalworking Industries of Latvia (MASOC), in 2016 compared with 2015 the turnover of the manufacturing sector rose by 66 %, which was fostered by market expansion and overcoming export problems. Besides, the historically highest output was achieved in 2016, which allowed increasing the proportion of manufacturing in total value added, yet the proportion still considerably lagged behind the projected targets set by the National Development Plan of Latvia for 2014-2020 – the contribution of manufacturing to GDP has to reach 20 % in 2020 and 26 % in 2030, while the exports of goods and services, as a percentage of GDP, have to increase to 70 % and 78 %, respectively.

One of the leading manufacturing industries in Latvia is mechanical engineering and metalworking, which encompasses design and construction of machines, mechanical engineering activities, manufacture of basic metals, manufacture and development of fabricated metal products, manufacture of electronic equipment, motor vehicles, medical instruments, repair and installation of machinery and equipment and other activities. One can conclude that it is a very important manufacturing supply chain link that links suppliers (steel and non-ferrous metal industries) and customers (various other industries). Setting the mechanical engineering and metalworking industry one of the priority industries in Latvia is in line with the economic transformation directions defined by the Smart Specialisation Strategy of Latvia – promotion of industries with future growth potential (smart materials, technologies etc.). The need to carry out economic transformation is conditioned by the regional development process and the aim to support high-productivity industries (Ciemleja G., Lace N., 2016).

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However, an analysis of the development of metal-related industries in Latvia allows concluding that the industries have faced sharp change periods, which occurred owing to diverse factors (Kamols U., Ivanova S. et al., 2014). In the early 1990s, the food and wood processing industries developed fast, while for the mechanical engineering and metalworking industry it was a problematic period, as the economic system established by the Soviet Union stopped existing after the collapse of it because it was not viable under the global market conditions (Mechanical Engineering and..., [s.a.]). This period was followed by the economic crisis of 1998-1999 in Russia; however, fast growth began by the year 2000, and since then the value added generated by the mechanical engineering and metalworking industry has increased many times, which was fostered by the availability of European Union (EU) funding for the modernisation of equipment, skills and knowledge built up in the industry (Strautins P., 2017) and the active development of new export markets, as well as local demand (Priēde J., Skapars R., 2012).

Even though the performance of the industry was significantly affected by the financial crisis of 2008-2009 and the fact that the company Liepajas Metalurģs stopped operating in 2013, the mechanical engineering and metalworking industry contributed to 17 % of the total turnover of manufacturing and 21 % of the total exports of goods in 2015, according to the MASOC data. Besides, the mechanical engineering and metalworking industry is a strategic industry, it generates high value added and it supplies all the other industries of the national economy with machinery, technological systems and components (Latvijas Masinbuvē un..., 2007). It has to be noted that in Latvia the manufacture and processing of metals and the manufacture of machinery and equipment comprise a significant proportion in the manufacturing sector, even though the proportion is lower in Latvia than, on average, in Europe. In terms of value, its total value added is almost the same as that of the food industry and the wood processing industry – these industries account for approximately 70 % of the manufacturing sector (Strautins P., 2017).

The research has put forward a **hypothesis** – the development and financial attractiveness of the mechanical engineering and metalworking industry, to a great extent, are determined by workforce availability and export opportunities. The research **aim** is to examine challenges for the mechanical engineering and metalworking industry. To achieve the aim, the following specific research **tasks** were set: 1) to describe challenges in the workforce context for the mechanical engineering and metalworking industry; 2) to examine export opportunities for the mechanical engineering and metalworking industry; 3) to analyse the financial performance of the mechanical engineering and metalworking industry.

A number of **research methods** were employed to achieve the aim and perform the tasks. The monographic and descriptive methods were used to theoretically discuss and interpret the research results based on scientific findings and theories on the mechanical engineering and metalworking industry; statistical analysis – descriptive statistics and time series analysis – were applied to analyse the performance of the mechanical engineering and metalworking industry. Central Statistical Bureau (CSB) and MASOC data on the mechanical engineering and metalworking industry for the period 2008-2016, the theoretical and analytical literature on trends and factors influencing the industry were used as information sources.

### **1. Challenges with workforce in the mechanical engineering and metalworking industry**

Trends in the labour market considerably affect the operation of any enterprise. In 2015, mechanical engineering and metalworking enterprises employed 20 752 individuals, which

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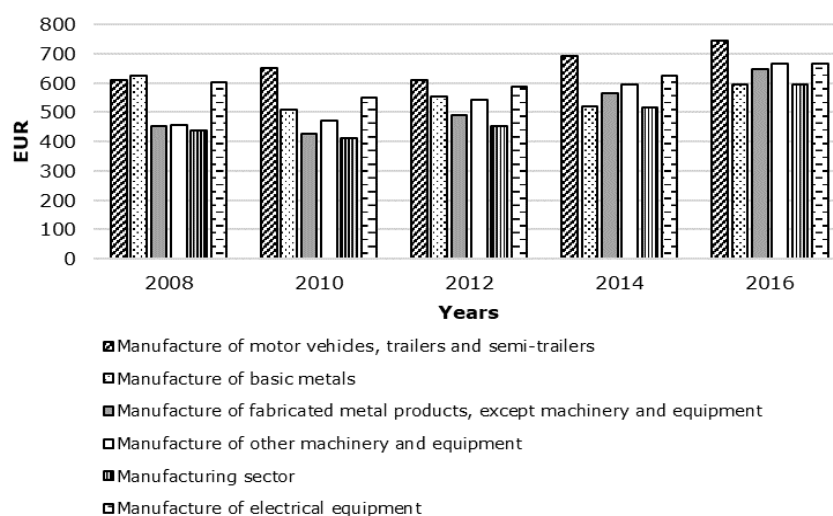
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accounted for 2.35 % of the total nationally. The average level of labour productivity at the enterprises was slightly higher than the average in the manufacturing sector (Strautins P., 2017). However, the enterprises were significantly affected by workforce availability and the remuneration level.

Considerable structural changes in the labour market have been observed since 2009, the lowest point of the economic recession, when, according to the CSB, 38 208 residents emigrated from Latvia, and a year later – 39 651. In view of the fact that the total population in Latvia in October 2017 was equal to 1.9 mln., one can estimate that the number of emigrants as a percentage of the total population was 9.34 %; moreover, it has to be taken into consideration that mostly working-age residents emigrated. This, in its turn, influences workforce availability for mechanical engineering and metalworking enterprises and does not contribute to the overall performance of the enterprises in the single European and global markets.

Furthermore, one can find that there is a lack of specialists of adequate qualification. As stated in the Informative Report on Labour Market Medium and Long-term Trends (2016) by the Ministry of Economics, young individuals do not prefer enrolling on mechanics and metalworking study programmes; consequently, the number of graduates is insufficient for normal reproduction of the workforce. Besides, there is a high student dropout rate in the engineering programmes. Nevertheless, experienced specialists and engineering graduates are very demanded in the labour market not only in Latvia but also abroad where their remuneration is often much higher than, on average, in Latvia. It has to be mentioned that there is still a widespread perception that the mechanical engineering and metalworking industry is associated with heavy work at unattractive workplaces, even though nowadays most of the enterprises use equipment instead of labour. As stressed in the mentioned report, 11.0 thousand high-qualification specialists are required in the manufacturing sector by 2020.

Workforce availability for mechanical engineering and metalworking enterprises is also affected by the level of earnings, for low-qualification employees (stackers, assemblers, equipment operators etc.) in particular. This might be explained by the fact that production costs have to be as low as possible in order to have a competitive price on a product; it also relates to the inability to pay higher wages and salaries at the existing sales volumes and mark-ups.



Source: authors' construction based on CSB data, 2017

Fig. 1. Average monthly employee earnings (net) in the manufacturing sector and in the sub-industries of mechanical engineering and metalworking in the period 2008 - 2016, EUR

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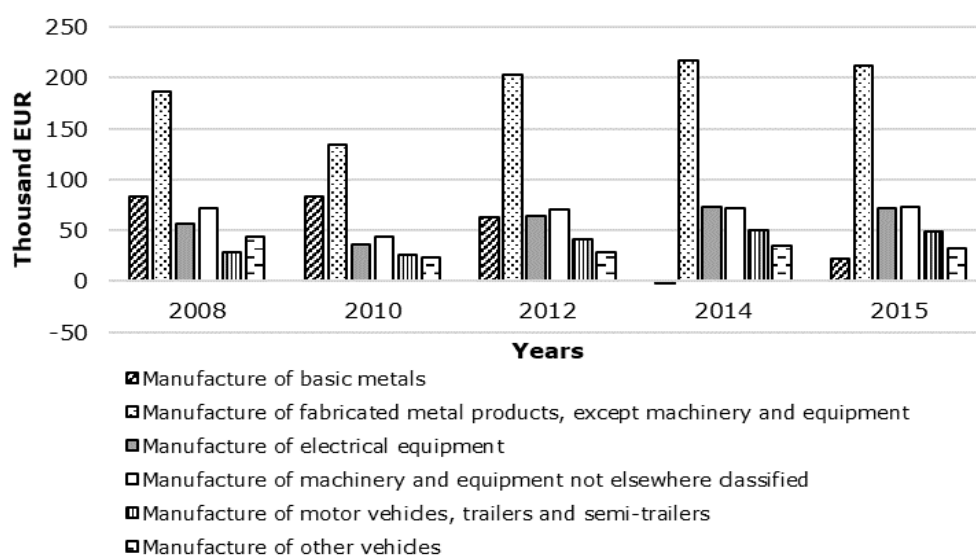
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An analysis of earnings in the mechanical engineering and metalworking industry reveals that changes in the earnings were the same as the overall earnings change trend, i.e. the earnings in this industry increased at the same rate as those in the entire economy (Fig. 1).

The average earnings level in the manufacturing sector was below the national average (in 2016, EUR 631 in the entire economy and EUR 593 in manufacturing), which could be explained both by the geographical location (the enterprises were mainly located outside the capital city, even though Riga contributed to more than half of the national GDP) and by the education level required by employers. In 2016, earnings were higher in the manufacture of fabricated metal products and other machinery and equipment than in the entire economy; besides, the earnings rose by more than 40 % in the analysis period. Even though there are no accurate data, qualification requirements in the mechanical engineering and metalworking industry are higher than those in manufacturing, which is because of expensive equipment exploited in the industry. For this reason, employees of adequate qualification are necessary to reduce the risks, which, in its turn, determines higher earnings paid to them. Furthermore, there is a perception that the proportion of the shadow economy in the mechanical engineering and metalworking industry is lower, which could be affected by a number of factors. First, the enterprises belong to foreign investors, mainly from the EU Member States. Second, the enterprises are relatively large and a proportion of products exported by them is very high, sometimes even 100 % are exported; for this reason, the enterprises have no easy access to cash and it is difficult for them to pay "under table money" even if they wished to do it (Strautins P., 2017).

It is important to analyse changes in value added in current prices with the aim to identify differences in change between various sub-industries and the entire economy. It has to be taken into consideration, of course, that the data are in current prices, that is why the real progress was not so considerable. However, there is no doubt that the manufacturers of electrical equipment and vehicle parts progressed more than the mechanical engineering and metalworking industry overall, exceeding the national average as well. During this period, a lot of foreign investors entered these industries and the scale of production increased (Strautins P., 2017).



Source: authors' construction based on CSB data, 2017

Fig. 2. Value added in current prices in the sub-industries of mechanical engineering and metalworking in the period 2008 - 2015, thou. EUR

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As shown in Figure 2, in the period 2008-2015, the highest value added reported in the mechanical engineering and metalworking industry was generated in the manufacture of fabricated metal products as well as machinery and equipment not elsewhere classified, which might be explained by a larger output and a higher value of employees. However, the most significant value-added increase was reported in the manufacture of motor vehicles, trailers and semi-trailers (by 75 % in the analysis period) and electrical equipment (27 %), whereas in the entire economy a decrease in value added was observed (-2.5 %).

The earlier value chain stage a product is at, the greater the challenge to find ways how to generate higher value added for a product. Producing technologies and engineering systems for other industries, mechanical engineering and metalworking enterprises can adapt their products to global requirements in various ways, including through integrating innovative solutions in their products, taking into account the EU-defined fast-growing key-enabling technologies, offering solutions to energy efficient and waste-free production as well as finding solutions to automatized production, especially in labour-intensive industries. In addition, it is possible to develop technological solutions to new technologies of production of materials for the production and processing of smart materials as well as to develop new, specific industr--tailored innovative products or technologies (Masinbuves kompetences centra..., 2016). It has to be also noted that production in this industry involves manual work when performing such operations as lathing, welding and other unautomated operations done physically, which allows selling such products with a higher value, thus generating higher value added from labour. This requires stressing the advantages of product individuality and fast-made changes in the product, which is not easy to do in automated production. Besides, the mechanical engineering and metalworking industry has a relatively low degree of specialisation, which allows the enterprises to adapt their technologies to new requirements and to be flexible (Nacionalas industrialas politikas..., 2013).

## **2. Trends in mechanical engineering and metalworking industry exports**

The mechanical engineering and metalworking industry, according to the intermediate report on the implementation of the "Guidelines on Promoting Exports of Latvian Goods and Services and Attracting Foreign Investments for 2013-2019" in the period 2013-2015 produced by the Ministry of Economics, is defined as one of the priority export industries to be supported, which could be explained by the fact that it is one of the industries most contributing to the GDP of Latvia and is mainly an export-oriented industry (exports account for up to 80 % of the total output).

In 2016, according to the CSB, mechanical engineering and metalworking industry exports totalled EUR 1 129 949 (if the exports of electronics producers are included) or EU 802 591 (if excluded). Nevertheless, it has to be stressed that this statistic is not accurate because products are exported by intermediaries whose key registered economic activity is not the production of goods (Strautins P., 2017). The key export markets for Latvia are nearby countries with a high standard of living and high purchasing power. Enterprises of Latvia are competitive in the Scandinavian markets owing to lower workforce costs; the manufacture of metal products is labour intensive, which often allows the enterprises to successfully market their similar-quality products that are available in the domestic market (of the exporting country), but at a lower price or with some extra added value. Norway, Germany, Sweden and Denmark consume 50 % of mechanical engineering and metalworking industry exports from Latvia, being potential markets also for those enterprises that only begin exporting their products (Makroekonomisko norisu parskats, 2016). Such scientists as J. Priede and R. Skapars (2012) identified the quality competitiveness of the

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metal industry of Latvia in iron and steel product groups of trade between Latvia and main trade partners (Lithuania, Estonia, Germany and Russia). Calculations showed that the quality and value added of exports were higher than those of imports. That indicates the quality competitiveness of Latvia in its main export markets.

However, if analysing the proportion of goods produced by the examined industries in the total exports, one has to take into account the fact that a significant proportion of the exports of Latvia is represented by re-exports that are typical of the countries having large transit flows of goods and serving as distribution centres. Not all the goods transited through Latvia appear in export statistics, e.g. coal, which is not produced in Latvia. According to experts of the Bank of Latvia, the average proportion of re-exports in the total exports make up about 30 %. The proportion of mechanical engineering and metalworking industry re-exports is higher than the average for the entire economy. A much more accurate amount of exports might be shown by the total turnover of the examined industries, as the mechanical engineering and metalworking industry exports, except for metalworking, actually account for 90 % and even more of the total exports (Strautins P., 2017). In the result, the analysis of CSB data on the proportion of exports in the total turnover of the examined industries reveals that this indicator for the mechanical engineering and metalworking industry is higher than the average for the entire economy, yet that for metalworking is slightly lower. The indicator for the manufacture of other vehicles is considerably lower. As regards metalworking, there is a large number of "garage type" or small enterprises whose labour productivity might be low and/or they do not report all their economic activities. The small-scale manufacture of metal structures is associated with "shadow" small-scale construction. In contrast, there is only one indicator for the activity – manufacture of other vehicles – that reflects the economic problems of the industry (Strautins P., 2017). Nevertheless, promoting exports is important, as it significantly affects labour productivity (Shatrevich Z., Zvanitajs J., 2011; Bernard A. B., Jensen J. B., 2004; Clerides S. K., Lach S. et al., 1998).

### **3. Characteristics of the financial performance of the engineering and metalworking industry**

To identify the financial attractiveness of and challenges for the mechanical engineering and metalworking industry, it is important to analyse the financial performance of the industry. The data on after-tax profit margins indicate that there were two sub-industries that had very attractive profit/cost ratios: manufacture of fabricated metal products and manufacture of motor vehicles, trailers and semi-trailers. In both sub-industries, profit margins were 12.8 % and 22.8 %, respectively, even though in the period 2010-2016 the sub-industries demonstrated a decrease in their profits by 29 % and 51 %. Their financial performance was affected by the specifics of their products, investment amounts and overall market trends. The situation in the other sub-industries was either similar to that in the manufacturing sector and the entire economy or considerably worse (Table 1).

The present research analysed also profits made by mechanical engineering and metalworking enterprises. One can conclude that the enterprises made profits, except those engaged in the following activities: manufacture of other vehicles and manufacture of basic metals – because the company Liepajas Metalurģs exited the market. This fact considerably affected the performance of the sub-industry.

Table 1

**Financial performance of the engineering and metalworking industry  
 in the period 2010-2016**

Indicators		2010	2011	2012	2013	2014	2015	2016	Average change rate, %
Profit margin, %	Manufacture of fabricated metal products	-20.1	15.1	11.7	15.6	10.3	11.0	12.8	-29.19
	Manufacture of machinery and equipment not elsewhere classified	3.8	7.5	12.3	11.2	-6.5	1.7	-0.05	-39.12
	Manufacture of electrical equipment	12.3	16.7	34.8	23.9	15.4	16.5	8.5	5.99
	Manufacture of motor vehicles, trailers and semi-trailers	11.1	17.3	16.0	18.5	23.9	-27.6	22.8	-50.82
Profits or losses after taxes, mln. EUR	Manufacture of fabricated metal products	-13.4	11.6	11.7	20.2	14.3	13.8	-	-29.15
	Manufacture of machinery and equipment not elsewhere classified	1.9	4	7.2	7.1	-3.9	1.1	-	-18.80
	Manufacture of electrical equipment	4.8	6.5	15.5	14.1	11.2	13.7	-	33.32
	Manufacture of motor vehicles, trailers and semi-trailers	5.1	8.5	9.0	11.2	12.8	-16	-	-22.74

Source: authors' calculations based on CSB data

The overall trend in relation to financial performance, however, is downward sloping. The financial performance of enterprises is often affected by their financial burden with regard to loans, i.e. paying back interest and principal can considerably worsen the financial performance. It is particularly true for the enterprises that are not yet stable and develop fast – buy new equipment and increase their production capacity. This might be explained by the fact that the total amount of investment in tangible assets was larger in the mechanical engineering and metalworking industry than in the manufacture of basic metals, the design and construction of machines and the manufacture of electronics but smaller than in the chemical industry and the motor vehicle industry.

The analysis of the CSB data on financial obligations of mechanical engineering and metalworking enterprises in 2016 shows that the level of liabilities was moderate (the debt ratio on the balance sheet was 0.612; the short-term debt ratio was 0.405; the liabilities-to-equity ratio was 1.597), which could be explained by the stable profits of the enterprises and the fact that more than 50 % of the enterprises in the industry were older than five years (Rutkovska A., 2015). This means that large and older/more stable enterprises have already gone through the start-up stage when a lot of borrowed capital is needed for their fast development – purchase of equipment as well as for current assets. However, loans are relatively easy to get and loan terms and conditions are favourable for the expansion of enterprises. Of course, average performance indicators of an industry usually "hide" large differences among individual enterprises. There are several enterprises in the mechanical engineering and metalworking industry that played a

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disproportionally large role in growth in the industry, and the funds needed for the enterprises were provided by their foreign owners.

Liquidity in the mechanical engineering and metalworking industry was quite high (according to the CSB, the overall liquidity ratio in the metalworking sub-industry was 1.266), which indicates an enterprise's efficiency of using its assets. An exception was the manufacture of vehicles with the overall liquidity ratio of 0.712, which reveals that large and inefficient investments were made in the past and that the particular sub-industry is risky for activity and investment in it. Nevertheless, overall, the metalworking enterprises of Latvia are able to meet their short-term liabilities.

The average asset turnover ratio in the metalworking sub-industry was considerably higher than that in the entire economy, 1.596 and 0.903, respectively, in 2016. Overall, the asset turnover ratio gives insight into how stable the sub-industry is; the data are comprehensive and cover also the enterprises with a ratio of below 1, while some enterprises have a ratio of above 5. Relative to the averages of the entire economy, the metalworking sub-industry demonstrates strong positions.

### **Conclusions, proposals, recommendations**

- 1) Mechanical engineering and metalworking enterprises are considerably affected by workforce availability. Latvia lacks specialists with adequate education and qualifications; engineers emigrate to other countries where earnings are competitive. Besides, there is a widespread perception that the mechanical engineering and metalworking industry is associated with heavy work at unattractive workplaces, which does not contribute to the interest of potential specialists in the mechanical engineering and metalworking industry.
- 2) The availability of the workforce for the mechanical engineering and metalworking industry is considerably affected by workforce remuneration. The average earnings level in the manufacturing sector was below the national average (in 2016, EUR 631 in the entire economy and EUR 593 in manufacturing), which could be explained both by the fact that the enterprises were mainly located outside the capital city.
- 3) In the period 2008-2015, the highest value added reported in the mechanical engineering and metalworking industry was generated in the manufacture of fabricated metal products as well as machinery and equipment not elsewhere classified, which might be explained by a larger output and a higher value of employees. The earlier value chain stage a product is at, the greater the challenge to find ways how to generate higher value added for a product.
- 4) The mechanical engineering and metalworking industry is one of the priority export industries to be supported, as it most contributes to the GDP of Latvia. The key export markets for Latvia are the Scandinavian countries due to their high standard of living and high purchasing power. Even though the export volume of mechanical engineering and metalworking products is larger than that of goods of other categories, re-exports comprise a considerable proportion in the total exports of Latvia.
- 5) In 2016, the average profit margin among mechanical engineering and metalworking enterprises was 12 %, which demonstrated the attractiveness of the industry for entrepreneurs and stimulated the establishment of new enterprises and provided profit-making opportunities for the existing ones. Besides, the enterprises made a net total profit of EUR 18 mln. in 2016, which indicated that the industry was economically strong and attractive to potential entrepreneurs.

## Bibliography

1. Association of Mechanical Engineering and Metalworking Industries of Latvia. Retrieved: [www.masoc.lv](http://www.masoc.lv). Access: 31.01.2018.
2. Bernard, A.B., Jensen, J.B. (2004). Why Some Firms Export. *Review of Economics and Statistics*, Vol. 86, No. 2. pp. 561-569.
3. Central Statistical Bureau of Latvia. Retrieved: [www.csb.gov.lv/en](http://www.csb.gov.lv/en). Access: 31.01.2018.
4. Ciemleja, G., Lace, N. (2016). Opportunities for Sustainable Development and Challenges in Nanotech Industry in Latvia. *Journal of Security and Sustainability Issues*, Volume 5, Issue 3, pp. 432-436.
5. Clerides, S.K., Lach, S., Tybout, J.R. (1998). Is Learning by Exporting Important? Micro-dynamic evidence from Colombia, Mexico, and Morocco. *The Quarterly Journal of Economics*, Volume 113, Issue 3, pp. 903-947.
6. Dilberoglu, U.M., Gharehpapagh, B., Yaman, U., Dolen, M. (2017). The Role of Additive Manufacturing in the Era of Industry 4.0. *Procedia Manufacturing*, Volume 11, pp. 545-554.
7. Fomins, A. (2005). Latvijas rūpniecības attīstības tendences un perspektīvas (Trends and Prospects of Latvian Industry). Rīga: LU, p. 242.
8. Kamols, U., Ivanova, S., Kamola, L. (2014). Industrial Development Latvia and its Major Cities and Towns. In: XII International Scientific Conference „Management and Engineering '14”: Conference Proceedings. Vol. 2, Bulgaria, Sozopol, 22.-25. June, 2014. Sozopol: TU Sofia, 2014, pp. 1026-1035.
9. Latvijas masinbūves un metalapstrādes rūpniecības nozares apraksts (Description of the Mechanical Engineering and Metalworking Industry) (2007). Rīga, p. 52.
10. Makroekonomisko norīsu pārskats 2016 (Macroeconomic Developments Report 2016) (2016). Latvijas Banka. No. 24, p. 96.
11. Masinbūves kompetences centra attīstības stratēģija (Strategy for the Development of the Mechanical Engineering Competence Centre). (2016). Rīga, p. 84.
12. Mechanical Engineering and Metalworking Industry in Latvia (s.a.) Investment and Development Agency of Latvia. p. 84.
13. Nacionālās industriālās politikas pamatnostādnes 2014. – 2020. gadam (Guidelines for the National Industrial Policy for 2014-2020) (2013). Ministry of Economics. p. 40.
14. National Development Plan of Latvia for 2014 – 2020 (2012). p. 70.
15. Par Latvijas precu un pakalpojumu eksporta veicināšanu un arvalstu investīciju piesaisti pamatnostādņu 2013.-2019.gadam īstenošanas 2013. – 2015.gada starpposma novērtējumu (Intermediate Assessment of the Implementation of the Guidelines on Promoting Exports of Latvian Goods and Services and Attracting Foreign Investments for 2013-2019 in the Period 2013-2015) (2016). Ministry of Economics, Rīga, p. 27.
16. Priede, J., Skapars, R. (2012). Quality Competitiveness of Latvia's Metal Industry in the Iron and Steel Product Groups. *Economics and Management*, Volume 17, Issue 1, pp. 202-208.
17. Rutkovska, A. (2015). Uznemumu demogrāfija Latvijā (Demography of Enterprises in Latvia). Retrieved: <https://www.makroekonomika.lv/uznemumu-demografija-latvija>. Access: 31.01.2018.
18. Santos, K., Loures, E., Piechnicki, F., Canciglieri, O. (2017). Opportunities Assessment of Product Development Process in Industry 4.0. *Procedia Manufacturing*, Volume 11, pp. 1358-1365.
19. Shatrevich Z., Zvanitajs, J. (2011). Export and Manufacturing Productivity Growth Effect on Macroeconomic Situation in Latvia. In: Practice and Research in Private and Public Sector -11: 1st International Scientific Conference, Lietuva, Vilnius, 5-6 May, 2011. Vilnius: Mykolas Romeris University, 2011, pp. 308-315.
20. Strautins, p. (2017). Latvijas Konkurētspējas Zinājums 2016. Masinbūve un metalapstrāde Latvijā (Report on the Competitiveness of Latvia 2016. Mechanical Engineering and Metalworking in Latvia). Rīga, p. 19.

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## SUSTAINABLE STRATEGIC PLANNING PRINCIPLES OF COLLEGES

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**Abstract.** At present, the concept of sustainable development is the key issue in all documents, including educational development planning guidelines, at the global, European and national levels. Sustainability has become a decisive factor for choosing strategies, drawing up development, action and investment plans. Sustainable development planning involves the use of many variables, forecasting and implementation of a systemic approach. Colleges develop their long-term development strategies for a certain period of time. A college mission could, in this case, be considered the "cornerstone" of an educational institution. Apart from defining a mission, it is indispensable to set strategic planning methods, principles and, not least important, vision and values. The aim of the article is to reflect and analyse the three main elements within the sustainable strategic planning of colleges – mission, vision, and values. Under the frame of sustainable development planning at colleges, the task of this article is to draw attention to mission and vision of colleges, to analyze mission and vision from the aspect of their definement and simultaneously to conduct a research of mission and vision of all colleges in Latvia and their correspondence definitions and objectives revolved on them. Within the framework of the research, general scientific research methods have been used: analysis, synthesis and logical construction methods.

**Key words:** administration, sustainable development, mission, vision, college.

**JEL code:** M1

### Introduction

A wide range of definitions of a strategy are available in the scientific literature (Klaus A., 2002; Steven R., 2008). A common idea in all definitions is that a strategy is a plan and a principle of action, a set of activities to be carried out covering all areas and directions of the organisation, which reflect measures for sustainable development. The existence of a strategy is the basis for implementing the organisation's competitive advantage. It is difficult to formulate a good definition of a strategy. This is also indicated by strategy and business consultant Neville Leigh (2007). A lot of managers focus on grand strategic dilemmas. They offer ideas on how to create a new product, such as an educational programme, a new model of cooperation between different educational institutions and entrepreneurs, in order to achieve a win-win situation in competition with other educational institutions. However, in the proposed variants the strategy often remains on paper and does not become reality due to several reasons: insufficient assessment of the situation, resources are limited, the manager is not interested in managing the change processes, the colleagues are dismissive, who in the foreseen implementation of the strategy see threats to their status, the fear of change, because it is impossible to predict the possible consequences, which may not meet expectations. At present, there are 26 colleges in Latvia that implement short-cycle professional higher education and the college's mission, vision and values play an important role in ensuring the successful operation of each college. What is not always clearly defined and as it can be concluded from the information available at colleges' websites it is often difficult to distinguish the college's mission from vision, values and the goals set. The article will reflect the above-mentioned theoretical aspects and the authors' views, as well as provide an overview of the colleges' mission and vision statements. Uniform strategic planning does not promote competitiveness and quality.

## **Mission, vision and values**

Sustainable development consists of at least three dimensions or spheres: social, economic and environmental dimensions, but some sources also mention four and even more dimensions, adding to the above-mentioned list the political dimension and highlighting the cultural dimension. All dimensions are interdependent and closely related; they interact with each other, i.e., changes in one dimension also cause changes in other dimensions. A systematic approach to the concept of sustainable development calls for an extended approach to understanding of the factors influencing sustainable development. Development planning documents are increasingly focusing on the human factor defined as the sustainable development of human resources or human capital. However, with regard to the three main dimensions, the economic one is undeniably important, since daily reality shows that competition is becoming global with each passing day. And here one of the benefits to sustainable development of the economy/business is socially responsible behaviour; therefore, socially responsible strategy planning is essential for the sustainable development of the company.

According to the classical theory of strategic planning, the beginning stage of strategic planning is the determination of a company's mission, which serves as a concentrated definition of the company's existence and defines the general direction of development. The mission and values of the company reflect the principles of entrepreneurial virtue and morality. The mission should, to a greater or lesser extent, reflect the needs of all strategic stakeholders. Undoubtedly, the manifestation of these entities' interests depends on the size of the company, its location, the sector represented etc. (Kochanova R., 2012).

However, with regard to the company's sustainable development and strategic planning it is not enough to discuss only mission. It is important to consider the three principles: mission (from Latin *missio* – to send), vision (from Latin *visio* – to see) and values.

Mission, vision and values are the basic tools of organisation management. The mission and values are the main elements, which justify the existence of the company, institution, organisation and the importance of person's belonging to one of them. The mission of the company, institution and organisation is the precisely defined main aim of the organisation as a whole. It should be emotional enough, it should justify why you and your staff are coming to work. If the formulation of the mission is similar to other companies' mission statements, boring and formal, then it does not make sense.

In the traditional (Drucker P., King V., and Cleland D.I.) and modern understanding of the management (Leigh N., 2007.), mission is a public operation, the main task that needs to be done for the benefit of the community.

Typically, the mission is formulated in an abstract and general way; it does not contain concrete measures, but reflects the general direction, motivation for action, creates the image of the institution, the idea that its operation is acceptable to the public, that the institution is successful and worthy of trust and support.

In daily practice, it is generally assumed that the mission is formulated by the company manager, a team created by the manager. However, this type of policy does not always reflect the whole company, institution, or organisation's perception of what a company's mission is. Consequently, if the company's management involves all employees and social partners in the development of the mission, it becomes one's own personal value, symbolises belonging to the team and promotes cooperation in achieving the common goal. Before the mission is formulated,



each institution needs to find out what the prospective action model will be. Neville Leigh (2007) offers four possible choices:

- to be almost the same but become better (to improve);
- to be almost the same but become larger (to expand);
- to keep some existing parts and add new parts (to develop);
- to substantially change (to re-establish).

The formulation of the vision is usually much shorter than the mission. It is like a visual image that shows what kind of organisation we are willing to be, in what atmosphere to work. Vision introduces the organisation's main development directions to employees and clients, partners and the general public. Vision provides guidelines for the basic things that need to be protected and those that need to be changed in the future.

The vision is an image of illusions and dreams, a phenomenon, a concise formulation of the organisation's desired future, a landmark for development (Klaus A., 2002). It can be seen that the proposed general formulation of the vision shows depth of its content and, possibly, the various approaches to its explanation. Neville Leigh (2007) offers the original definition of the vision, "Vision is the highest expectations and ideals of the organisation, what the organisation is willing to become. The formulation often describes the organisation's elevated, even romantic and mythical nuances". Usually institutions perceive the vision as an ideal, general purpose, which serves as a landmark for what to strive.

The definition of vision is usually shorter; it does not require much effort as a mission statement. To be effective, the formulation of the vision should be (Dzedons A., 2003):

- significant (one that is important to the management team);
- well-known (it should be communicated to the customer, social partners and institution's staff);
- stimulating (one that would create a desire to get involved and participate);
- reliable (based on reality);
- picturesque (to stick in memory and be associated with a particular institution). Often the vision is formulated simultaneously with the development of the mission.

Undeniably, the essence of a sustainable enterprise, institution and organisation is rooted in basic values that do not change over time. The purpose of such existence is not just to make money. Values substantiate deeper meaning of existence and significance for both the organisation's employees and the society as a whole.

Sustainable organisations distinguish their core values and their main goal/mission, which never changes, from their business strategies and action practices, which need to change constantly to respond to the changing world's impact. A clear vision and mission allow making productive changes without losing core values. *The importance of this concept has proven to be quite dramatic, for example, in the lives of companies such as Walt Disney in 1939, 1980; Boeing in the 1930s, in the late 1940s and again in the early 1970s; Hewlet-Packard in 1945 and 1990; Sony from 1945 to 1950 and again in 1970. These are interesting and evidence-rich stories worth being familiar with in order to better understand one's own organisation. They have passed the test of time, difficult circumstances and situations.*

This applies both to large and small businesses – to make productive changes without destroying the core values. Radical changes in business activities, cultural norms and business strategies do not mean the loss of basic principles.

## Mission, vision and values of colleges

In preparation for battle, I have always found that plans are useless, but  
planning is indispensable.

/Dwight David

Eisenhower

Thirty-Fourth President of the United

States/

The author has examined the information on the colleges' mission available at the websites of the colleges in Latvia, who implement short-cycle professional higher education. Within the framework of the study, 25 colleges' websites have been studied; 3 colleges do not provide information about their mission, vision and values at their websites.

As far as strategic planning is concerned, starting a planning process each college management should first answer the following questions:

- Who are the partners in providing services? How will service users participate in the planning?
- What services do people need?
- What is the capacity of existing service systems and will they be able to meet the needs in the long term?
- What will the impact of service systems be on the social and economic spheres and the environment?
- When and how will service sustainability be achieved? (Local Agenda 21, 1996).

By analysing colleges' mission statements according to the above-mentioned questions, it can be said quite convincingly that the answer to the second question is to "provide a quality service". For example, *educating and training professional, high-level specialists in the field of chemistry, pharmacy, biotechnology, environment, food and their related industries meeting the requirements of sustainable and high-quality education in the modern technology environment in educational programmes with high value added /OMTC/. Mission of Riga Medical College of the University of Latvia: to enable students to acquire high-quality education and professional qualification through implementation of achievable results-based study programmes. Mission: To provide high-quality higher and general professional education in line with the demand of the national economy /JAC/.*

Analysing the colleges' mission, it has been found that most of them, 80 %, also include the answer to the question "What will the service system influence be on the social and economic spheres and the environment?" Virtually, all contained one idea "the labour market will be provided with professional, competitive professionals", thus providing Latvia economy with the specialists, who promote the competitiveness of the industry and are competitive both in the local and international labour market (RBC). The mission is to educate and train highly skilled, qualified and competitive specialists in the field of health and social care, who will provide a solid basis for lifelong learning (Riga 1st Medical College). .... to educate and train talented and creative professionals in the business and culture for the labour market (Alberta College). The mission of the College of Law is to educate and train qualified specialists who have acquired not only good theoretical knowledge but also practical skills for the labour market of Latvia.

Having evaluated the mission statements of all colleges, it can be seen that most of them, practically all, are based on the same strategic planning model. And in such cases, the

effectiveness of the method decreases and it is no longer a source of competitive advantage. According to the scientific literature, planning balance is important for the successful implementation of the company's mission, and in this case we can also attribute it to the planning balance among all 25 colleges.

"Vision is the highest expectations and ideals of the organisation, what the organisation is willing to become. The formulation often describes the organisation's elevated, even romantic and mythical nuances" (Leigh N., 2007). When assessing colleges' vision, it can be stated that most colleges are self-confident, which is also reflected in their formulated vision. "To be in the top three colleges in Latvia; to educate and train skilled specialists required for the labour market; to ensure the growth of the college, by gaining international experience and continuously improving the quality of studies" /the College of Law/. "Riga Technical College in 7 years will become the technical education, culture and cooperation centre for professionals, businesses and industries, as well as the stakeholders." "A modern, prestigious college with an attractive communication and cultural environment, solid professional basis that implements and develops sustainable vocational education in the health and social care sector." /Riga 1st Medical College/.

As Neville Leigh (2007) has noted, vision is a goal of ideals that serves as a landmark for what to strive. Do the vision statements of all colleges include these ideas? Colleges' vision statements undeniably include certain goals. However, they do not always reflect a goal of ideals. Two colleges in their vision are willing to be in the top three colleges in Latvia. Why not the first? The vision of Riga Medical College of the University of Latvia is not directed to an ideal goal achievement, i.e., Riga Medical College of the University of Latvia is a recognized higher education institution that implements first-level professional higher education study programmes, as well as the mission of Jekabpils Agribusiness College manifests comprehensive growth and stable positions among professional higher education institutions.

At the same time, the Business Management College is convincing in its vision – To become the leading distance education business school in Latvia and the Baltics.

## **Conclusion**

Although many definitions of mission and vision can be found, usually mission and vision can be comprehended as something that organisation is currently, and what it would like to be. As definition of mission testify it is one of the steadiest characterising elements of the organisation, which formulate the purpose, the main long – term objectives and efforts of the organisation. Traditionally mission is expressed in one inspirational sentence. In practice, the formulation of mission and vision takes place simultaneously. However, formulating the mission and vision of a college, it would still be important to avoid duplication of information; some colleges reflect the same information in their mission and vision, i.e., to educate and train qualified specialists for the labour market, to educate and train competent specialists etc. Within the framework of the study, it has not been identified, which methods are used by the colleges in the development of their mission and vision. Only a subjective assessment has been performed as a result of the analysis of the mission and vision statements formulated by the college management, founders. To properly formulate the mission and vision, it would be advisable to create a working group – a team that brings together different opinions, proposals, ideals that would be reflected in the common material, discussed and the "core" would be extracted.

## References

1. Darba tirgus petijums „Profesionālas un augstākās izglītības programmu atbilstība darba tirgus prasībām” (Labor market research "Compliance of vocational and higher education programs with labor market requirements). (2007). Retrieved: [http://www.lm.gov.lv/upload/darba\\_tirgus/darba\\_tirgus/petijumi/profesionala\\_augstaka\\_izglitiba.pdf](http://www.lm.gov.lv/upload/darba_tirgus/darba_tirgus/petijumi/profesionala_augstaka_izglitiba.pdf). Access: 01.02.2018.
2. Dimensions of sustainable development. Retrieved: [http://www.unesco.org/education/tlsf/TLSF/theme\\_a/mod02/uncom02t02.htm](http://www.unesco.org/education/tlsf/TLSF/theme_a/mod02/uncom02t02.htm) . Access: 02.05.2017.
3. Drucker, P. (1971). Management: Tasks, Responsibilities and Practices. New York: Harper&Row. 1971.
4. Dzedons, A. (2003). Strategiska vadisana (Strategic management). Riga: Kamene. 2003.
5. King, W.R., Clelland, D.J. (1979). Strategic Planning and Policy. Van Nostrand Reinhold. 1979.
6. Klaus, A. (2002). Zinības vadītājam (Knowledge for manager). Riga: Preses nams. 2002.
7. Kochanova, R. (2012). Strategic Management System for providing sustainable development of organization. Retrieved: [https://dspace.lu.lv/dspace/bitstream/handle/7/4860/34914-Raja\\_Kocanova\\_2012.pdf?sequence=1](https://dspace.lu.lv/dspace/bitstream/handle/7/4860/34914-Raja_Kocanova_2012.pdf?sequence=1). Access: 02.01.2018.
8. Leight, N. (2007). Strategiska planošana (Strategic planning). Riga: SIA Multineo. 2007.
9. Misija, vizija un vērtības ir jākomunicē (Mission, vision and values). Retrieved: <http://www.springvalley.lv/lv/aktuali/publikacijas/misija-vizija-un-vertibas-ir-jakomunice/> Access: 01.02.2018.
10. Nipers, J., Zids, O., Kuklis, J. (2012). Profesionālā izglītība iesaistīto vispārīgā izglītībā mācību priekšmetu pedagogu kompetences paaugstināšana (Increasing the competence of teachers of general education subjects involved in vocational education). Retrieved: [http://profizgl.lu.lv/pluginfile.php/36205/mod\\_resource/content/0/3\\_modulis/O\\_Zida\\_materials.pdf](http://profizgl.lu.lv/pluginfile.php/36205/mod_resource/content/0/3_modulis/O_Zida_materials.pdf). Access: 20.01.2018.
11. Stevan, R. Covey. (2008). Astotais paradums. No efektivitātes līdz izcilībai (Eighth habit. From efficiency to excellence). Riga: Zvaigzne ABS. 2008.

## CURRENT TRENDS IN DEVELOPMENT OF PUBLIC-PRIVATE PARTNERSHIP IN AGRARIAN SECTOR OF REGIONAL ECONOMY

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**Abstract.** The cooperation between the state authorities and private business is one of the most important factors for stimulating innovation activity in economic and social sectors. At present, there is a need to support public-private partnerships, which will facilitate the inflow of foreign capital, as well as advanced technologies that will improve production. Priority areas for development of Russia require rapid and intensive changes towards the development of public-private partnerships, which will lead to rapid economic growth. One of the priority spheres of the economy is the agrarian sector. The complexity of issues related to the development of public-private partnership in modern conditions, which is burdened by financial and economic crisis, poses the task for economic science to make profound and comprehensive theoretical and methodological interpretation of the current situation. High practical importance of the analysis and evaluation of new structures functioning on the basis of public-private partnerships led to novelty and determined the relevance of this study. The purpose of this study is to develop recommendations to find out the perspective directions for development of public-private partnership in the agricultural sector on the example of the Samara region of the Russian Federation. As a methodological basis for the study, dialectical principles, methods of a systemic and integrated approach to the analysis of economic phenomena were used: analysis and synthesis, the method of scientific abstraction, the economic-statistical method, the method of expert assessment etc. The study showed the importance of developing the mechanism of interaction between the state and business structures through public-private partnerships for modernization of economics, as well as intensification of innovative relations in the agrarian sector.

**Key words:** agrarian sector, cooperation, private investor, public investor, public-private partnership.

**JEL code:** R110

### Introduction

The problem of public-private partnership in the development of the Russian economy has been significant in recent years. Cooperation between the state authorities and private business is one of the most important factors for stimulating of innovation activity of the economic and social sectors. There is an urgent need to use public-private partnership instruments, which will facilitate the inflow of foreign capital, as well as advanced technologies that will improve methods of production. Priority areas for the development require rapid and intensive changes towards the development of public-private partnership, which will lead to rapid economic growth of these areas. One of the priority spheres of the economy is the agrarian sector. State regulation of the agrarian sector of the economy is an integral part of the system of state regulation. Topicality of development of agrarian sector is that the production of most part of the basic necessities is at the expense of agricultural raw materials. Economic condition of the region and the country as a whole largely depends on the activities of the agrarian sector of the economy, so it needs an innovative development approach (Naumkin A., 2011). In assessing the potential for overcoming economic problems in the agrarian sector of the Russian economy, it was found that development of public-private partnerships is considered as priority. Considering the special importance of socio-economic development, priority areas in public-private partnership are not profitable projects (gas and oil refining industry), but on the contrary, long-paid and unattractive projects from the investment point of view; however, they are socially significant. Agrarian sector of the economy is an object-lesson example of such sphere (Hachatryan E., 2013).

The theoretical and methodological framework of the theory of public-private partnership in economic literature is represented by the system of views of such foreign scientists as Karlof B., Kejns Dzh., Mankiw G., Samuehlson P. and others. They had a decisive influence on the formation and development of the theory of interaction between government and business.

In the Russian economic science, research within the framework of public-private partnership and its impact on the processes of modernizing the economy under modern conditions has developed considerably since the 1990s XX century. A significant contribution to the study of this problem was made by Abalkin L., Valitov Sh., Varnavskij V., Deryabina M., Kabashkin V., Sharinger L., and others. Problems of development of public-private partnership in the innovative sphere of Russia are studied in the works of such scientists as Guriev S., Seliverstov V., Yakovets Yu. and others.

The complexity of issues related to the development of public-private partnership in modern conditions, burdened by the financial and economic crisis, sets requirements to economic science for a comprehensive theoretical and methodological interpretation of the current situation. The high practical importance of the analysis and evaluation of new structures functioning on the basis of public-private partnerships led to novelty and determined the relevance of this study.

The purpose of the study is development of recommendations for identifying promising forms of development of public-private partnership in the context of modernization of economics, the activation of innovative relations in the agrarian sector on the example of the Samara region at the present stage of the development of society. In accordance with this goal, the following tasks were set and solved: the place and role of public-private partnership in the modern economy was determined, the experience of using the mechanisms of public-private partnership in various spheres of the Russian economy was studied, recommendations were developed to intensify the use of public-private partnership mechanisms in the agrarian sector of the economy. As a methodological basis for the study, dialectical principles, methods of a systemic and integrated approach to the analysis of economic phenomena were used: analysis and synthesis, the method of scientific abstraction, the economic-statistical method, the method of peer review and etc.

## **Research results and discussion**

Public-private partnership is one of the ways to develop public infrastructure based on long-term interaction between the state and business, in which the private party participates not only in the designing, financing, construction or reconstruction of the infrastructure objects, but also in their subsequent use - provision of services at the created facility and/ or maintenance (Rekomendacii po realizacii proektov ..., 2016; Varnavskij V., 2009; Yakovets Yu., 1991). The goal of public-private partnership from the economic point of view is to stimulate the attraction of private investments in the production of services, works and consumer goods, which should be provided by public entities at the expense of the corresponding budgets, as well as reducing state participation in economic turnover, when the same tasks can be more effectively executed by business (Deryabina M., 2008; Valitov Sh., 2009).

Regulation of public-private partnership in the Russian Federation is based on the federal laws "On public-private partnership, municipal-private partnership in the Russian Federation (2015)" and "On Concession Agreements (2005)".

In order to ensure the implementation of mentioned Laws in the territory of the Samara region, has been developed necessary regulatory framework that regulates in details the work of the executive authorities of the region.

Regardless of form, public-private partnership must satisfy prescribed characteristics (Table 1).

Table 1

### Features of public-private partnership

<b>№</b>	<b>Features</b>	<b>Specifications</b>
<b>1.</b>	The long-term nature of the partnership (for agreements on public-private partnership for at least 3 years)	On average, the concession agreements in Russia are concluded for a period of 13 years. The long-term nature partnership projects follows from the need to return private investment
<b>2.</b>	The distribution of risks and responsibilities between partners by attracting a private investor not only to the creation of the facility, but also to its subsequent operation and/ or maintenance	Risks in infrastructure projects are potential changes in the indicators of projects that affect the revenues and expenses. Distribution of risks is an obligatory condition for structuring private and public relations in partnership projects.
<b>3.</b>	Full or partial financing of creation of a public infrastructure object by a private party	The main difference between public-private partnership and the public procurement is the obligatory financing of the establishment of the facility by a private partner, while the public partner has the right to compensate part of the costs incurred to create the object of the agreement, as well as fully or partially finance the costs associated with the operation and/ or maintenance of the facility

Source: *Rekomendacii po realizacii proektov ...*, 2016; Seliverstov V., 2008

Based on the considered mandatory features of public-private partnership, the authors have summarized main advantages of their using (Table 2).

Table 2

### Advantages of the mechanism of public-private partnership

<b>Possibilities for public investors</b>	<b>Possibilities for private investors</b>
<b>The possibility to attract a private investor to provide funding for creation of objects allows to implement infrastructure projects even in the absence of sufficient amount of budgetary funds without increasing the debt burden in the current period</b>	The possibility to establish conditions for interaction with the public investor in frame of long-term agreement
<b>The possibility to combine various stages within framework of one project allows to improve the quality of the object being created and to reduce risks of exceeding the cost of construction and operation</b>	The possibility of obtaining plot of land, forest, water and/ or other land plot
<b>The possibility to purchase not an object but a service at the expense of payments tied to the volume and quality of its delivery, which also contributes to the development of competition in the market of socially significant services</b>	The possibility of co-financing the project by the public investor, obtaining additional guarantees, including minimum income
<b>The ability to use the resources and competencies of private partner (concessionaire) to provide socially important services, improve their quality and customer satisfaction, attract new technologies</b>	The ability to increase revenue from the project through the provision of additional paid services and/ or the use of various solutions that reduce costs
<b>Transfer of part of project risks to the private partner (concessionaire)</b>	Transfer of part of project risks to the public partner (concedent)
<b>Reducing the state's presence in the economy</b>	Consolidation in the spheres of activity traditionally occupied by the state
<b>In the case of a private initiative, it is possible to shift the costs associated with project development to a private project initiator and shorten the time of investor selection, as well as improve the management of the property</b>	In the case of a private initiative, it is possible to investigate the structure of the project and propose a draft agreement

Source: Karlof B., 1991; Kejns Dzh., 2007; Mankiw G., 1991; *Rekomendacii po realizacii proektov ...*, 2016; Sharinger L., 2004

Thus, a public-private partnership is a mutually beneficial legal relationship between an entrepreneur and a state institution. Cooperation is voluntary and does not imply arbitrary interference of the state in business affairs. The idea of it is to achieve mutually beneficial effect (Guriev S., 2011; Kabashkin V., 2008).

In the beginning of 2017, the Russian Federation passed the stage of deciding on the implementation of 2.5 thousands infrastructure projects involving the attraction of private investments on the principles of public-private partnership. At the same time, more than 480 projects are in development process and about 1 thousand, according to expert estimates, are structured by private partners for use of the "private initiative" mechanism (Issledovanie «Gosudarstvenno-chastnoe ...», 2016; Mamai O., 2015).

The results of the conducted research of more than 100 realized investment projects in the Russian Federation make it possible to state that the priority for the state and attractive for Russian business are fields of industrial production (30 %), housing and communal services (24 %), development of territories (12 %) road construction (11 %) and the agrarian sector (10 % (Polyanskova N., 2014) (Figure 1).

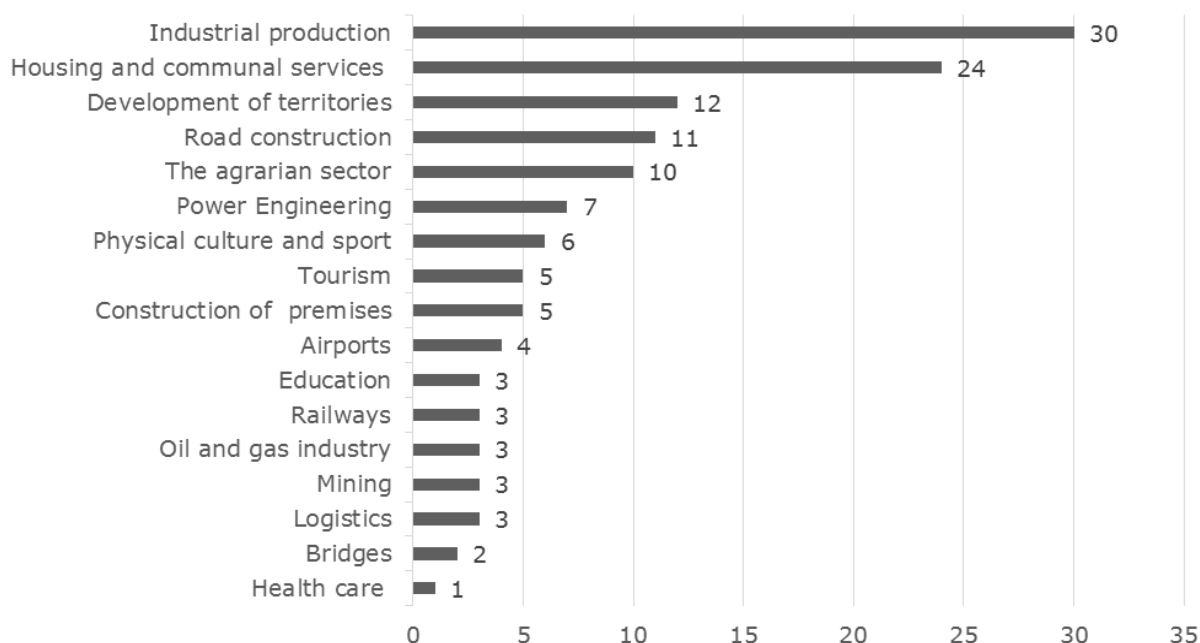


Fig. 1. **Number of realized investment projects in the Russian Federation on the basis of public-private partnership in the spheres of economy (on 01.01.2017)**

Assessment of the level of development of public-private partnership in the regions of Russia is conducted taking into account the following factors:

- development of institutional environment - legislative acts in the sphere of public-private partnership at the regional and local levels, as well as other institutional factors, for example, the presence of an authorized institution, number of specialists who have got special training etc., are analysed;
- experience in the implementation of public-private partnership projects in the regions, which is assessed on the basis of analysis and specialized calculation of projects implemented in various organizational and legal forms;
- investment attractiveness of the region, which is assessed in accordance with the data of the rating agency "Expert" (Rejting regionov Rossii ..., 2018).



The ranking of regions on public-private partnership development for 2014-2017 is shown in Figure 2.

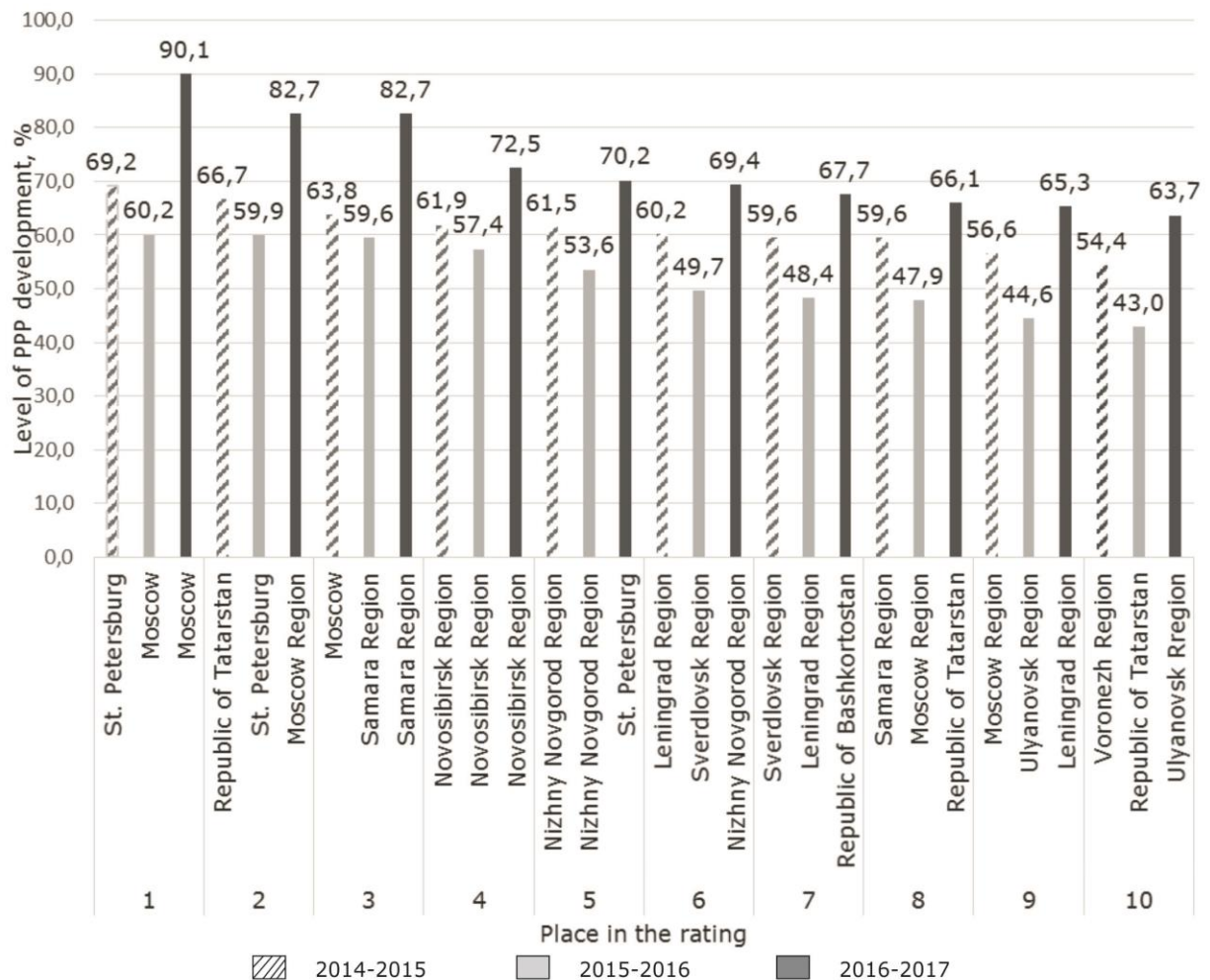


Fig. 2. **Rating of regions of the Russian Federation according to public-private partnership development (2014-2017)**

As it can be seen from Fig. 2, the value of the indicator characterizing the level of public-private partnership development in the Russian Federation regions in 2016-2017 has increased practically in all regions, which indicates positive dynamics in the development of this direction. It is also clear that the Samara region has been leading the last two years among other regions of the Russian Federation and occupies the third place.

The analysis of public-private partnership mechanisms in the agrarian sector of the Samara region showed that projects in the livestock complex and land reclamation of agricultural land have been launched or are in the pre-project stage on the territory of the region (Nekrasov R., 2017).

To specify the problems of implementing public-private partnership in the agrarian sector of the Samara region the authors conducted analysis of its strengths and weaknesses (Table 3).

Table 3 shows that the efforts of the regional government as the main initiator of public-private partnership projects should be focused on creating investment climate in the agrarian sector that is maximally favourable for private business sector. Increasing the effectiveness of public-private partnership projects is possible by providing of advantages of the region in general and the agrarian sector in particular (Nekrasov R., 2010).

To reduce the risks of implementing investment projects in the agrarian sector of the Samara region, caused by the impact of weaknesses, it is important to optimize the forms and models of

public-private partnership. Out of the variety of forms of public-private partnership, it should be necessary to select those that will rely on the financial capacity and administrative resources of public authorities even at the initial stage of the project. Subsequently, when a joint-stock or private business in this project will make a profit, it will repay the state share of the invested capital, up to the privatization of the entire property under certain conditions.

Table 3

**Analysis of implementation of public-private partnership in the agrarian sector of the Samara region**

<b>Strengths</b>	<b>Weaknesses</b>
<b>In general favourable investment climate in the region</b>	Low investment attractiveness of the agrarian sector due to low productivity and profitability
<b>Significant investment potential of the region</b>	Low investment opportunities of the regional budget in comparison with other regions of Russian Federation
<b>High demand of the region for innovative products and technologies</b>	Lack of experience in the implementation of large projects
<b>Presence of regional law regulating economic relations in the sphere of public-private partnership</b>	Inadequate legal framework
<b>Availability of universities capable of training and retraining specialists in the field of public-private partnership</b>	Lack of qualified public specialists in the field of management of public-private partnership projects
<b>Presence of institutions for the development and support of entrepreneurship, system of state support in various forms for agricultural producers, the formation of a register of public-private partnership projects</b>	The complexity and non-transparency of competitive procedures for access to the public-private partnership market

Source: Results of Polyanskova N., 2014, updated by authors

**Conclusions, proposals, recommendations**

- 1) Public-private partnership stimulates the attraction of private investments in the production of services, jobs and consumer goods, which should be provided by public investors at the expense of the corresponding budgets, as well as reduced state participation in economic turnover, when the same tasks can be more effectively fulfilled by business.
- 2) Public-private partnership is a mutually beneficial legal relationship between the entrepreneur and the state institution. Cooperation is voluntary and does not imply arbitrary interference of the state in business affairs.
- 3) In recent years, public-private partnership mechanisms are actively developing in various sectors of the economy in all regions of the Russian Federation.
- 4) Taking into account the special importance of socio-economic development, priority areas in public-private partnership are not profitable projects (gas and oil refining industry), but on the contrary, long-paying and unattractive projects from the investment point of view; however socially significant, such as agrarian sector of economy.
- 5) Samara region for the last two years is confidently leading among other regions of the Russian Federation in the activity of public-private partnership development and ranks third, while projects in the livestock complex and land reclamation of agricultural purposes have been launched or are under way at the pre-project stage.
- 6) The conducted analysis of strengths and weaknesses of public-private partnership implementation in the agricultural sector of the Samara region allowed to determine the main directions of the development of the public-private partnership mechanism in this region.

## Bibliography

1. Deryabina, M. (2008). Teoreticheskie i prakticheskie problem gosudarstvenno-chastnogo partnerstva (Theoretical and practical problems of public-private partnership). Doklad podgotovlen pri finansovoj podderzhke RGNF proekty No 06-02-001892 i No 04-02-00131a. Retrieved: <http://www.imepi-eurasia.ru/baner/docladD.doc>. Access: 22.01.2018.
2. Guriev, S., Kachins, E., Oslund, A. (2011). Rossiya posle krizisa (Russia after the crisis). Moscow: Alpina Biznes Buks. p. 394.
3. Hachatriyan, E., Shcherbenko, E. (2013). Gosudarstvenno-chastnoe partnerstvo v sisteme prodovol'stvennogo obespecheniya regiona (Public-private partnership in the region's food security system). Ekonomika i pravo. No. 6. pp. 15-24.
4. Issledovanie «Gosudarstvenno-chastnoe partnerstvo v Rossii 2016-2017: tekushchee sostoyanie i trendy, rejting regionov» (The study "Public-private partnership in Russia 2016-2017: current state and trends, rating of regions") (2016). Moscow: Associaciya «Centr razvitiya GCHP». p. 32.
5. Kabashkin, V., Levchenko, A., Sidorov, V. (2008). Razvitie gosudarstvenno-chastnogo partnerstva v regionah RF (Development of public-private partnership in the regions of the Russian Federation). Belgorod: Politera. p. 466.
6. Karlof, B. (1991). Delovaya strategiya: Konceptsiya. Soderzhanie. Simvoly (Business strategy. A Guide to Concepts and Models). Moscow. p. 239.
7. Kejns, Dzh. M. (2007). Obshchaya teoriya zanyatosti, procenta i deneg (The General Theory of Employment, Interest and Money). Moscow. p. 960.
8. Mamai, O., Mamai, I. (2015). Teoreticheskie osnovy innovatsionnogo razvitiya agrarnogo sektora regionalnoy ekonomiki (Theoretical bases of innovative development of the agrarian sector of regional economy). Kinel. p. 163.
9. Mankiw, G., Romer, D. (1991). New Keynesian Economics: Volume 1: Imperfect Competition and Sticky Prices. The MIT Press. p. 444.
10. Naumkin, A. (2011). Gosudarstvenno-chastnoe partnerstvo pri provedenii modernizatsii otraslej sel'skogo hozyajstva (Public-private partnership in the modernization of agricultural sectors). Moscow. p. 253.
11. Nekrasov, R. (2010). Ispol'zovanie mekhanizmov gosudarstvenno-chastnogo partnerstva pri formirovanii klasterov v APK Samarskoj oblasti (Use of mechanisms of public-private partnership in the formation of clusters in the agro-industrial complex of the Samara region). Regionologiya. No. 3. pp. 106-116.
12. Nekrasov, R., Gusakova, E., Petrov, M. (2017). Stimulirovanie innovacionnyh processov v APK Samarskoj oblasti (Stimulation of innovative processes in the agro-industrial complex of the Samara region). Intellekt. Innovacii. Investicii. No. 3 (15). pp. 35-42.
13. Polyanskova, N., Guseva, M., Dmitrieva, E. (2014). Razrabotka modeli gosudarstvenno-chastnogo partnerstva dlya realizacii proektov v APK Samarskoj oblasti (Development of a model of public-private partnership for the implementation of projects in the agro-industrial complex of the Samara region). Agro-inform. No. 7. pp. 3-14.
14. Rejting regionov Rossii po urovnyu razvitiya gosudarstvenno-chastnogo-partnerstva (Rating of Russian regions by the level of development of public-private partnership) (2018). Moscow: Nekommercheskoe partnerstvo «Centr razvitiya gosudarstvenno-chastnogo partnerstva», Ministerstvo ekonomicheskogo razvitiya Rossijskoj Federacii. Retrieved: <http://www.pppi.ru/regions>. Access: 22.01.2018.
15. Rekomendacii po realizacii proektov gosudarstvenno-chastnogo partnerstva. Luchshie praktiki. (Recommendations on the implementation of public-private partnership projects. Best practices) (2016). Moscow: Ministerstvo ehkonomicheskogo razvitiya Rossijskoj Federacii. p. 165.
16. Seliverstov, V. (2008). Novaya koncepciya sovershenstvovaniya regionalnoj politiki v Rossijskoj Federacii (A new concept of improving regional policy in the Russian Federation). Region: ekonomika i sociologiya. No. 4. pp. 3-14.
17. Sharinger, L. (2004). Novaya model investicionnogo partnerstva gosudarstva i chastnogo sektora (A new model of investment partnership between the state and the private sector). Rossijskij ekonomicheskij zhurnal. No. 9/10. pp. 41-52.
18. Valitov, Sh., Malgin, V. (2009). Vzaimodejstvie vlasti i biznesa. Sushchnost, novye formy i tendencii, socialnaya otvetstvennost (Interaction of power and business. Essence, new forms and trends, social responsibility). Moscow: Ekonomika. p. 208.
19. Varnavskij, V. (2009). Gosudarstvenno-chastnoe partnerstvo: nekotorye voprosy metodologii (Public-private partnership: some issues of methodology). Vestnik instituta ehkonomiki RAN. No. 3. pp. 17-33.
20. Yakovets, Yu. (1991). Uskorenie nauchno-tehnicheskogo progressa: Teoriya i ekonomicheskij mehanizm (Acceleration of scientific and technical progress: Theory and economic mechanism). Ekonomika, Moscow. p. 333.

## THE USE OF THE DATA BANK IN COMMUNE DEVELOPMENT PLANNING IN THE KUYAVIAN-POMERANIAN PROVINCE

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**Abstract.** A very important task for local authorities is to properly plan and establish their long-term development policies. To this end, being informed on the possibilities of using official statistical data from the Local Data Bank (LDB) is necessary. These data constitute the basis for preparation of various analyses, trends, strategies, reports, and statements. The results of the study were obtained in order to find the answer to the research problem stated as follows: Are offices operating in rural areas informed on the LDB and on employing official statistical data for their own identified purposes? The subject of the study included local government units in the Kuyavian-Pomeranian province. The main aim of the study was to evaluate the extent of knowledge and the degree to which the Local Data Bank was used for the purposes of regional development. In order to achieve this aim, 157 Commune Offices within the area of the Kuyavian-Pomeranian province were surveyed. The surveys showed that the extent of knowledge regarding the Local Data Bank and its potential is very small, while general availability of the LDB is very limited.

**Key words:** Local Data Bank, official statistics, special, regional development, commune development strategy.  
**JEL code:** R58

### Introduction

Significance of the addressed topics regarding official statistics and use of the Local Data Bank (LDB), particularly in local government units in rural areas, arises from the fact that the units are responsible for establishing proper social and economic development policy. The issues of official statistical data and its applications are becoming an important task to be dealt with by institutions responsible for regional development. In Poland, the official statistics information system is built by a number of institutions. The aim of these entities is to provide high quality comparable data for areas of various sizes in the long-term perspective. Thereby, statistical data on sustainable development are collected and published, e.g. by the Central Statistical Office (Bal-Domanska B., 2016).

Moreover, in conditions of globalisation, popularisation of statistical data methods (including access to information) and methods of statistical survey result analysis is growing important. Official statistics should be the basis of accurate diagnosis of the social and economic situation as well as an element of monitoring (Witkowski J., 2010). The recent years have seen a large increase in interest in statistical data, especially among districts and communes (Pieniasek M., 2015). As a consequence, the desire to make official statistics so useful in practice so that it could have an effect on long-term development and not just short-term consumption, e.g. consumption of EU funds, has been identified. The demand for statistical data on the local level is also increasing, which is caused by the growing importance of the use of statistical information in spatial planning involving methods in which Geographic Information Systems (GIS) are used, among other things (Parteka T., Czochanski J. T., 2005).

It is important to note that official statistics play a key role in the process of monitoring social and economic development. Provision of statistical information is becoming an indispensable element of management processes, the process of making effective decisions and undertaking actions as well as in planning and achieving strategic goals (Pieniasek M., Rogalinska D., 2017).

This paper presents selected results of the study concerning different aspects of using the available official statistics information resources for purposes including (but not limited to) strategic management in communes of the Kuyavian-Pomeranian Province.

The subject of the study included local government units in the Kuyavian-Pomeranian province. The hypothesis of the research, assumes that the Local Data Bank is a valuable source of data to prepare the strategy. The main aim of the study was to evaluate the extent of knowledge and the degree to which the Local Data Bank was used for the purposes of regional development. The specific aim was to indicate areas in which the collected data (official statistical data) could be applied, to evaluate assets in view of needs of the communes as well as to evaluate the use of IT assets for the purposes of preparing strategic documents. An additional aim was to study opinions on the Local Data Bank platform itself with regard to such criteria as:

- content of the displayed data,
- clarity of the displayed data,
- coherence of the displayed data,
- the data sought being easy to find,
- using the portal,
- navigating the website,
- available tools.

In order to achieve this aim, 157 Commune Offices within the area of the Kuyavian-Pomeranian Province were surveyed.

### **Research results and discussion**

The largest database for economy, society, and environment in Poland is the Local Data Bank (LDB). It contains over 40.000 statistical variables grouped by topics and covers the period since 1995. The LDB contains:

- data and indices describing statistical localities, communes, districts, provinces, and Poland as a whole as well as units accordant with the NTS (Nomenclature of Territorial Units for Statistical Purposes) naming convention: sub-regions and regions,
- information resources (annual and short-term statistical data) are completed and updated on a current basis,
- additional options – territory portraits (summaries), ratings, Statistical Handbook for Local Government Employees, sustainable development indices – are available in the Domain Databases – Multi-domain statistics (Bank Danych Lokalnych, 2018).

The Local Data Bank is a universal tool used to evaluate strategic sustainable development actions for the purposes of local, regional, or national planning. National census results and official statistics information resources, including administrative data, are the source of data constituting the Local Data Bank. It is the source of information used for interregional and time-based comparison (Marczak S; Pluto-Kossakowska J., 2014).

Statistical data should be used in strategic planning and current decision making processes. Analysis of the changes and phenomena that are taking place should be conducted by local government authorities using statistical information. As D. Wyszowska states, local governments can use data prepared by the Polish official statistics service and based on research on the so-called short-term territorial statistics while making various decisions. These include information on the employment market, industry in general and the construction industry, agriculture, business entities, enterprise finance, investment outlays as well as condition and structure of the population. Furthermore, data on new phenomena and processes associated with the economic system

transformation in Poland is also an important issue to be tackled by regional statistical services. (Portal samorzadowy; Wyszowska D., 2017).

Official statistics index sets allow both evaluation of the current condition and determination of measurable goals. They are also applied in the process of monitoring changes that are taking place and in evaluation of effects after decisions are made or actions are undertaken. It has to be expressly emphasised that monitoring is one of the most important elements of implementing regional development policies (Bal-Domanska B., 2015).

The National Regional Development Strategy 2010-2020 adopted by the Council of Ministers in 2010 has provided the opportunity of making institutional and systemic changes on the national and local government levels. Two new institutions can be established in this respect in order to support implementation of the regional policy. These are the National Territorial Observatory on the national level and Regional Territorial Observatories on the regional level. The task of observatories established at the regional level will be to carry out strategic research and analyses using various statistics. They will be based on the currently created region information Banks that are collections of papers or links to data sources, reports, or analyses (Stelmach-Fita B., Brodowicz D. P., 2017).

Regional policies require the process of monitoring understood as 'the process of systematic collection and processing (analysis) of reliable data (both quantitative and qualitative) regarding implementation of projects, programmes, and development strategies'<sup>1</sup> (Malik K., 2011).

Earlier study conducted by the present authors in 2013 covered the degree to which the Local Data Bank is used in respect of Commune Development Strategy planning. Its scope included all communes in the province. Its results showed that the Local Data Bank is popular only to a small extent and its impact on development strategy formation and planning is very low. Only 25 % of the surveyed local administration units were making use of its capacities (Zajdel M., Michalcewicz-Kaniowska M., 2013).

The present study covered all local government units as well. The method of collecting data from primary sources was mail survey. Questionnaires accompanied by a cover letter were sent to each of the 157 Commune Offices in the Kuyavian-Pomeranian Province. The study was exhaustive in its nature, which means that it covered the entire subject population. Completed survey questionnaires were sent back by 94 offices, which is equal to nearly 60 % of all communes covered by the study. Three counties ('starostwa'), 20 urban communes ('gminy miejskie'), 23 urban/rural communes ('gminy miejsko-wiejskie'), and 48 rural communes ('gminy wiejskie') participated in the study. Data analysis was conducted using descriptive statistics tools.

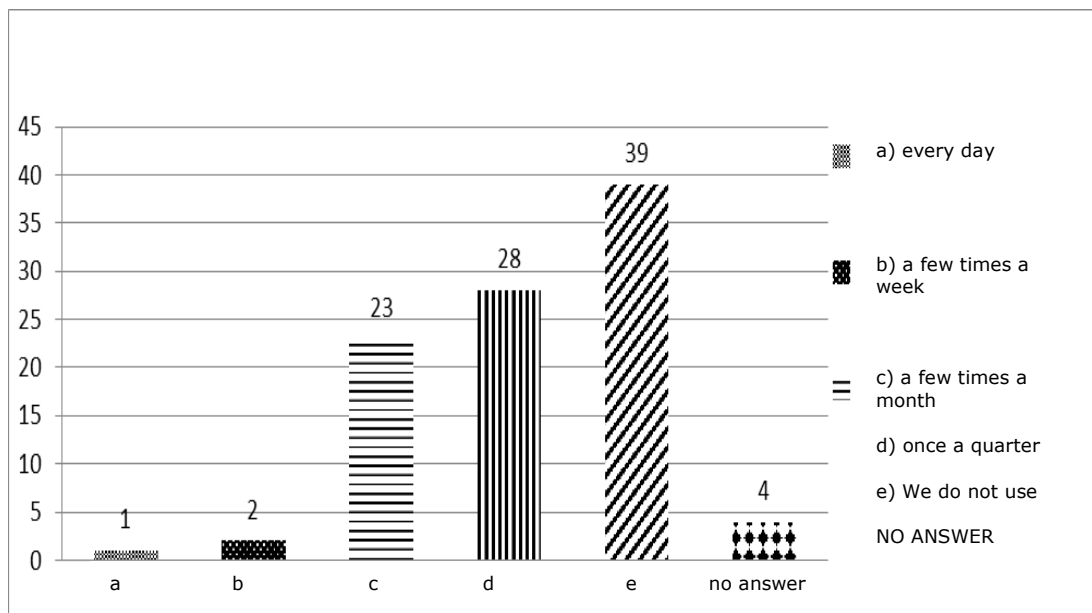
Communes are entirely free to develop strategic plans but at the same time they should make use of planning methods and techniques. Local development strategies constitute the territorial approach (Podejście "Leader" podstawowy poradnik, 2006).

They are the ones that have to implement regional development policies such as those on education, health, social assistance, unemployment prevention, culture, land and water management, environment protection, communication, safety etc. (Wiatrak A. P., 1998).

The study concerned issues such as the use of the Local Data Bank (LDB) in view of commune development planning in the Kuyavian-Pomeranian province, in both quantitative and qualitative aspect. The first question in the questionnaire touched upon the LDB frequency of use. The answers given are shown in Figure 1.

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<sup>1</sup> Original quote in Polish: 'proces systematycznego gromadzenia i przetwarzania (analizowania) wiarygodnych danych (ilościowych i jakościowych) dotyczących wdrażania projektów, programów i strategii rozwoju'.



Source: author's study

Fig. 1. The LDB frequency of use

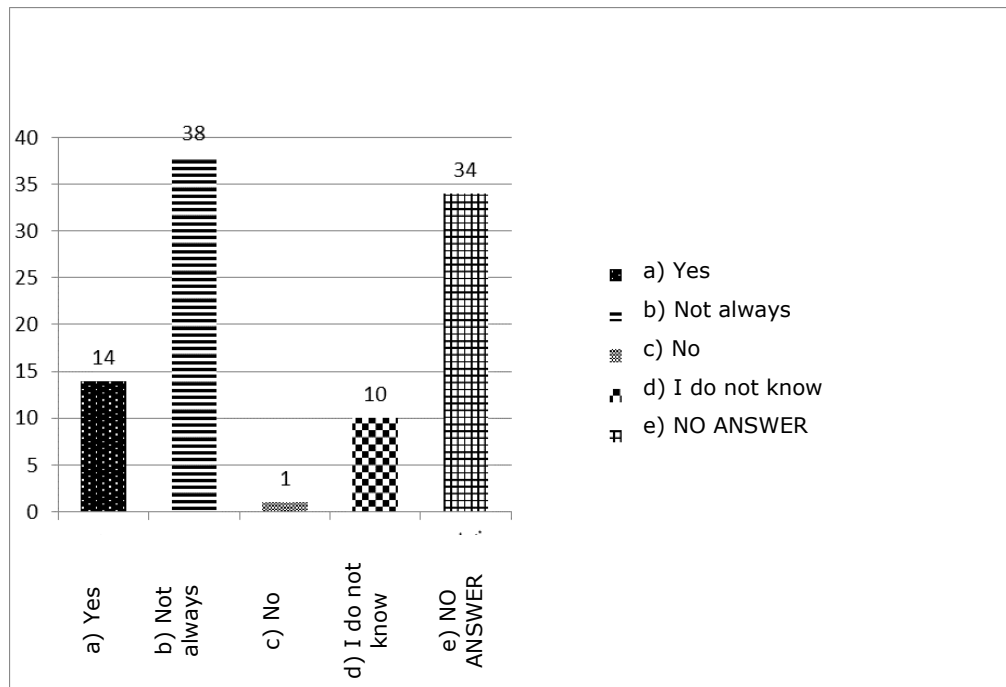
The survey demonstrated that over 40 % of the analysed communes were not using the Local Data Bank and only 30 % were using it once a quarter. The Bank was used on a daily basis or a few times a week by just 3 % of the interviewees. A qualitative analysis showed that interviewees who used the LDB a few times a month had used the data, e.g. to:

- update and prepare development programmes,
- analyse demographic trends for strategic plans,
- provide current analyses needed for statistics, e.g. for operation of the Commune Office and Commune Council in order for them to be able to make decisions or adopt resolutions,
- prepare assessments and compare data covering a few years.

On the other hand, interviewees from communes who used the LDB once a quarter had used the data, e.g. to:

- update district statistical data to be used in articles, publications, EU projects,
- prepare various analyses, forecasts, long-term reports,
- describe the potential of a commune, promote it commercially,
- monitor and verify strategies,
- prepare assessments in strategic documents, development programmes and plans,
- obtain statistical information used for preparation of plans, strategies, and other documents that are strategic in nature,
- create a variety of informative materials and analyses needed in subsidy applications.

The next aspect of the study was concerned with analysing information needs of communes in view of LDB resources. Accordingly, 14 % of the interviewees responded that data resources in the LDB satisfied their needs, 40 % responded that these resources were not always sufficient, and more than 35 % of the communes did not answer this question (Figure 2).



Source: author's study

Fig. 2. Does the data available in the Local Data Bank sufficiently satisfy your needs?

The interviewees who responded that they were using the LDB and that the bank resources were sufficient had used the data to:

- update district statistical data to be used in articles, publications, EU projects,
- update and prepare development programmes,
- prepare assessments for strategic documents,
- draw up e.g. planning documents used to draft designs,
- describe the state of affairs in national and EU subsidy application forms.

The use of LDB resources in communes using the Bank that deemed the resources not always sufficient was also the subject of analysis. The interviewees' answers indicated that the data had been used, e.g. in:

- analyses, forecasts, reports, strategies,
- current analyses needed for statistics, e.g. for operation of the Commune Office and Commune Council in order for them to be able to make decisions or adopt resolutions,
- preparation of statements, surveys, strategic documents, feasibility studies for the implemented projects,
- statements, projects etc. where the commune needs to be characterised or similarly described.
- preparation of assessments in strategic documents, development programmes and plans, reports,
- to fill in surveys and statements as well as documentation.

The third issue covered in the questionnaire concerned the LDB as a source of information used in preparation of various strategic documents or studies. The survey revealed that, out of 97 communes that had sent the questionnaire back, 29 communes were using the LDB to prepare various analyses, 18 – to prepare forecasts, 20 – to prepare reports, 46 are using LDB resources to establish strategic plans, and only 28 communes were using the LDB to prepare other studies.

Another aspect of the study pertained to evaluation of the LDB by potential users in 7 areas:

- content of the displayed data,



- clarity of the displayed data,
- coherence of the displayed data,
- the data sought being easy to find,
- using the portal,
- navigating the website,
- available tools.

As far as content of the displayed data is concerned, the results show that 41 % of the communes rated this aspect 'very good' but more than 42 % of the communes did not answer this question. Clarity of the displayed data was rated 'very good' and 'good' by more than 41 % of the interviewees, while in 43 % of the communes the question regarding this aspect was left with no answer. As for coherence of the displayed data, the evaluation was similar, i.e. more than 43 % answered 'very good' or 'good', while 42 % of the communes did not choose any answer at all. The next evaluated criterion was whether the data was easy to find; however, only 34 % of the communes rated this aspect 'good' and 'very good', with 20 % answering 'mediocre'. The aspects concerning use of the portal and navigation on the website were rated 'good' and 'very good' by 34 % of the interviewees, whereas 22 % rated it 'mediocre'. Availability of tools received similar ratings. This aspect was rated 'very good' and 'good' by 31 % of the interviewees, 'mediocre' by 22 % of the communes, and left with no answer by 43 % of the subjects.

The last aspect of the study touched upon the possibility of using other databases. In this respect, 43 % of the communes answered that they were not using any other portal, whereas 40 % answered that they were. Qualitative analysis suggested the following sources:

- Commune Office databases,
- the Central Statistical Office,
- official gazettes,
- data from the Marshal's Office,
- the legal database – Lex,
- grants map,
- journals, data from books.

### **Conclusions, proposals, recommendations**

- 1) Results of this study conducted on communes suggest that the extent of knowledge regarding the Local Data Bank itself as well as its potential is very small. This means that general availability of the LDB in the Kuyavian-Pomeranian province is still very limited. The Central Statistical Office should extend the scope of its educational activity.
- 2) The subjects indicated that data stored in the Local Data Bank are used predominantly to prepare current assessments and reports.
- 3) The period of validity for development strategies implemented by most of the communes is coming to an end. Therefore, the need for expertise in planning methods and techniques is growing. It can be significant during establishment of new strategies.
- 4) An apparent default on the part of communes covered by the study was that they still used the LDB and official statistical data from other sources to such a limited degree.
- 5) A very low percentage of communes have undertaken to prepare such plans.

## Bibliography

1. Bal-Domanska, B. (2015). Statystyczne bazy danych jako narzedzie monitoringu zrownowazonego rozwoju – wybrane aspekty teoretyczne (Statistical Databases As A Tool For Monitoring Sustainable Development - Selected Theoretical Aspects) *Przeglad Statystyczny R. LXII – Zeszyt 4/2015*; s. 435 – 455
2. Bal-Domanska, B. (2016) Wybrane problemy budowy zestawow wskaźników zrownowazonego rozwoju na poziomie lokalnym i regionalnym na przykladzie Banku Danych Lokalnych (Selected Problems Of Building Sets Of Indicators Of Sustainable Development On The Local And Regional Level On The Example Of The Local Data Bank); *OPTIMUM. STUDIA EKONOMICZNE NR 1 (79) 2016* s. 150 – 164
3. Bank Danych Lokalnych (2018) (Local Data Bank); <https://bdl.stat.gov.pl/BDL/start#>; dostep 2018
4. Malik, K. (2011) Ewaluacja polityki rozwoju regionu – metody, konteksty i wymiary rozwoju zrownowazonego (Evaluation Of Regional Development Policy - Methods, Contexts And Dimensions Of Sustainable Development), PAN KPZK, Warszawa,
5. Marczak, S., Pluto-Kossakowska, (2014); SPATIAL DATABASES TO ANALYZE THE USE OF EU FUNDS IN POLAND; Analizy wykorzystywania funduszy europejskich w Polsce (Analyses Of The Use Of European Funds In Poland) *Polskie Towarzystwo Informacji Przestrzennej, Roczniki Geomatyki 2014 m TOM XII m ZESZYT 1(63)*: 97;
6. Parteka, T., Czochanski, J.T. (2005); Monitorowanie programowania i zmian w przestrzeni jako instrument zarzadzania rozwojem regionalnym (Monitoring Programming And Changes In Space As An Instrument For Regional Development Management), w: Czyz T., Rogacki H. (red.), *Wspolczesne problemy i koncepcje teoretyczne badan przestrzenno-ekonomicznych (Contemporary Problems And Theoretical Concepts Of Spatial And Economic Research)*, Biuletyn KPZK PAN, z. 219, Warszawa, s. 88-112.
7. Pieniazek, M., Rogalinska, D. (2017) Rozwoj badan statystyki regionalnej na potrzeby monitorowania polityki spójności (Development Of Regional Statistics Surveys For Monitoring Cohesion Policy); w *RESEARCH PAPERS OF WROCLAW UNIVERSITY OF ECONOMICS* nr 466,
8. Pieniazek, M., Rogalinska, D., (2015), Statystyka publiczna w procesie monitorowania wymiaru terytorialnego polityki spójności (Public Statistics In The Process Of Monitoring The Territorial Dimension Of Cohesion Policy), [w] *RESEARCH PAPERS OF WROCLAW UNIVERSITY OF ECONOMICS*, t. 380, s. 158-165.
9. Podejscie "Leader": podstawowy poradnik (2006) (Leader Approach: A Basic Guide), *Urząd Oficjalnych Publikacji Wspolnot Europejskich*, Luksemburg, s. 8
10. Portal samorzadowy; Wyszowska D; <http://www.portalsamorzadowy.pl/prawo-i-finanse/jak-statystyka-moze-wspierac-rozwoj-wojewodztw,40567.html>; dostep 2017
11. Stelmach-Fita, B., Brodowicz, D.P. (2017) Baza wiedzy o regionie i jej potencjalna oraz faktyczna rola w rozwoju terytorium (Knowledge Base About The Region And Its Potential And Actual Role In The Development Of The Territory); *Biuletyn KPZK PAN, Zeszyt 267, s2*
12. Wiatrak, A.P. (1998) Przedsiębiorczosc w strategii rozwoju gminy w: Agrobiznes w krajach Europy Srodkowej w aspekcie integracji z Unia Europejska (Entrepreneurship In The Commune Development Strategy In: Agribusiness In The Countries Of Central Europe In The Aspect Of Integration With The European Union); *V Kongres Stowarzyszenia Rolnictwa i Agrobiznesu, Wydawnictwo AE we Wroclawiu, Wroclaw, s.523*
13. Witkowski, J. (2010). *Wiadomosci Statystyczne (Statistical News)*; Nr 2 (585);
14. Zajdel, M., Michalcewicz-Kaniowska, M. (2013) Bank Danych Regionalnych w aspekcie planowania Strategii Rozwoju Gminy (Regional Data Bank In The Aspect Of Planning The Commune Development Strategy), *Europa Regionum, Tom XVI, s. 191 - 199, 2013,*

## PERFORMANCE CHARACTERISTICS OF ACTIVITIES IN PRIORITY 3 OF RURAL DEVELOPMENT PROGRAM 2014-2020

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**Abstract:** The study covered five activities which, according to the European regulations, were included in Priority 3 of RDP 2014-2020. The aim of this priority is improvement in the organization of the food chain, promotion of animal welfare and risk management in agriculture. Most support instruments within the entire priority were pointed to processing and marketing of agricultural products (42.8 %) and to establishing of producer groups and organizations (24.9 %). The planned product indicators in the first case were set at the level of 1.5 thousand beneficiaries, in the second case at the level of 1.8 thousand groups, which will gather 36 thousand farmers. In general, 1619.0 million euros are intended for activities under Priority 3, including 1030.1 million euros from the European Agricultural Fund for Rural Development (EAFRD), or (12.0 %) of the indicative budget of the Rural Development Program (RDP), set at 13.5 billion euros, including 8.6 billion euros from the EAFRD.

**Keywords:** priority, activities, program, support.

**JEL code:** Q18

### Introduction

The process of supporting the organization of the food chain, including the processing and marketing of agricultural products, animal welfare and risk management in agriculture is one of the most important tasks in the Rural Development Program. This phenomenon is important in the conditions of farm fragmentation, which is dominant in the Polish agriculture. The share of the small and medium agricultural producers in modern marketing channels is insignificant due to a small scale of production and the inability to adjust to quality requirements of the customers. The essence of an efficient functioning of the food chain is primarily in strengthening the agri-food processing sector by building integration links between farmers and processors. The farmers are expecting to ensure the certainty of sales and stability of prices of agricultural products. The access to the sale of agricultural products is more advantageous for producers with larger batches of goods, which are more uniform and meet the expectations of processors. For smaller producers, it is planned to organize farmers into groups or teams that will offer competitive products on the market. Due to the necessity to make farmers aware of the need for integration activities and the need for professionalization of the tasks undertaken by them in the fields of product quality and sales, it is essential to implement advisory and training activities in this sphere.

Risk prevention and risk management on farms is an important issue in Poland, especially due to the growing threats, which result from climate change. The intervention will cover farms affected by natural disasters, adverse climatic events and catastrophes. In addition, measures will be taken to protect the farms from adverse weather events in the future.

Generally speaking, in the development strategy for the ten-year period of the European Union - CAP 2020 - it was assumed that future economic growth should be "smart", i.e. based on knowledge and innovation, "sustainable", i.e. in line with the needs of long-term development of the EU and "inclusive", i.e. beneficial for the whole society. Within the framework of rural development, the three strategic objectives related to competitiveness, natural resources and balanced territorial development should be pursued. The long-term goals were interpreted in terms of priorities, six of which were defined in the Regulation on rural development (CAP 2020, 2010).

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The goal of Polish policy in the field of food safety is a broadly understood protection of health and consumer interests. For this purpose, a number of legal standards were implemented in terms of not only the food hygiene control applicable to both farmers, producers, processors and sellers, but also the principles of correct labelling or packaging of food products. All these rules are to ensure compliance with the principle of transparency, that is, to guarantee the safety of food products at every stage of the production and distribution chain.

The main goal of the study was to analyse the Priority 3 of the RDP 2014-2020, which was primarily aimed at improving and creating the food chain, improving animal welfare and risk management in agriculture. Priority 3 is one of the six priorities included in the Rural Development Program. In their research work the authors wanted to characterize the five activities (focus areas) included in the Priority 3 in terms of requirements, expectations, scope of impact, costs and planned product indicators.

In the paper, there were used methods of induction in order to draw general conclusions from individual observations and synthesis with deduction for achievement of output of the known and already proven general theorems. The elaboration is mainly based on the European and national legislation, especially the Rural Development Program 2014-2020.

### **Research results and discussion.**

In the European Union under the current financial perspective (2014-2020), it was assumed that measures (sub-measures) of the RDP should be viewed through the prism of priorities. The priorities have in some ways replaced the thematic axes in the previous rural development Program. The priorities allow for better identification of activities and more effective grouping them in the uniform focus areas. In turn, within the individual priorities, more detailed thematic areas have been distinguished, aiming at finding common features for a given group of activities.

Priority 3 aims to promote agricultural practices conducive to the creation of links between the agricultural sector and the processing of agri-food products and risk management. The implementation of this priority covers the whole range of financial instruments that aim at making agriculture and rural areas safe for the population and food production. At the base of this priority, there is integration of agricultural producers through creation of the food chain and development of the market for agricultural products. The basic goal is to support the competitiveness of the food sector, strengthen the position of producers and their closer link to the market. The process of integrating producers with the food chain will be carried out through quality systems, promotion on local markets and short supply cycles, producer groups and inter-branch organizations. Another goal is to introduce instruments to prevent and eliminate the effects of natural catastrophes (EP and European Council Regulation, 2013).

One of the ways to achieve the goal is, for example, through groups of agricultural producers and producer organizations. Poland belongs to the group of countries whose agriculture is characterized by the lowest level of horizontal integration. Thus, agricultural producer groups and producer organizations are expected to play an increasingly important role in the food supply chain. The advantages of these groups are manifold. The groups improve the bargaining power of their members, create the added value, and allow to take advantage of economies of scale. In addition, the groups reduce the market risk, reduce transaction costs, provide access to resources and strengthen their competitive position through the product innovation and guarantee the food quality and safety. Financial support instruments aim to generate new groups and help them in

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their first period of operation. Groups implementing the commodity production should strive to eliminate intermediaries in agri-food trade and take their positions in the distribution of goods on the market.

In the division of financial instruments under Priority 3, the most attention was paid to the processing and marketing of agricultural products (42.8 %) and the creation of producer groups and organizations (24.9 %). The planned product indicators in the first case were set at around 1.5 thousand beneficiaries, in the second case at the level of 1.8 thousand groups that will gather 36 thousand farmers. Potential recovery and preventive actions in replacement investments will support 4.8 thousand beneficiaries. Support for investments in the processing, marketing or development of agricultural products is intended to provide tangible or intangible investments for processing and marketing of agricultural products at the level of wholesale trade. The support is addressed mainly to micro, small and medium-sized enterprises operating in the processing sector or wholesale trade in agricultural products. Promotional support of local products will cover about 0.4 thousand manufacturers.

In turn, the action related to the quality system of agricultural products and foodstuffs will be implemented through two sub-measures, namely support for the new participants of the quality systems and carrying out the informational and promotional activities. The support is motivational and aims to facilitate production in the new conditions required by a specific quality system, which is to cover about 26 thousand producers (RDP, 2014).

### **Characteristics of specific actions (sub actions) under Priority 3**

#### **1. Processing and marketing of agricultural products**

The processing and marketing of agricultural products plays an essential role in the food chain. The farmer is a supplier of raw materials, which in the further process require adaptation to the needs of consumers. For this reason, the help is granted for tangible or intangible investments regarding the processing and marketing at the level of wholesale trade in agricultural products. The help takes the form of reimbursement of a part of the eligible costs of the operation. The beneficiaries of this activity may be: a natural person; a legal person or an organizational unit without legal personality. Eligible costs include:

- costs of construction, modernization or reconstruction of production or storage buildings and structures constituting the infrastructure of processing plants, necessary to implement investments in the purchase of machinery and equipment or for infrastructure environmental protection;
- purchase costs (including installation) or leasing of machines or devices for processing, storing or preparing products for sale;
- costs of implementing the procedure of the certified quality management systems, fees for patents and licenses;
- general costs, i.e. preparation of technical documentation of the project, preparation of a business plan.

Each activity has specific eligibility conditions. In this sense, aid can be granted if certain requirements are met. First of all, an applicant is able to implement and maintain the planned project, which is verified on the basis of the analysis of economic data related to the current business activity and financial projections included in the business plan. Secondly, an applicant declares that after completion of the operation he will purchase at least 50 % of the total amount

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of raw materials needed for production under long-term (at least 3-year) contracts concluded directly with farmers, producer groups or organizations, unions or associations of organizations of agricultural producers. Aid may be granted for the implementation of operations in plants that meet the applicable hygiene and sanitary, environmental protection and animal welfare standards. Investments assuming the increase of production capacity may be supported provided that the raw material base is documented and the disposal of the planned production is demonstrated. The measure supports investments in the processing sectors: milk, meat, fruit and vegetables, cereals and others (Regulation of the Ministry of Agriculture and Rural Development, 2015).

The rules for determining the selection criteria will include operations concerning, in particular:

- producer groups or producer organizations as well as unions or associations of producer organizations, and cooperatives;
- young farmers, i.e. farmers under 40 years of age;
- applicants purchasing raw materials for production on the basis of long-term contracts concluded directly with agricultural producers, at a level exceeding 50 % of the total quantity of the purchased agricultural products;
- innovation, environmental protection, and counteraction of climate change.

The level of aid, which may amount to 50 % of the investment eligible for support, is important.

The maximum amount of aid under the sub-measure granted during the Program implementation period to one beneficiary is 3 million zlotys, and in the case of associations of agricultural producer groups or associations of producer organizations, it amounts to 15 million zlotys. The minimum amount of aid granted for one operation is 100 thousand zlotys.

Table 1.

**Number of applications submitted and amount applied for processing and marketing of agricultural products (2015)**

Provinces	Number of applications submitted	Amount applied for (in thousands of zlotys)
Lower Silesia	30	61 663.2
Kujawy-Pomerania	61	92 456.1
Lublin	79	153 423.6
Lubuskie	24	51 255.4
Lodz Province	74	116 213.9
Malopolska	47	70 544.4
Mazovia	115	210 352.2
Opole Province	18	33 913.1
Podkarpacie	17	26 059.1
Podlasie	18	32 673.6
Pomerania	44	93 505.4
Silesia	45	86 133.5
Swietokrzyskie	32	50 427.4
Warmia-Mazuria	42	76 260.8
Wielkopolska	154	262 952.7
West Pomerania	34	72 732.8
<b>Total</b>	<b>834</b>	<b>1 439 311.8</b>

Source: Management Information System of Agency for Restructuring and Modernisation of Agriculture

Based on the Regulation of Ministry of Agriculture and Rural Development of 2015, the Agency for Restructuring and Modernization of Agriculture collected applications of the future beneficiaries. Applications were submitted by 834 beneficiaries, the largest number in Wielkopolska (154),

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Mazovia (115), Lublin (79), and Kujawy-Pomerania (61) provinces. The four mentioned provinces, constituting 25 % of all local governments, participate numerically at the level of 46 %. The claimed amount equals 1.4 billion zlotys.

Details are presented in Table 1.

## **2. Restoration of agricultural production potential damaged by natural disasters and calamities and implementation of appropriate preventive measures**

As a result of deepening climate changes, agriculture is more and more often exposed to natural disasters in the form of hurricanes, hail, drought, excessive floods and other unpredictable phenomena. The size of a natural disaster cannot always be eliminated under usual insurance, therefore this measure was already introduced in the previous financial perspective. The action takes the form of material or non-material help allowing for the reproduction of agricultural production potential. The aid is intended to reconstruct those components of the farm's production potential that have been damaged or destroyed as a result of the above-mentioned events. The aid takes the form of reimbursement of a part of the eligible costs of the operation, the beneficiary being a farmer (RDP, 2014).

When thinking over the aid, it is important to determine the eligible costs. Eligible costs cover, among others: construction, reconstruction, renovation or modernization of buildings; purchase or construction of elements for technical infrastructure as well as costs usually linked to expenses, including costs of preparation of technical operational documentation of and purchase of livestock included in the basic herd. Aid is provided only if the investment is economically justified and it is not possible without the usage of public funds. The level of support is 80 % of the eligible costs of an operation. The amount of aid may not exceed the value of damage caused by the relevant production potential on a holding. The maximum amount of aid granted to one beneficiary and per one agricultural holding may not exceed 300 thousand zlotys. The aid is granted for the operation with a planned amount of eligible costs of at least 20 thousand zlotys (RDP, 2014). Until the end of 2016, the executive regulations of the minister competent for agriculture did not appear, which did not allow the Agency for Restructuring and Modernization of Agriculture (ARMA) to start the call for applications.

## **3. Investments in marketplaces or construction objects intended for promotion of local products**

According to the Rural Development Program (2014-2020), the construction and modernization of commercial infrastructure is aimed at creating places where farmers will be able to sell products produced on farms. Investments in marketplaces aim to shorten the food chain and increase the share of farmers in the added value. Construction or modernization of marketplaces is to facilitate the distribution of agricultural products. The action should contribute to better integration of the main producers into the food chain through quality schemes, promotion on local markets and short supply cycles implemented mainly by producer groups and producer organizations. Due to the nature of the operation, communes, administrative districts or their associations will be its beneficiaries. Therefore, eligible costs include the costs of construction, reconstruction or modernization of construction objects, purchase costs of materials and services for the implementation of operations, and general costs directly related to the preparation and implementation of operations (RDP, 2014).

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The aid takes the form of reimbursement of a part of eligible costs of the operation. The amount of the EAFRD aid may not exceed 1 million zlotys per beneficiary during the Program implementation. The aid will be granted if the operation is carried out in a city with no more than 200 thousand inhabitants, which will be coherent with the commune planning document or the local development strategy of the commune and will also be implemented on the property belonging to the applicant (RDP, 2014). Until the end of 2016, the executive regulations of the minister competent for agriculture did not appear, which did not allow ARMA to start the call for applications.

#### **4. Creation of producer groups and organisations in agricultural sector**

Instruments of financial support are launched to facilitate the creation of producer groups and organizations in the agricultural sector and are set out in the RDP 2014-2020. The state was given the opportunity to give priority to producer groups and organizations of high quality products covered by the action on the quality systems of agricultural products and foodstuffs. The above proceedings result from the limited financial resources. Groups must become profitable entities and therefore they should operate on the basis of business plans that are a condition for granting support (RDP, 2014).

The growing requirements of the consumers of agricultural raw materials and the need for horizontal integration is a harbinger of changes that encourage farmers to create groups and organizations of farmers' producers. There appear new social, economic or organizational arguments for generating new forms of cooperation.

From the point of view of agricultural producers, participation in the group of producers means for them stabilizing the sales of products, increasing the profitability of production. As part of a producer group or organization, there appears the possibility of joint planning and organizing the production so that it can ensure its appropriate size and quality.

Further benefits appear in the joint preparation of products for sale by storage and transportation. The groups should establish trade contacts and negotiate the terms of sale themselves and not through intermediaries. Members of the group must be aware that group action strengthens the position of agricultural producers in the food chain and is conducive to increasing their share in the added value. Cooperation with a group of producers is also beneficial for the consumers of the raw materials due to the possibility of ensuring regular supplies and adaptation of their size to the adequate and equal quality of the raw materials.

In this way, the food chain is shortened. The groups are part of a larger Program related to improving the competitiveness of agricultural producers through better integration with the agri-food chain, improvement of the quality systems and creation of the added value. Another feature of these groups is promotion of goods on local markets by producers' and inter-branch organizations. Additionally, groups of producers through the introduction of new solutions in the scope of production and marketing organization as well as production technologies can contribute to increasing the innovation of the agricultural sector. There is no doubt that the implementation of the measure should also be part of the climate and environmental objectives (RDP, 2014).

Preferences regarding access to support for groups and organizations are foreseen. The support will be granted to producers who grow plants for energy purposes or for technical use, and in the category of organic farming products. It is not envisaged to grant support for the creation of groups that carry out production in the field of live poultry, meat and edible offal. The creation of a

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group of agricultural producers should allow proper management of supply issues in the context of limiting the negative impact on the environment, including post-production waste. In addition, the funds should be intended for joint purchases, enabling team-based and thus more efficient use of machinery and equipment (RDP, 2014)

Financial assistance instruments have been changed. At present, support will be provided in the amount calculated as a percentage of the lump sum on the net income from the sale of products of the group. Revenues must be generated on the farms of its members and the amount will be analysed in particular years. The aid is granted for the first five years of the group's functioning from the date of its registration. An additional requirement is that the group should be a small or medium enterprise (SME).

The maximum amount of aid may amount to 100 thousand euros in the first year, the support is 10 % of the amount, 8 % in the second and it decreases by another 2 % in subsequent years. The payment of the last installment of support will take place after confirming the correct implementation of the business plan, which is a new requirement in the current financial perspective. The business plan should include, in particular, the group's basic goals, a coherent concept of action and stages of group development. The business plan should describe the process of adapting the group to market requirements, the method of jointly launching goods to the market, and the preparation of the centralization of sales and delivery to wholesale customers. The new task is to establish common rules on production information with particular emphasis on data sets and availability of goods (RDP, 2014).

Assuming that groups are created solely and exclusively on the basis of financial support instruments, it is worth investigating the amount of assistance provided in the certain programming periods. In the first period of RDP (2004-2006), the EAFRD funds amounted to 139 million euros, which accounted for 05 % of the total budget. Based on these funds, 100 groups were organized. In the next financial perspective, covering the 7-year programming period, 1.400 million euros was allocated for the creation of groups of agricultural producers, as a result of which 39 thousand groups were organized. In the period under discussion, the rate of group establishment varied. At first, the process proceeded with moderate interest. Only when the possibility of allocating part of the funds for investments (2012) and not only for administrative activity was allowed, it attracted more farmers willing to cooperate.

## **5. Quality system of agricultural products and foodstuffs**

Among consumers, the expectations of food produced under quality systems are growing. They are based on specific and checked standards guaranteeing the product a unique quality. Joining the system is therefore an opportunity for the development of farms and strengthening cooperation in the food chain. Participation in such activities is associated with higher production costs, which is why it seems important to help all those interested in running this type of activity. The aim of the measure is to encourage agricultural producers to process and market the agricultural products with proven standards promoting animal welfare and risk management in agriculture, with particular emphasis on better integration of agricultural producers into the agri-food chain through the quality systems.

An additional goal is promotion on local markets and short supply cycles, support of producer groups and organizations and inter-branch organizations during this period. One should be aware that in order to distinguish and better protect the culinary heritage and the common achievements

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of generations, which are the best, and the unique traditional and regional products around the world, the European Union introduced a special system of certifying and marking these products. Thanks to the labelling of products, consumers have clear and reliable information about their exceptional quality and originality, and it gives the producers the opportunity to promote them and it enables protection against unfair competition and falsification of their products. Joining the quality system is connected with the farmer incurring additional costs resulting from the need to introduce necessary changes in the farm and subjecting it to the necessary controls in accordance with the specific system standards. Support is motivational and aims to facilitate production in the new conditions required by a specific quality system.

The measure - "quality systems for agricultural products and foodstuffs" will be implemented through two sub-measures:

- 1) support for new participants of quality systems that aims to increase farmers' participation in the EU and national quality systems;
- 2) support for informational and promotional activities including support for actions in the field of information and promotion of high-quality products undertaken by participants of quality systems, i.e. by promotional teams consisting of at least two producers.

Beneficiaries are economically active farmers. The amount of support is 2 thousand euros per year per farm for participation in the national and EU food quality systems. The aid takes the form of a refund within 3 years after joining the quality system.

Eligible costs include costs incurred in joining the quality system and an annual contribution for participation in the system. Eligible costs include expenses related to the control of compliance with the requirements of the system. The aid was granted to an applicant who manufactured agricultural products or foodstuffs for human consumption under the quality scheme, also in the previous financial perspective. The selection criteria take into account, in particular, the size of the land area on which an applicant produces production of high quality. Preferences in granting aid will apply to farms up to 5 ha, for which the fixed costs resulting from participation in the quality systems constitute a high financial burden. Support for carrying out informational and promotional activities aims at increasing the recognition of products covered by the quality systems. In turn, additional expenditures are required for recognition.

In Poland, there is still a low level of knowledge regarding the functioning of the EU and national quality systems under which high-quality products are produced. As a result, there is still a low demand for this type of products. The purpose of such support is to provide consumers with information about high-quality products and to pay attention to their advantages, which in turn should lead to an increase in demand. For producers, the possibility of obtaining additional financial aid means an incentive to increase the scale of production or to start to produce it. Higher demand for this type of production may positively affect the activation of rural residents and increase employment in these areas. The beneficiary is an entity called the "promotional team", created by at least two producers producing agricultural products or foodstuffs within the quality systems. The amount of support is 70 % of the eligible costs for carrying out informational and promotional activities.

In 2016, the beneficiaries submitted 1186 applications, of which over 738 (62.2 %) were positively verified. The amount of support was set at 59 million zlotys. The data concerning the provinces are presented in Table 2.

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Table 2.

**Number of applications submitted and amount of issued decisions in the field of production quality system (2016)**

Provinces	Number of applications submitted	Quantity of issued decisions	Amount of decisions issued (in thousands of zlotys)
Lower Silesia	28	7	54.6
Kujawy-Pomerania	62	38	260.8
Lublin	72	34	290.7
Lubuskie	19	4	32.2
Lodz Province	64	40	304.5
Malopolska	20	13	112.2
Mazovia	458	350	2 874.3
Opole Province	8	2	18.0
Podkarpacie	51	14	124.3
Podlasie	34	19	165.7
Pomerania	12	2	173
Silesia	11	0	0.00
Swietokrzyskie	115	87	722.8
Warmia-Mazuria	97	47	326.7
Wielkopolska	94	64	428.4
West Pomerania	41	17	150.4
<b>Total</b>	<b>1 186</b>	<b>738</b>	<b>5882.9</b>

Most beneficiaries submitted their applications in Mazovia, (458) Swietokrzyskie (115) and Warmia-Mazuria (97) provinces.  
**Source: Management Information System of Agency for Restructuring and Modernisation of Agriculture**

**Conclusions**

- 1) The European Union has identified six priorities for rural development. They were divided into 18 focus areas in order to better and more precisely define each priority and to facilitate the programming process.
- 2) The Rural Development Program sought to identify the specific policy objectives for each thematic area. The discussed Priority 3 related to the creation of the food chain and risk management was based on five activities (sub-measures). They were connected by the main objective linked thematically to the areas of impact.
- 3) By the end of 2016, two activities were launched in the amount of 1444.3 million zlotys, which, taking into account the exchange rate of EUR to PLN at 4.32 (according to the European Central Bank), equals 334.3 million euros, or 20.4 % of the indicative budget within the discussed priority.
- 4) Incomplete launch of all activities was partly due to the process of settling the European funds. The system of financing the EU projects requires that the national budget first put out the money, and only after the end of the activity makes the settlement.
- 5) Every year, the European Union sets annual (partial) budgets, which together should take the shape of a 7-year financial perspective. The late launching of the actions specified in the Program for the years 2014-2020 resulted from the difficulty of settling the measures contained in the Multiannual Financial Framework 2007-2013 (the R + 2 rule) and reorganization factors in the agricultural sector and paying agencies.

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## BIBLIOGRAPHY

1. CAP 2020: Meet the Future Challenges of Food-related Natural Resources and Territorial Aspects. European Commission (2010), Brussels, p. 481
2. *Program Rozwoju Obszarow Wiejskich w 2015 (Rural Development Program for 2015)*. Ministry of Agriculture and Rural Development (2015). Warsaw, p. 265
3. *Regulation EP (EC) No 1305/2013 of 17 December 2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) repealing Regulation of the Council of the European Union No 1698/2005*. (2013). Brussels, p. 161
4. *Regulation of the European Parliament and of the Council of Europe (EU) No R 1151/2012 of 21 November 2012 on quality schemes for agricultural products and foodstuffs*. (2013). Brussels, p. 161
5. *Regulation of the Minister of Agriculture and Rural Development of 5 October 2015 on detailed conditions and procedure for granting and payment of financial aid under the sub-measure "Support for investment in agricultural products, their processing or development" covered by the Rural Development Program for 2014-2020*. Ministry of Agriculture and Rural Development (2015). Warsaw, p. 321
6. *Regulation of the Minister of Agriculture and Rural Development of 7 July 2016 on detailed conditions and procedure for granting and payment of financial aid under the sub-measure "Support for information and promotion activities carried out by producer groups on the internal market" covered by the Rural Development Program for 2014- 2020*. Ministry of Agriculture and Rural Development (2016). Warsaw, p. 194

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## CONDITIONS OF DEVELOPMENT OF ARABLE LAND BELONGING TO STATE TREASURY IN WARMINSKO-MAZURSKIE REGION

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**Abstract.** The paper undertakes to investigate the issue of factors determining utilization and development of arable land belonging to the Treasury Agricultural Property Stock in Warminsko-Mazurskie region. The objective of the paper is to identify factors affecting operation and development of agricultural holdings using lands purchased or leased from the Treasury Agricultural Property Stock. The assessment was made based on opinions of purchasers and lessees of agricultural real estate belonging to the State Treasury in Warminsko-Mazurskie region. In the research, an opinion survey method is used, realized through questionnaire technique. The research sample included 179 people, ca. 70.9 % questionnaires were returned. 119 questionnaires were qualified for further analysis. The description of data was conducted using descriptive statistics methods as well as Kruskal-Wallis tests for selected variables.

According to conducted research, market factors focusing on cost and demand, namely unstable prices of agricultural products and high prices of agricultural means of production, are of crucial significance to functioning and development of analysed farms. Large impact is also that of factors focused on resources, particularly acreage and quality of arable lands as well as available machinery. In opinion of respondents, an important development barrier is also limited access to external sources of financing, particularly credits, and complexity of application procedures for subsidies from the European Union. In case of deterioration of financial and economic situation, majority of respondents would reduce expenditures and attempt to obtain support in form of short-term loan. Importantly, virtually nobody would consider selling land.

**Key words:** conditions of management, farmers, arable land, State Treasury.

**JEL code:** Q12, Q15

### Introduction

Until the end of September 2017, the 25-years long process of ownership transformations in Poland was conducted by Agricultural Property Agency, a state legal entity and legal successor of Agriculture Property Agency of the State Treasury, created based on the Act of 19 October 1991 on Management of Agricultural Property Stock of the Treasury (The Act..., 1991). The Agency operated as fiduciary institution, ordered by the State Treasury to execute ownership rights and other rights in rem pertaining public property in agriculture. The Agency performed activities previously pertinent to Agriculture Property Agency of the State Treasury with respect to regulations included in the Act on Shaping of the Agricultural System of April 11, 2003 (The Act..., 2003). Article 1 of this Act determines rules of shaping the agricultural system in the country in order to improve spatial structure of agricultural holdings, prevent excessive concentration of agricultural real estate and promote conducting agricultural activities by people with proper qualifications. As a result of nationwide operation, Treasury Agricultural Property Stock acquired a total of ca. 4.74 million ha, including lands from 1666 state-owned agricultural holdings, which constituted 79.4 % (3.76 million ha), whereas other lands came from State Land Fund (12.7 %) and from other entitlements (7.9 %) (Banski J., 2011; Mickiewicz B., 2013; Sadowski A., 2014; Takacs-Gyorgy K., 2010). The process of acquiring was practically finished in 1995 (Mickiewicz A., Mickiewicz B., 2013; Sadowski A., Takacs-György K., 2005). Participation of public sector in use of land and therefore in agricultural production showed high territorial diversification (Banski J., 2014; Dzun W., 2015). Largest share of state ownership in agriculture was present in northern and north-western part of Poland, where, in 7 voivodeships, Treasury Agricultural Property Stock acquired 3.71 million ha,

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78.5 % of total (Report..., 2017). One of the voivodeships with largest share of public ownership in agriculture of Warmińsko-Mazurskie, in which TAPS acquired 820.6 thousand ha, which constituted 17.3 % of nationwide acquisitions (Report..., 2017). In consequence, scale of issue and result of ownership transformations in public sector agriculture also vary between regions (Przygodzka R., Mioduszewski J., 2016). In the end of 2016, Treasury Agricultural Property Stock contained ca. 1.4 million ha (29.2 %), 73.8 % (1.02 million ha) of which was leased. At the same time, the treasury stock in Warmińsko-Mazurskie Voivodeship permanently distributed 662.0 thousand ha, 81.9 % of which through sale, while out of remaining 152.2 thousand ha, majority is being leased (118.1 thousand ha) (Report..., 2017).

Multiple issues occurred in regions dominated by state ownership prior to 1989 due to privatisation of state agricultural holdings. Because of these issues, monitoring of structural changes in agriculture and economic condition of farms still has both cognitive and application significance (Koloszko-Chomentowska Z., Sieczko L., 2014; Kowalski A., Rembisz W., 2005; Zietara W., 2013; Mioduszewski J., Niedzielski E., 2012; Rynek..., 2014). Hence, the objective of conducted research was to identify factors affecting functioning and development of agricultural holdings using lands purchased or leased from Treasury Agricultural Property Stock. Achieving this goal should provide an answer to the question, which factors stimulate and which hinder management of agricultural real estate coming from Treasury Agricultural Property Stock. Performing the research following tasks enabled the accomplishment of the purpose: studies of the literature, analysis of legal acts, the assembly and analysis of statistical data, gathering opinions of lessees and buyers of agricultural real estate in Warmińsko-Mazurskie region and processing and analysis of achieved results.

The scope of the research included external determinants (barriers) resulting from macro-environment, such as: formal (legal), economic (real estate prices, profitability of production), political (objectives of agricultural policy) and barriers coming from microenvironment. In the research, an opinion survey method was used, realized through questionnaire technique and conducted in second half of 2016. The questionnaire was sent to 179 lessees and buyers of State Treasury real estate, whereas 127 respondents (70.9 %) decided to answer and return the surveys back. Out of these, 119 questionnaires (66.4 %) were filled completely and correctly. In order to obtain answers to raised research questions, statistical analyses were performed using IBM SPSS Statistics 24. Using these tools, descriptive statistics analyses were conducted as well as Kruskal-Wallis tests for selected variables. Statistical significance value for this paper was set to typical  $p < 0.05$ . Results with  $p$  in range between 0.05 and 0.1 were considered as results close to statistical significance (statistical trend level). In the first step, basic descriptive statistics were calculated for analysed quantitative variables together with Kolmogorov-Smirnov test which indicated that distribution of all analysed variables is entirely different from normal distribution. Hence, analysis utilizing non-parametric tests was necessary. Analysed agricultural holdings were divided into three sets. First set contained farms with acreage of less than 50 ha, second, holdings between 50 and 100 ha and third covered holdings with over 100 ha of land. Descriptive statistics methodology was used for analysis and assessment of results of the survey, statistical data from Agricultural Property Agency (ANR) and yearbooks for agriculture and rural areas published by Central Statistical Office (GUS).

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## Research results and discussion

Among the 119 respondents, vast majority (99.2 %) managed the farm themselves, whereas in one holding a person was employed for management. The respondents were dominated by young people with two thirds not exceeding 50 years of age. The largest group (29.4 %) were people in age range of 41-50 years and 27.7 % of them were in age of 51-60 %. More than one in five people (23.5 %) were in age range of 31-40 years. Relatively small group was that of people over 60 years old (6.7 %). For the purpose of analysis and assessment, statistical data was considered in division (grouping) according to spatial groups and in general. In general, respondents were managing a total of 10.1 thousand ha (arable lands constituted 91.2 %) located in 19 powiats (LAU 1 equivalents) in Warminsko-Mazurskie region. Apart from the privately-owned land, the structure of ownership and use is dominated by arable lands from Treasury Agricultural Property Stock, which constituted 41.6 % (ca 5.5 thousand ha) of total. Almost half of it (2.7 thousand ha) were repurchased, 16.7 % came from private owners,  $\frac{3}{4}$  of which (ca 1.1 thousand ha) was purchased and the rest was used based on lease agreements with their owners. Analysis of working experience in agriculture indicates that respondents have many years of experience and good background for managing agricultural holdings. Vast majority of respondents (99.2 %) obtained the experience while working in their own holding, whereas 1 in 18 had also been employed in state agricultural holding and every third respondent also worked on other farm. Therefore, a conclusion can be made that opinions obtained from the respondents are reliable.

The aim of conducted research was, among others, to identify factors stimulating and hindering functioning and development of agricultural holdings using arable lands belonging to the State Treasury. Significance of each individual factor was assessed by respondents on 5-point scale, where 5 points indicated high significance of given factor to functioning and development of farms, whereas 1 point marked an insignificant factor. According to the respondents, the most significant factors were those with impact on efficiency of the holding with reflection in the profitability of agricultural production shaped mostly by unstable prices of products (4.4), costs of agricultural production (4.3), prices of means of production (4.2) and demand for products made in the holding (4.0). Great significance to management of farm is also indicated for resource factors, such as: size of the agricultural holding (acreage of arable land – 4.3), possession of proper machinery (4.2), quality of available land (4.0). Relatively significant are also such factors as geographic location of the farm and climate conditions in given region (3.7), which determine level of costs and capability of obtaining sufficient income dependent on level of production (yields) and options of sale. Financial barrier referring to accessibility of investment capital also has great impact on development of agricultural holdings. This barrier may result from number of procedural requirements for obtaining subsidies from European Union (3.7) (this problem is pointing also by Wigier M., 2011), formal and legal requirements for obtaining credits (3.5) and debt service costs coming from, among others, general level of debt (3.3). Such perception of financial situation of agricultural holdings is affected by formal and legal regulations pertaining purchasing (3.5) and leasing of agricultural real estate (3.2), which, in turn, determine levels of payments for acquired land (3.6) and level of rents for agricultural real estate (3.6), levels of payments for other acquired property (buildings, constructions and other objects – 3.4) as well as required public burdens (e.g. land tax – 3.2). This is a result of a fact that respondents rarely use hired labour force and employ few permanent and seasonal workers. This, however, may have a great significance from

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the intensification of production point of view. One of the reasons for low level of employment may also be high costs of employing and maintaining workers, particularly due to seasonal character of work in agriculture as well as small number of people with proper qualifications and motivation for work (Krzyzanowski J., 2014; Kowalski A., 2011). Much smaller significance is that of insurance of property (2.9) and social security fees (2.7), mostly due to relatively low level of such services.

In the next step, analysis was conducted on whether size of agricultural holding has influence on different perception of factors affecting its functioning and development. Twenty-two factors described above were taken into account. Kruskal-Wallis test was conducted for each factor (respondents were to assess strength of each factor on 5-point scale, where 1 is lowest influence and 5 is highest), which indicated differences exist between three compared sets of agricultural holdings in terms of assessed influence of two factors, namely size of the farm (acreage of arable land) and taxation (land tax). Following results were obtained:

- Kruskal-Wallis test for farm size factor -  $\chi^2(2)=6.576$ ,  $p=0.037$ , average rank for set 1=68.24; average rank for set 2=51.26; average rank for set 3=57.63;
- Kruskal-Wallis test for taxation level factor -  $\chi^2(2)=7.600$ ,  $p=0.022$ , average rank for set 1=67.95; average rank for set 2=59.96; average rank for set 3=46.80;.

Additionally, for both factors comparison in pairs was conducted in order to determine exactly between which sets statistical differences exist. Obtained results indicate that differences in case of farm size factor occur between sets of smallest holdings and those with acreage within range of 50-100 ha (statistical significance was adjusted using Bonferroni correction). For the former, average influence of this factor was 4.48, whereas for the latter this value was 4.05. In case of factor of land tax levels, statistically significant differences occurred between the smallest and the largest holdings. Respondents managing the largest farms rarely indicated greater significance of this factor for functioning and operation of agricultural holdings (average of 2.77, as compared to 3.44 in set of farms smaller than 50 ha). Conducted analysis shows, that size of agricultural holding affected perception of influence of these two factors, i.e. size of farm (acreage of arable land) and levels of taxation (land tax), on functioning and development of agricultural holdings. In case of other 20 factors, their perception was statistically independent from the size of agricultural holding. Assessments of individual factors made by respondents from various groups are similar. The most important factor influencing functioning and development of conducted agricultural operation in case of holdings below 50 ha in total acreage was production profitability, a derivative of costs of agricultural production, unstable prices of products and scale of production resulting from the size of the farm, which gives very little possibilities of modifying production profile. In case of holdings with over 100 ha of arable lands, the most important factor determining functioning and development of agricultural holdings is scale of production resulting from the size of farm (acreage of arable lands), although soil quality, unstable prices and available machinery are also of significance. In case of holdings in range between 50 and 100 ha, the greatest significance is attached to profitability of agricultural production resulting from unstable prices of products and production costs.

Another analysed issue was respondents' behaviour and their potential decisions and actions pertaining acquired agricultural real estate in case when their holdings would find itself in difficult financial situation. Respondents had opportunity of selecting up to three options out of twelve provided. Respondents indicated that primarily they would take actions that do not require

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significant expenses or actions limiting production potential of the agricultural holding. In their opinion, they would use external sources of financing and attempt to solve the difficult situation by taking a bank credit (57.1 % responses). According to the respondents, the credit would allow for a relatively quick solution to a difficult situation and additional "time" would let them take further actions aimed at improvement of economic situation. Subsequent action that would be taken by the respondents are rationalization of personal budget by limiting personal expenses (54.6 %) and legal actions, within which they would ask for extension on payments of their existing obligations, gaining time to take necessary steps towards the solution. Frequently selected option was also utilizing possibility of a loan from family or friends. Should the aforementioned solution not bring improvement of the situation, the respondents would reduce size of production by selling necessary stock (30.3 %) and part of animal production (21.0 %). Less popular solution was sale of part of owned land (15.1 %) and action towards changing the profile of production (8.4 %). A few respondents suggested readiness to return acquired fixed or working assets to owners/contractors (6.7 %) or sell some of the machinery. Only 2.5 % of respondents indicated that one of possible solutions would be finding a business partner in possession of necessary funds or loan from non-bank institutions.

The subsequent step in analysis was determination whether statistical correlation exists between size of agricultural holding and action potentially taken by their owners in case of difficulties with liquidity. Twelve factors were taken into account. Kruskal-Wallis test indicates that perception of such preventive measures as loan from family and friends ( $\chi^2(2)=11.394$ ,  $p=0.003$ , average rank for set 1 =67.01, for set 2 = 63.01, for set 3= 44.40), extension on credit payments ( $\chi^2(2)=11.783$ ,  $p=0.003$ , average rank for set 1 =55.49, for set 2 = 53.38, for set 3= 76.12) and change of production profile ( $\chi^2(2)=6.985$ ,  $p=0.030$ , average rank for set 1 =64.52, for set 2 = 58.05, for set 3= 55.00) were perceived differently in three analysed sets of respondents. In case of financial problems, smallest holdings owners were more likely to use financial support from family than owners of medium holdings and much more likely than owners of largest farms. Similar observations can be made in case of change of production profile factor. Small holding would consider changing profile of production if facing financial difficulties. In turn, largest holdings attached much greater importance to factor referring to possibility of extension on their credit payments. In case of smallest and medium farms, this factor was considered much less important. Perception of remaining 9 factors was similar in all three sets of holdings.

Significant change in circulation of agricultural real estate was started by adoption of Act on Shaping of the Agricultural System of 5 August 2015 (The Act..., 2015), which introduced limitations aiming at preventing purchasing land by foreigners after the end of 12-years protection period in 2016, as well as speculating on market of agricultural land. The justification of new regulation was conviction that Polish arable lands will become objects of interest for buyers from other European Union countries, particularly those, where prices are higher and circulation is regulated by the state (Przygodzka R., Mioduszewski J., 2016). As an effect of changing management policy of Treasury Agricultural Property Stock, Act on Ceasing Sale of Properties belonging to Treasury Agricultural Property Stock was introduced and adopted on 30 April 2016 (The Act..., 2016). Basing on this act, sale of agricultural lands from TAPS with acreage over 2 ha was stopped in general and the basic form of management became leasing. Selling larger areas requires obtaining proper permissions.

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Opinion survey conducted among the owners of agricultural holdings indicates that primary phenomenon occurring on the market will be greater difficulties in both selling and buying of agricultural lands (76.5 %), which will in turn lead to reduction of number of people willing to purchase land (63.9 %). According to over half of respondents (50.4 %), limited opportunities of investing in land and treating it as capital investment will result in decrease of prices of agricultural lands. In their assessments, one out of three respondents (35.3 %) suggested this may lead to significant increase in popularity of leasing as a form of management, since role of the Agency will include special supervision of trade of agricultural land, both public and private. One third of the respondents suggested this may lead to slowdown in changes in agrarian structure, whereas every tenth argued this will accelerate these changes. According to 1/3 of respondents, introduction of these regulations will result in increase of rents and according to 17 % - decreased thereof. Paradoxically, all of them may be right, since any changes will stem from situation on the market and demand-supply relations in individual regions. According to 1/5 of respondents, introduction of limitations in land trade will enforce stricter control of sources of financing for the acquisition of land and will indirectly affect profitability of agricultural production.

Subsequently analysed issue was whether size of agricultural holding affects perception of consequences of introduction of Act on Shaping of the Agricultural System. Results obtained by consideration of twelve factors in Kruskal-Wallis test indicate that perception of consequences of the aforementioned act was similar regardless of the size of agricultural holding with exception of two factors. These exceptions were increase in difficulties in buying and selling of agricultural land ( $\chi^2(2)=6.243$ ,  $p=0.044$ , average rank for set 1 =53.77, for set 2 = 61.79, for set 3= 68.05), which in case of holdings with over 100 ha of land were selected notably more frequently than in case of smallest farms, and issue of slowdown of changes in agrarian structure. Kruskal-Wallis test ( $\chi^2(2)=7.678$ ,  $p=0.022$ , average rank for set 1 =51.71, for set 2 = 65.41, for set 3= 66.78), indicates that largest holdings selected this consequence much more frequently in comparison to the smallest farms. The remaining ten consequences of introducing this act were perceived similarly regardless of size of the holding.

### **Conclusions, proposals, recommendations**

Over 25 years of activities pertaining utilization of property previously belonging to state agricultural holdings as well as public land coming from other sources significantly reduced share of public property in agriculture, leading to strengthening of position of privately-owned farms. Research results presented in this paper depict opinions of buyers and lessees of agricultural property belonging to the State Treasury. These results allow to formulate the following conclusions.

- 1) According to opinions of the respondents, large interest is being taken in utilization and development of agricultural property belonging not only to the State Treasury, but also to the private owners. Analysed agricultural holdings covered a total of 10.1 thousand ha with 91.2 % of that in arable lands. In structure of land, the largest share was that of purchased land (41.6 %), 29.7 % of which was bought from Treasury Agricultural Property Stock, whereas share of leased land was 34.7 %, 29.9 % of which was leased from TAPS. This indicates that significant part of land came from private market.
- 2) Factors, that respondents considered important to efficiency of functioning, were primarily unstable prices of agricultural products, high costs of production, prices of means of production

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and demand for goods produced in the holding. Large impact is also carried by factors pertaining to available resources, such as size of the holding (acreage of arable land), possession of proper machinery and quality of soil.

- 3) Financial barrier, resulting from availability of capital required for development, i.e. subsidies and grants from European Union and formal requirements for obtaining credits as well as costs of debt service, is also considered very significant.
- 4) Decisions and actions taken in reference to acquired agricultural properties in case of economic and financial difficulties would be primarily focused on activities not requiring significant expenses. In opinion of the respondents, most beneficial solution would be to obtain a short-term, external source of financing, e.g. a credit. Respondents indicate that such credit would allow for relatively quick solution of current difficulties, and additional "time" would allow them to implement further actions aimed at improvement of their financial situation, such as rationalization of budget, application for extension on payments on existing debts or loan from family and friends. Should such measures prove insufficient to improve financial situation, respondents would reduce size of their production by selling essential stock and some of animal production. Less popular action would be sale of part of owned land and activities aimed at changing the profile of production.
- 5) In their assessment of changes in legal regulations shaping agricultural system in Poland, respondents indicated denoted dangers stemming from limitations placed on land circulation and increased control. According to almost a half of respondents, the prices of land will decrease, however, due to increased interest in leasing, rents will rise, thus reducing the profitability of production.
- 6) In general, opinions of respondents on analysed issues were very similar, regardless of size of agricultural holdings owned or managed by them.
- 7) Conducted research indicate that from among the factors affecting functioning and development of agricultural holdings utilizing land purchased or leased from Treasury Agricultural Property Stock, the largest importance is attached to those pertaining to the market, particularly prices of agricultural products and prices of agricultural means of production. According to the majority of the respondents, accessibility of external sources of financing is also essential. One important aspect should also be taken into account, namely, both purchased and leased land is for many farmers a specific form of capital investment. This is furthermore attested by the fact that, although respondents suggested various courses of action in case of financial difficulties, in general they did not declare willingness to sell acquired land. Hence, conclusion can be made that essence of farmers' activities is rational management of available resources in order to achieve profitable production. To this end, introducing temporary limitations on circulation of agricultural land is not beneficial. On one hand, these limitations affect farmers' discretion in matters of shaping the size of their holding and scale of production and, on the other, increase uncertainty pertaining future solutions in terms of agricultural land trade resulting from agricultural policy.

## **Bibliography**

1. Banski, J. (2011). Changes in Agricultural Land Ownership in Poland in the Period of the Market Economy. *Agricultural Economics*, Vol. 57, No 2, pp. 93-101. Retrieved: <http://www.agriculturejournals.cz/publicFiles/20110235544.pdf>. Access: 31.01.2018.

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3. Banski, J. (2014). Structure and Ownership of Agricultural Land in Poland in the First Years of New Millennium. *Journal of Agricultural Science and Technology B*, No 4, pp. 85-93.
4. Dzun, W. (2015). Corporate Farms in Poland During the Process of Transformation and UE Integration. Polish Academy of Sciences Institute of Rural and Agricultural Development, Warsaw, pp. 139-141.
5. Kołoszko-Chomentowska, Z., Sieczko, L. (2014). Gospodarstwo rolne jako podmiot w gospodarce narodowej (The Agricultural Farm as the Subject in the National Economy). *Economics and Management* 2014, no 1, pp. 97-111.
6. Kowalski, A. (2011). Conditions of the Development and Global Challenges for the Agrifood Sector in Poland, and European Union Food Sector after the Last Enlargements – Conclusion for the Future CAP. No 6.1, Warsaw: IERiGZ-PIB, pp. 9-29.
7. Kowalski, A., Rembisz W. (2005). Rynek rolny i interwencjonizm a efektywnosc i sprawiedliwosc spoleczna (The Agricultural Market and the Interventionism versus the Effectiveness and the Social Justice). Warszawa: IERiGZ-PIB, pp. 1-182.
8. Krzyzanowski, J. (2014). Przyszlosc rolnictwa, gospodarki zywnosciowej i obszarow wiejskich (Future of Farming, Food Economy and Rural Areas) In: Drejerska, N. (ed.) *Rolnictwo, gospodarka zywnosciowa, obszary wiejskie – 10 lat w Unii Europejskiej (The Farming, Food Economy, Rural Areas - 10 years in the European Union)*. Warszawa: Wydawnictwo SGGW.
9. Mickiewicz, A., Mickiewicz, B. (2013). Kierunki ewolucji struktury agrarnej w swietle spisow rolnych 2002 i 2010 roku (Directions of the Evolution of the Agricultural Structure in the Light of Agricultural Registrations 2002 and of 2010). In: Runowski H. (red.), *Przekształcenia własnościowe w rolnictwie – 20 lat doświadczeń i perspektywy (Privatizations in the Farming - 20 Years of Experience and Prospects)*. Warszawa: Wydawnictwo SGGW, pp. 150-161.
10. Mickiewicz, B. (2013). Wplyw regulacji prawnych na zmiane struktury agrarnej w Polsce po 1991 roku (Influence of Regulations on the Change of the Agricultural Structure in Poland after 1991). *Roczniki Naukowe SERiA (Annals of the Polish Association of Agricultural and Agribusiness Economists)*, Vol. XV, No 1, pp. 142-147.
11. Mioduszewski, J., Niedzielski, E. (2012). The Role of Lease in Management of Agricultural Properties of the States Treasury. *PTE, Olsztyn*, p. 22, 42-43, 66-68.
12. Przygodzka, R., Mioduszewski, J. (2016). The Agricultural Land Market in Poland and its Characteristics. In: Dr. Takacsne Prof. dr. habil Gyorgy Katalin (ed.), *Challenges and Prospects for Innovation between 2014-2020, Papers of Scientific Days, Karoly Robert College, Gyongyos*, p. 1315-1323.
13. Raport z dzialalnosci Agencji Nieruchomosci Rolnych na Zasobie Wlasnosci Rolnej Skarbu Panstwa w 2016 r. (The Report of the Agricultural Property Agency Activity on the State Treasury) (2017). Warsaw: Agricultural Property Agency, pp. 1-162. Retrieved: <http://orka.sejm.gov.pl/Druki8ka.nsf/0/009A930AB1B75AA7C1258191003FCC23/?%24File/1797.pdf>. Access: 30.01.2018.
14. *Rynek ziemi rolniczej. Stan i perspektywy (Market of the Agricultural Land. The State and Prospects)* (2014). Warszawa: Instytut Ekonomiki Rolnictwa i Gospodarki Zywnosciowej – PIB, Agencja Nieruchomosci Rolnych, Ministerstwo Rolnictwa i Rozwoju Wsi, pp. 1-68.
15. Sadowski, A. (2014). Zmiany agrarne w polskim rolnictwie jako efekt przekształcen systemowych (Agricultural Changes in the Polish Farming as the Effect of System Transformations). *Prace Naukowe Uniwersytetu Ekonomicznego we Wroclawiu (Research Papers of Wroclaw University of Economics)* no 361, pp. 215-226.
16. Sadowski, A., Takacs-Gyorgy, K. (2005). Results of agricultural reform: Land use and land reform in Poland and Hungary. *Studies in Agricultural Economics*, No 103, 53-70.
17. Takacs-Gyorgy, K., (2010). Changes in Land Use in CEE Countries During the Last Decade. *Annals of the Polish Association of Agricultural and Agribusiness Economists*, Vol. XII, No 6. pp. 173-179.
18. The Act from 19 October 1991 on Management of Agricultural Property Stock of the Treasury (D. U. from 1991, No 107, pos. 464; D. U. from 2015 r., pos. 1014).
19. The Act from 11 April 2003 about the Shaping of the Agrarian System (D. U. from 2012, pos. 803). Ustawa z dnia 11 kwietnia 2003 r. o kształtowaniu ustroju rolnego (t.j. Dz. U. z 2012 r., poz. 803).
20. The Act from 5 August 2015 about the Shaping of the Agrarian System (D. U. from 2015, pos. 1433). Ustawa z dnia 5 sierpnia 2015 r. o kształtowaniu ustroju rolnego (Dz. U. z 2015 r., poz. 1433).
21. The Act from 14 April 2016 about Ceasing Sale of Properties Belonging to Treasury Agricultural Property Stock and about the Amendment to Some Acts (D. U. from 2016, pos. 585). Ustawa z dnia 14 kwietnia 2016 r. o wstrzymaniu sprzedaży nieruchomości Zasobu Własności Rolnej Skarbu Państwa oraz o zmianie niektórych ustaw (Dz. U. z 2016 r., poz. 585).
22. Wigier, M. (ed.) (2011). Analiza efektow realizacji polityki rolnej wobec rolnictwa i obszarow wiejskich (The Analysis of the Effects of Implementation of the Agrarian Policy on Agriculture and Rural Areas). Warszawa: IERiGZ-PIB, pp. 56-80.
23. Zietara, W. (2013). Przeslanki i uwarunkowania przekształcen własnościowych w rolnictwie (Reasons and Conditions of Privatizations in the Farming). In: Runowski, H. (ed.), *Przekształcenia własnościowe w rolnictwie – 20 lat doświadczeń i perspektywy (Privatizations in the Farming - 20 Years of Experience and Prospects)*. Warszawa: Wydawnictwo SGGW, pp. 82-85.

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## AGRICULTURAL PRODUCER GROUPS AS MANIFESTATION OF TEAM ENTREPRENEURSHIP IN POLAND

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**Abstract.** The EU agricultural legislation explicitly acknowledges the role of producer organisations for realising the objectives of agricultural business activity. This form of cooperation contributes to strengthening the position of farmers in the economic reality, inter alia by optimising agricultural production costs, adapting to the requirements of foreign markets and obtaining higher prices through collective negotiations. In Poland, poor organization of agricultural producers remains one of the most important problems of Polish agriculture. The aim of this study is to evaluate the current process of forming agricultural producer organizations, with regard to factors conducive to the development of this form of team entrepreneurship as well as barriers causing resignation from this form of cooperation. The paper provides review of problems related to team entrepreneurship in Polish agriculture, presents basic forms of support, discusses the existing advancement of this form of entrepreneurship in Poland and indicates key factors which contribute to the termination of this form of cooperation.

**Key words:** team entrepreneurship, agricultural producer groups, determining factors.

**JEL code:** O13, Q12

### Introduction

In Polish literature, consideration is given to the phenomenon of a treadmill in agriculture. It is a market mechanism which, despite the continuous efforts of farmers to increase productivity of production factors (e.g. through the implementation of new technologies -technological treadmill) flushes away the benefits of these endeavours because when widespread adoption of new technology takes place, the increased production lowers the price of the commodity for all producers. On the other hand, farmers who resist new technologies and new organizational solutions tend to lag behind and lose competitiveness. Due to the phenomenon of technological treadmill, the main benefits from the implementation of research results and related new technologies to agricultural practice ultimately reach the final consumer, but can also be seized by other, non-agricultural actors, operating in agribusiness, which results in draining of economic surplus from agriculture (Czyzewski B., 2017). Consequently, looking for opportunities to increase the competitiveness of Polish agriculture and boost agricultural incomes, the literature proposes stimulation of concentration processes and improvement of the agrarian structure.

Poland has an unfavourable farm structure in relation to other European Union countries. However, positive changes are taking place in the structure of farms. This is confirmed by the systematic, though slow, decline in the number of farms, mainly those smaller in size (1-10 ha of utilized agricultural area (UAA)) in favour of the largest farms. Nevertheless, in 2014 still more than half of the total number of farms (52.0 %) were holdings from 1 to 5 ha of UAA. Although a relatively big numerical growth was recorded in the group of relatively big farms, (30 hectares and over and especially 50 hectares and over), they still constitute a small group. In 2014, the percentage of this size of holdings was respectively 5.4 % and 2.4 % and it was almost 2 times lower than the EU-28 average (Karwat-Wozniak B., Chmielizski P., 2016). The decrease in the number of farms resulted in the increase in the average UAA per one farm - from 9.85 ha in 2010 to 10.65 ha in 2017.

The necessity of horizontal integration of farmers results from the mechanisms of the market economy, in which entities have to make economic decisions taking into account the current situation on the market. This is a consequence of both the law of supply and demand as well as the

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growing competition in the food economy. The farmer, like any other producer, strives to obtain the highest possible income in the given market conditions. Small agricultural producers around the world are looking for better ways to organize their farms. Obtaining high incomes is not and will not be possible in the future without seeking solutions that would boost their economic potential by stimulating rural entrepreneurship. One of its manifestations is forming agricultural producer organizations.

The concept of entrepreneurship has a relatively long history (Singh A. P., 2013). In the simplest definition it can be described as the art of coping in life. According to Shane, entrepreneurship involves all activities aiming at the discovery, evaluation and exploitation of opportunities to create future goods and services, or ways of organizing new markets and raw materials through organizing efforts that previously had not existed (Shane S., 2003). Some scientific articles emphasize that it also involves people's activities undertaken to search for new solutions, introduce changes in current activity, utilize emerging opportunities, as well as seek additional and alternative sources of income (Windmill A. P., 1996; Jeczmyk A, Mackowiak M., 2013). Thus, entrepreneurship understood as a form of peoples' activity can involve both individuals and group of associated individuals. The concept of team entrepreneurship can be understood as organized, conscious and voluntary cooperation of people focused on the implementation of a common goal through a more optimal allocation of resources, reduction of production costs (the effect of scale and scope) and strengthening their position on the market (the increase in market share) (Parzonko A. J., 2012). Team cooperation can also reduce transaction costs by improving the level of commercialization (Latynskiy E., Berger T., 2015). Therefore, team entrepreneurship requires close labour relations between people, uses their talents and creative abilities. Agricultural producer organizations are an example of team entrepreneurship, but also cooperatives, partnerships and associations (Kania J., Bogusz M., 2009). According to Kahan, in order for farmers to be entrepreneurial, they need to be innovative and forward-looking, they need to manage their businesses as long-term ventures with a view to making them sustainable and they need to be able to identify opportunities and seize them. The members of producer organizations have to take initiative and be ready to take calculated risks to open or create new markets for their products. They must also be ready to cooperate in a joint production activity and take full responsibility for the result (Kahan D., 2012). Glinka and Gudkova follow the same path of thinking. They believe that being an entrepreneur is a way of life and involves a specific way of looking at the world. It is necessary to have a vision and courage to take action, create opportunities for a more effective use of resources and combine factors of production (Glinka B., Gudkova S., 2011).

Due to the great dispersion of the agricultural sector in Poland, it is important to monitor the integration processes. Taking the above into consideration, the aim of this study is to evaluate the current process of forming agricultural producer organizations, with regard to factors conducive to the development of this form of team entrepreneurship, as well as barriers causing resignation from such cooperation. The research study was based on the literature review, data from the Agency for Restructuring and Modernization of Agriculture (ARiMR) and the Ministry of Agriculture and Rural Development, provisions contained in the EU and Polish legal acts ..

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## Research results and discussion

In Poland's history farmers' teamwork was induced by political regulations (1949-1956), and despite the time distance, the idea still carries strong negative connotations in the minds of today's agricultural producers. In the later years of the socialist economy, the form of cooperation encouraged by the state authorities were individual farmers' teams (1973-1989) and intersectoral cooperatives, established between the agricultural state sector and the individual farmers' sector, which were supposed to remedy the food shortages on the market. The rural cooperatives existed as long as financial incentives were provided to support them, but as the support was reduced, the organizations started to disappear (Mickiewicz A. et al., 2014). In general, in Central and Eastern Europe, farmers perceived agricultural cooperatives as collectivized, almost monopolistic structures formed to realise government intervention schemes and provide a wide range of services, including: food production, raw material supply, incurring loans and marketing of produce (Millnes J., Juhasz J., 2006).

Producer organizations appeared in Poland in the early 1990s. Then, they were formed to defend farmers against the effects of disastrous changes following the introduction of market economy. The emerging groups of agricultural producers began their activities without specific legislation on producer organizations. It was only the Act of 15 September 2000 on producer organisations and associations of producer organisations and amending other acts that set out the rules of forming organizations of agricultural producers and their associations and provided criteria for granting public financial aid to support these organization and their operations. The final shape of the legislation concerning agricultural producer organizations was provided by the Act of 18 June 2004 amending the act on producer organisations and associations of producer organisations and amending other acts. Amendments to the act under consideration and the entry into force of the Council Regulation (EC) No 1698/2005 of 20 September 2005 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) had a significant impact on the pace of development of this form of entrepreneurship in agriculture (Nowakowska-Grunt J., Parzonko A. J., Kielbasa B., 2016). In 2004, only 1 % of the total number of Polish farmers cooperated within agricultural producer groups (Czapniewska G., 2013). The research study conducted in 2006, on a sample of 600 agricultural producers in the Chelm county (powiat) in eastern Poland showed that the main reasons for farmers to resist cooperation included low awareness and lack of positive experiences in the field of joint action. The surveyed farmers presented mainly conservative attitudes; they declared the intention to join a producer group but only when they could see the benefits of this membership (Oleszko-Kurzyna B., 2007).

In Poland, under the Common Agricultural Policy (CAP), the basic instrument for supporting producer groups after 1 May 2004 was financial assistance from the EU funds assigned to facilitate the setting up, administrative activity and investments of a producer group within the framework of activities included in "Agricultural producer groups" RDP 2004-2006, "Agricultural producer groups" RDP 2007-2013, "Setting-up and development of micro enterprises" RDP 2007-2013, "Increasing the added value of basic agricultural and forestry production" RDP 2007-2013, "Forming producer groups and producer organizations" RDP 2014. The amount of aid granted to agricultural producer groups under the RDP 2004-2006 was PLN 74.4 million and under RDP 2007-2013 it was PLN 361 million (until the end of June 2013). The financial plan of the RDP 2014-2020 provides EUR 402,987,547 for support of agricultural producer groups (<http://www.arimr.gov.pl>).

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The research on RDP 2007-2013 showed positive aspects of cooperation within agricultural producer groups. Financial support significantly improved the adjustment of production to the food market requirements and Polish farmers noticed the benefits of belonging to the group (Krzyzanowska K., Trajer M., 2011). The theoretical assumptions can be observed in practice. The research study involving Polish farmers associated in agricultural producer organizations showed how they benefited from this cooperation. The benefits include (Cupial M., Szlag-Sikora A., 2012; Ptak A., 2017): better planning of production and adjusting it to the needs of contractors, collective negotiating of prices and payment dates, easier cooperation with the contractors, optimisation of production costs through joint purchases of inputs, joint use of equipment, preparation of products for sale and organization of their sale, better access to information, greater investment opportunities resulting from joint capital and access to EU funds, joint marketing of agricultural products, easier access to preferential loans, support for joining quality systems and promotion of certified products and easier access to training and study tours.

Table 1

**Total number of agricultural producer groups created since 2001, in operation and deleted from register - as of 5 January 2018**

Province (Wojewodztwo)	Number of agricultural producer groups registered since 2001	Agricultural producer groups in operation		Agricultural producer groups deleted from register	
		Number	%	Number	%
<b>Poland</b>	1847	900	49	947	51
<b>Lower Silesia</b>	185	86	46	99	54
<b>Kujawy – Pomerania</b>	120	72	60	48	40
<b>Lubelin</b>	52	26	50	26	50
<b>Lubuskie</b>	82	44	54	38	46
<b>Łódź</b>	95	80	84	15	16
<b>Malopolska</b>	27	17	63	10	37
<b>Mazovia</b>	110	77	70	33	30
<b>Opole</b>	161	82	51	79	49
<b>Podkarpacie</b>	61	38	62	23	38
<b>Podlasie</b>	51	25	49	26	51
<b>Pomerania</b>	95	41	43	54	57
<b>Silesia</b>	36	18	50	18	50
<b>Swietokrzyskie</b>	14	8	57	6	43
<b>Warmia-Masuria</b>	125	53	42	72	58
<b>Wielkopolskie</b>	533	209	39	324	61
<b>West-Pomerania</b>	100	24	24	76	76

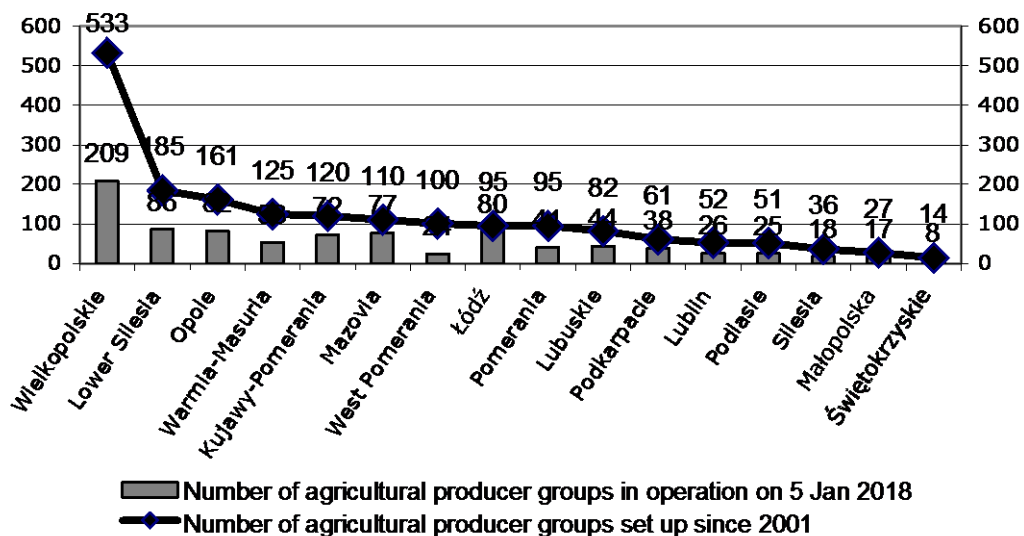
Source: authors'elaboration based on: *Rejestr grup producentow rolnych (Register of Agricultural Producer Groups)*, <http://www.arimr.gov.pl> (Retrieved on 15 Jan 2018)

As demonstrated in Table 1, there are big disparities in the number of agricultural producer groups operating in individual provinces. Unfortunately, their spatial distribution does not follow the logic that smaller producers decide to cooperate in order to adapt to the needs of today's market. In fact, producer organizations are most popular in regions with thriving agriculture. In provinces with the lowest level of competitiveness of agriculture, such as Swietokrzyskie, Malopolskie or Podkarpackie, where group initiatives would be desirable, changes in the field of integration are



progressing very slowly. Regional diversification of producer organizations implies the necessity to adjust aid instruments to the character of individual regions.

As shown in Table 1, the process of forming agricultural producer groups in Poland is neither dynamic nor sufficient. Compared to the Member States of the so-called old European Union (EU-15), such as Denmark and France, the proportion of farmers undertaking joint economic activities in Poland is much lower (Prus p. et al., 2014). Moreover, the fact that more than half of the groups created over the last 17 years terminated their cooperation is alarming. It is worth asking question about the reasons. It can be assumed that the motivating factor for setting up and operating agricultural producer groups was the available funding. Currently, financial assistance under the Rural Development Program for the years 2014-2020 has been earmarked only for groups of agricultural producers recognized not earlier than on January 1, 2014. It means, that agricultural producer groups registered until 31 December 2013 will not have access to funding despite meeting all other formal conditions provided in the RDP 2014-2020. It also applies to other activities from the European Agricultural Fund, such as the creation and development of micro-enterprises or increasing the positive value of basic agricultural and forestry production. This situation for many groups is a serious obstacle in the implementation of statutory objectives, including developing business and marketing skills as well as organizing and facilitating the processes of innovation and environmental protection. In addition, the support is directed to individual natural persons, being agricultural producers, working together as part of a formalized group. Thus, regulations excluding legal persons and entities without legal personality from the financial assistance system within the group of agricultural producers could reduce the number of potential beneficiaries. In addition, to avoid providing operating aid and to maintain the motivating role of support, the maximum duration of support has been limited to five years from the date of recognition of the producer group or organization based on the business plan.



Source: authors' elaboration based on: *Rejestr grup producentów rolnych (Register of Agricultural Producer Groups)*, <http://www.arimr.gov.pl> (Retrieved on 15 Jan 2018)

Fig. 1. The number of agricultural producer groups formed since 2001 and the number of groups in operation on 5 January 2018

The intention behind the introduced restrictions is well justified. Several years of experience in supporting agricultural producer groups have revealed certain pathologies including low number of members in the registered groups, which is usually at a minimum level of 5 members. In addition,

dubious effectiveness was recorded in the case of groups formed by legal persons, which were often created by artificial isolation of new entities previously functioning as a whole, whose sole purpose was to obtain support (Bala D., 2016). The data presented in Figure 1 show that farmers from provinces with the most unfavourable agrarian structure are less likely to form producer groups. Granting financial aid to agricultural producer groups consisting of natural persons is aimed at starting structural changes from the smallest farms. Also, preference in assigning funding is given to agricultural producer groups organized in the form of cooperatives, with the biggest possible number of members in a given category, located in a county (powiat) with high agrarian fragmentation or those planning investments contributing to the implementation of cross-cutting objectives.

### **Conclusions and recommendations**

The EU regulations encourage farmers to form producer groups. This form of cooperation strengthens the position of agricultural producers in the economic reality, inter alia by optimising agricultural production costs, adapting to the requirements of foreign markets and collective negotiating of prices for their produce.

The conducted analysis demonstrated the following.

- The instruments provided under the Common Agricultural Policy have significantly contributed to the popularization of the idea of agricultural producer groups in Poland.
- The formation of agricultural producer groups in Poland is not a widespread process. Since 2001, only 1.847 groups have been registered, of which only 900 are currently active. This is mainly a consequence of farmers' low awareness of the potential benefits of producer cooperation and lack of positive experiences in the field of joint action in the past. What is more, the entrepreneurial, market oriented attitude is not typical for Polish farmers.
- Taking into account the spatial distribution of producer groups, (the smallest number was recorded in provinces with a highly fragmented agrarian structure and the lowest level of agricultural development), it can be concluded that the barrier limiting the formation of agricultural producer groups is the low economic strength of farms and lack of sufficient production resources.
- Regional diversification of farmers' integration has resulted in the adjustment of aid instruments to the character of individual regions. A particular challenge within the framework of the financial perspective for 2014-2020 is the popularization of horizontal integration among farms from south-eastern Poland.
- Drawing from literature and available registers, we identified the following factors that may determine the success of a producer group: financial assistance from the EU funds for setting up a producer group and its administrative or investment activities within the period of the group's operation under the Rural Development Program for the years 2004-2006, 2007-2013 and 2014-2020, the number of members forming the producer group, previous experience of members in the field of team cooperation and support received from various institutions, mainly agricultural advisory bodies.

To sum up, the farmers' interest in cooperation within agricultural producer groups is growing, which results in an increasing number of producer organizations. However, attention should be paid to the durability of the emerging entities.

## Bibliography

1. Bala, D. (2016). *Wpływ instrumentów wspólnej polityki rolnej na rozwój grup producentów rolnych w Polsce w ujęciu regionalnym* (The impact of the Common Agricultural Policy Instruments on the Development of Agricultural Producer Groups in Poland – the Regional Approach). *Studia Obszarów Wiejskich*, Tom 42, pp. 155-164. <http://dx.doi.org/10.7163/SOW.42.12>. Retrieved on 15 Jan 2018.
2. Karwat-Wozniak, B., Chmielinski, p. (2016). *Przemiany w strukturze agrarnej polskiego rolnictwa i wpływ wybranych instrumentów WPR na te procesy* (Changes in the Agrarian Structure of Polish Agriculture and the Impact of Selected CAP Instruments on these Processes). *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu. Polityka ekonomiczna. No 450*, pp. 272-274.
3. Cupiał M., Szlag-Sikora A., (2012). Grupy producenckie jako przykład rozwoju przedsiębiorczości wspierany funduszami UE na obszarach wiejskich (Producer Groups as an Example of Entrepreneurship Development Supported by EU Funds in Rural Areas). *Zarządzanie i Finanse Vol.1, No. 2*, pp. 257-267.
4. Czapniewska, G. 2013. Grupy producentów rolnych w rozwoju obszarów wiejskich Pomorza (Groups of Agricultural Producers in the Development of Pomeranian Rural Areas). *ACTA Universitatis Lodzianensis, Folia Geographica Socio-Oeconomica*, No 13, p. 166.
5. Czyżewski, B. (2017). *Kierat rynkowy w europejskim rolnictwie* (Market Treadmill in European Agriculture). Warszawa: Wydawnictwo Naukowe PWN SA, pp. 16-17.
6. Glinka, B., Gudkova, S. (2011). *Przedsiębiorczość* (Entrepreneurship). Warszawa: Wydawnictwo Oficyna Wolters Kluwer Business, p. 53.
7. Horter, T., (1993). *Organisation of Marketing Cooperatives. The Determinants of Success*. *Acta Horti* No. 340, pp. 155-159.
8. <http://www.arimr.gov.pl>. Retrieved on 15 Jan 2018.
9. Jeczmyk, A., Mackowiak, M., (2014). *Przedsiębiorczość w agroturystyce* (Entrepreneurship in Agritourism), (In:) *Przedsiębiorczość w turystyce* (Entrepreneurship in Tourism), Snarski, S.J., Jalinik, M., (Ed.). Białystok: Wydawnictwo EkoPress. pp. 47-59.
10. Kahan, D., (2012). *Entrepreneurship in farming*. Food and Agriculture Organization the United Nations. Rome. p. 9.
11. Kania, J., Bogusz, M., (2009). *Spoleczno-ekonomiczne aspekty funkcjonowania grup producentów rolnych w województwie małopolskim* (Socio-Economic Aspects of the Functioning of Agricultural Producer Groups in the Malopolskie Province), (In:) *Rozwój przedsiębiorczości i zespołowej działalności gospodarczej w rolnictwie w świetle integracji z Unią Europejską* (The Development of Entrepreneurship and Team Economic Activity in Agriculture in the Light of Integration with the European Union), Zawisza, S. (Ed.). Bydgoszcz: Wydawnictwo Uniwersytet Technologiczno-Przyrodniczy w Bydgoszczy. pp. 181-197.
12. Krzyżanowska, K., Traje, r M., (2011). *Pomoc finansowa dla grup producentów rolnych w ramach działania 142 „Grupy Producentów Rolnych” PROW 2007–2013* (Financial Aid for Agricultural Producer Groups Under Measure 142 "Agricultural Producer Groups" RDP 2007-2013), (In:) *Studies & Proceedings of Polish Association for Knowledge Management*, No. 56, pp. 87-93.
13. Latynskiy, E., Berger, T. (2016). *Networks of Rural Producer Organizations in Uganda: What Can Be Done to Make Them Work Better?* *World Development*, Vol. 78, p. 572.
14. Mickiewicz, A., Mickiewicz, B., Wawrzyniak, B.M., (2014). *Charakterystyczne cechy rolniczych spółdzielni produkcyjnych funkcjonujących w latach 1949-2010* (Characteristic Features of Agricultural Production Cooperatives Operating in the Years 1949-2010). *Zagadnienia Doradztwa Rolniczego No. 3*, pp. 51-71.
15. Millnes, J., Juhasz, J., (2006). *Promoting Farmer Entrepreneurship Through Producer Organizations in Central and Eastern Europe*. Food and Agriculture Organization the United Nations, Rome, p. 41.
16. Nowakowska-Grunt J., Parzonko A.J., Kiełbasa B., (2016). *Determinants of Managing Networks of Organizations in Rural Areas*, Czestochowa: Publishing Office of Faculty of Management Czestochowa University of Technology. pp. 51-80.
17. Oleszko –Kurzyńska, B. (2007). *Postawy rolników wobec grup producentów rolnych* (Farmers' Attitudes Towards Agricultural Producer Groups), *Annales Universitatis Mariae Curie-Skłodowska Lublin vol. XLI,11 Section H*, pp. 162-175.
18. Parzonko, A.J. (2012). *Role of Leadership in Development of Group Enterprise*. *Proceedings of the International Conference on Management of Human Resources 2012, Management - Leadership - Strategy - Competitiveness: Gödöllő, Hungary, 14-15 June, Vol. 1*, pp. 249-251.
19. Prus, P., Marcysiak, T., Goszka, W., Wielewska, I., (2014). *Działalność ośrodków doradztwa rolniczego w procesie integracji poziomej w rolnictwie w opinii członków grup producentów rolnych* (Agricultural Advisory Centers in the Process of Horizontal Integration in Agriculture in the Opinion of Agricultural Producer Group Members), *Roczniki Naukowe SERIA 2014, Vol. 16, Issue 3*, pp. 242-246.
20. Ptak, A. (2017). *Zalety i wady działania w grupie producenckiej* (Advantages and Disadvantages of Operating within a Producer Group). *Farmer No. 01/2017*, p. 11.
21. Shane, S. (2003). *A General Theory of Entrepreneurship. The Individual–Opportunity Nexus*, Edward Elgar Pub., Northampton, p. 3.
22. Singh, A.P. (2013). *Factors Influencing Entrepreneurship Among Farming Community in Uttar Pradesh*. *International Refereed Research Journal Vol. IV, Issue 3, July*, pp. 115-116.
23. Wiatrak, A.P. (1996). *Przedsiębiorstwo, przedsiębiorca, przedsiębiorczość* (Enterprise, Entrepreneur, Entrepreneurship), (In:) *Rola doradztwa w kreowaniu przedsiębiorczości na obszarach wiejskich* (The Role of

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Advisory Services in Creating Entrepreneurship in Rural Areas ), Wiatrak ,A.P. (Ed.), Warszawa:  
Wydawnictwo SGGW. pp. 7-16.

## AGRICULTURAL SUPPORT POLICY AS A DETERMINANT OF INTERNATIONAL COMPETITIVENESS: EVIDENCE FROM THE EU AND US

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**Abstract.** Government policies are more important and pervasive than natural endowments in determining competitiveness of agri-food sector. One of the most important policy areas are agricultural policies. The aim of this paper is to identify the differences in levels and structures of support for agricultural producers in the EU and US over the 1986-2016 period. The study relies on data retrieved from the "Producer and Consumer Support Estimates Database" of the OECD. The following indicators of agricultural support were used: TSE, % TSE, PSE, % PSE, MPS, GSSE, TCT, NAC and NPC. Both the EU and the US still heavily support their agricultural sectors. However, positive developments took place in the structure of support which means a gradual substitution of price support measures with payments having less distortive effects on market and trade processes. Irrespective of changes to the nature of support, which have already taken place, it may be assumed that in the economies considered, there is still a potential to introduce less trade distorting and more market oriented policies. The EU provides the agricultural producers with twice as much support (measured with the % PSE index) as the US, and the EU market is covered by stronger customs protection measures. Having this in mind, it may be assumed that in the context of potential liberalization of the EU-US bilateral trade (and/or world trade) and the progressive reduction of support for the domestic agricultural sector, the expected trade creation effect (stronger in the US than in the EU) could drive the strengthening of the US international competitive position.

**Key words:** agricultural producer support, international competitiveness, the EU, the US.

**JEL code:** E64, Q18.

### Introduction

The EU and the US are the largest players of world trade in agri-food products. In 2016, the value of agri-food exports from the EU and from the US was USD 521.4 billion and USD 135.6 billion, respectively, representing nearly 38 % and 10 % of world exports (UNCTADstat, 2018). However, considering that the Single European Market (SEM)<sup>1</sup> represents almost ¾ of the EU's trade flows, and taking account only of trade volumes with non-EU countries (USD 137.5 billion in 2016), the shares of the countries considered in the global food trade were at a nearly equal level of around 10 %. On one hand, despite a relatively small value of bilateral trade, the EU and US are important trade partners (Pawlak K., 2017), but on the other, they compete with each other.

According to Bienkowski (1995), the macroeconomic determinants of international competitive capacity include the national socio-economic system and government policy, next to the size, quality, structure and efficiency of owned production resources and the ability to impact the international economic environment. The importance of the government policy for the development of competitive advantages of the agri-food sector is also noted by Dunmore (1986), Brinkman (1987), Harrison and Kennedy (1997), Van Duren, Martin and Westgren (1991)<sup>2</sup>, Abbott and Bredahl (1994), and Prus and Drzazdzynska (2017). As emphasized by Dunmore (1986), government policies are more important and pervasive than natural endowments in determining competitiveness and comparative advantage, especially in the longer term, when they become the source of the "dynamics" of comparative advantage. According to the author, the three most important policy areas are: domestic macroeconomic policies, domestic farm policies, and foreign

<sup>1</sup> The high share of intra-EU flows in the EU's agricultural exports is primarily determined by geographic proximity of EU states and absence of mutual trade barriers. That trade pattern is also largely affected by similar dietary habits and food marketing systems (Reed M.R., 2001).

<sup>2</sup> According to Van Duren, Martin and Westgren (1991), the government's impact on the business environment with various types of policies is equivalent to factors controlled by government or, in other words, factors beyond the control of competing firms (Reiljan J., Hinrikus M., Ivanov A., 2000).

trade and agricultural policies (Dunmore J. C., 1986). Abbott and Bredahl (1994) also pay considerable attention to trade and agricultural policies as the determinants of international competitiveness of the agri-food sector. In the context of the on-going rivalry in the international agricultural market, and considering the agricultural policy as a primary determinant of competitiveness of the agri-food sector, it is necessary to ask the question about the level and structure of agricultural support in the countries playing the key role in world trade. Therefore, the aim of this paper is to identify the differences in levels and structures of support for agricultural producers in the EU and US over the 1986-2016 period.

### **Data and research methods**

This study relies on data retrieved from the "Producer and Consumer Support Estimates Database" of the Organization for Economic Cooperation and Development (OECD). The purpose of indicators published in the Database is to assess the impact of agricultural and trade policy measures on agricultural producers and food consumers. Both the budget transfers allocated to individual producers and the payments to the agricultural sector as a whole are covered by the indicators. The support resulting from the operation of tools which lead to a price gap between the domestic and global market is also included in (Poczta-Wajda A., 2017). Published annually, these indicators are the only internationally comparable, complete and widely available source of information about agricultural support levels in developed countries<sup>1</sup> (Poczta-Wajda A., 2013).

This paper uses the following available indicators (OECD, 2016; OECD, 2017):

- Total Support Estimate (TSE) – the annual monetary value of all gross transfers from taxpayers and consumers arising from policy measures that support agriculture. It is calculated as the sum of Producer Support Estimate (PSE), General Services Support Estimate (GSSE), and Transfers to Consumers from Taxpayers (TCT). For reasons of comparability between countries, the Percentage TSE ( % TSE) is calculated which shows TSE transfers as a percentage of GDP;
- Producer Support Estimate (PSE) – the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policy measures that support agriculture. It includes Market Price Support (MPS); payments based on inputs use; payments based on current or non-current area planted, animal numbers, farm receipts or farm income (production required or not required); and other transfers. For reasons of comparability between countries, the percentage PSE ( % PSE) is calculated which refers to PSE transfers as a share of gross farm receipts;
- Market Price Support (MPS) – the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers arising from policy measures that create a gap between domestic market prices and border prices of a specific agricultural commodity, measured at the farm gate level;
- General Services Support Estimate (GSSE) – the annual monetary value of gross transfers to general services provided to agricultural producers collectively (such as agricultural knowledge and innovation system, inspection and control, development and maintenance of infrastructure, marketing and promotion, cost of public stockholding and miscellaneous items), arising from policies that support agriculture. The GSSE does not include any transfers to individual producers;

<sup>1</sup> Since 1986, support indicators have been calculated each year for all OECD member countries, including EU countries considered globally. Also, since 1995, OECD has consistently extended the subjective scope of its statistics with non-member countries, including developing countries. There are: Brazil, Colombia, China, Costa Rica, Indonesia, Kazakhstan, Philippines, Russia, South Africa, Ukraine, and Viet Nam.

- Transfers to Consumers from Taxpayers (TCT) – the annual budgetary payments to consumers that are given for the specific purpose of compensating them for the higher prices they pay for agricultural products that result from policies that support producer prices. The TCT is obtained from the information on budgetary expenditures;
- Producer Nominal Assistance Coefficient (NAC) – the ratio between the value of gross farm receipts (including support) and gross farm receipts valued at border prices (measured at farm gate). It specifies how many times more do farmers earn than they would without state intervention;
- Producer Nominal Protection Coefficient (NPC) – the ratio between the average price received by producers at farm gate (including payments per tonne of current output and excluding price levies based on output) and the border price (measured at farm gate). It measures the distortion of domestic prices.

The timeframes of this study were determined by the availability of data, extending from 1986 to 2016, split into three three-year periods: 1986-1988, 1995-1997 (first years of implementing the Agreement on Agriculture entered into under the GATT/WTO Uruguay Round Final Act whose assumptions included limiting the levels and increasing discipline in the use of domestic support measures for the agriculture, while providing the countries with a broad range of support measures that take account of specific conditions of agricultural production), and 2014-2016.

### **Research results and discussion**

The TSE is the OECD's broadest indicator of agricultural support. Over the past decades, both the US and the EU have provided substantial government support for their agricultural sectors. In absolute terms, from 2014 to 2016, the total costs incurred by the society to finance agricultural support in EU countries was USD 115.9 billion, on average, representing 36 % of total transfers allocated for that purpose in OECD countries (Table 1). In the US, the average annual value of transfers to the agricultural sector and agricultural producers was by nearly ¼ smaller (USD 88.4 billion) than in the EU in that period. However, at the same time, it was more than 80 % higher than agricultural support allocated in 1986-1988. An important insight is provided by the analysis of TSE expressed as a percentage value. Despite the growth of support delivered to the agricultural sector and producers in absolute terms, the overall burden of agricultural support on the EU and US economies has declined since the mid-1980s, as measured by total support as percentage of GDP. In the EU countries (considered as a union between 28 Member States), the total agricultural support went down from 2.6 % of GDP in 1986-1988 to 0.7 % of GDP in 2014-2016 whereas in the US, the share of transfers to the agricultural sector and agricultural producers in GDP declined from 1.0 % to 0.5 % over the same period. But public policy support continues to be important for the agricultural sectors of the EU and USA. In those countries, the ratio of TSE to the total production value (at farm gate) was around 31 % and 23 %, respectively, compared to 27 % in the OECD countries. The ratio between TSE and agricultural value added in both economies under consideration was close to the OECD average of 39 % (OECD, 2017).

In the EU, policy transfers to individual producers (PSE) are the major component of total support. In the EU, throughout the study period, the share of PSE in the total value of monetary transfers from taxpayers and consumers to the agricultural sector and agricultural producers remained at a level of around 88 %; in 2014-2016, it was twice higher than in the US (43 %; Table 2). It should be noted that 1986-2016 was a period of considerable evolution in the structure

of financial support for the US agricultural sector. The importance of gross monetary transfers from taxpayers and consumers to agricultural producers declined by 30 percentage points. This was accompanied by the growing importance of mechanisms supporting the demand for foodstuffs (TCT), which also provide indirect support to agricultural producers. That indicator went up from 21 % in 1986-1988 to 47 % in 2014-2016. In this respect, the US follow a globally unique policy for the support of the agricultural sector and agricultural producers. In 2014-2016, according to OECD data, the average value of food aid schemes (which is approximated by TCT) was by nearly USD 3.0 billion higher than the value of agricultural producers support measured with PSE. In that period, the value of support delivered to US agricultural producers (PSE) was USD 38.4 billion, whereas USD 41.3 billion were allocated to national food aid schemes (TCT). Meanwhile, in the EU, the level of measures designed to support food consumption was almost USD 1.2 billion, compared to USD 101.8 billion allocated to transfers for agricultural producers (Producer and Consumer Support Estimates Database, 2018). Therefore, it may be assumed that PSE is not fully reliable in the case of the US, as it fails to take account of measures designed to support food consumption which exceed the value of support allocated to agricultural producers. In the economies considered, the importance of total transfers allocated to the sector (GSSE) was comparable throughout the study period, representing 10-11 % of total support<sup>1</sup> in 2014-2016 (Table 2).

Table 1

**Support to agriculture in the OECD countries, EU and US in 1986-2016**

Specification	1986-1988			1995-1997			2014-2016		
	OECD	EU	US	OECD	EU	US	OECD	EU	US
<b>TSE (million USD)</b>	258 483	111 515	48 534	319 438	132 543	48 292	319 383	115 911	88 449
<b>TSE %</b>	2.40	2.60	1.00	1.40	1.40	0.60	0.60	0.70	0.50
<b>PSE %</b>	36.50	39.20	21.20	30.40	33.80	11.90	18.20	19.60	9.50
<b>NAC</b>	1.57	1.64	1.27	1.44	1.51	1.14	1.22	1.24	1.10
<b>NPC</b>	1.51	1.69	1.12	1.31	1.33	1.06	1.10	1.05	1.03

*Source: author's calculations based on Producer and Consumer Support Estimates Database (2018)*

Table 2

**Composition of the Total Support Estimate in the EU and US in 1986-2016 ( %)**

Specification	1986-1988		1995-1997		2014-2016	
	EU	US	EU	US	EU	US
<b>TSE, including:</b>	100.0	100.0	100.0	100.0	100.0	100.0
<b>PSE</b>	87.3	72.8	88.2	53.0	87.9	43.4
<b>GSSE</b>	8.2	6.4	8.1	8.8	11.1	9.9
<b>TCT</b>	4.5	20.8	3.7	38.2	1.0	46.7

*Source: author's calculations based on Producer and Consumer Support Estimates Database (2018)*

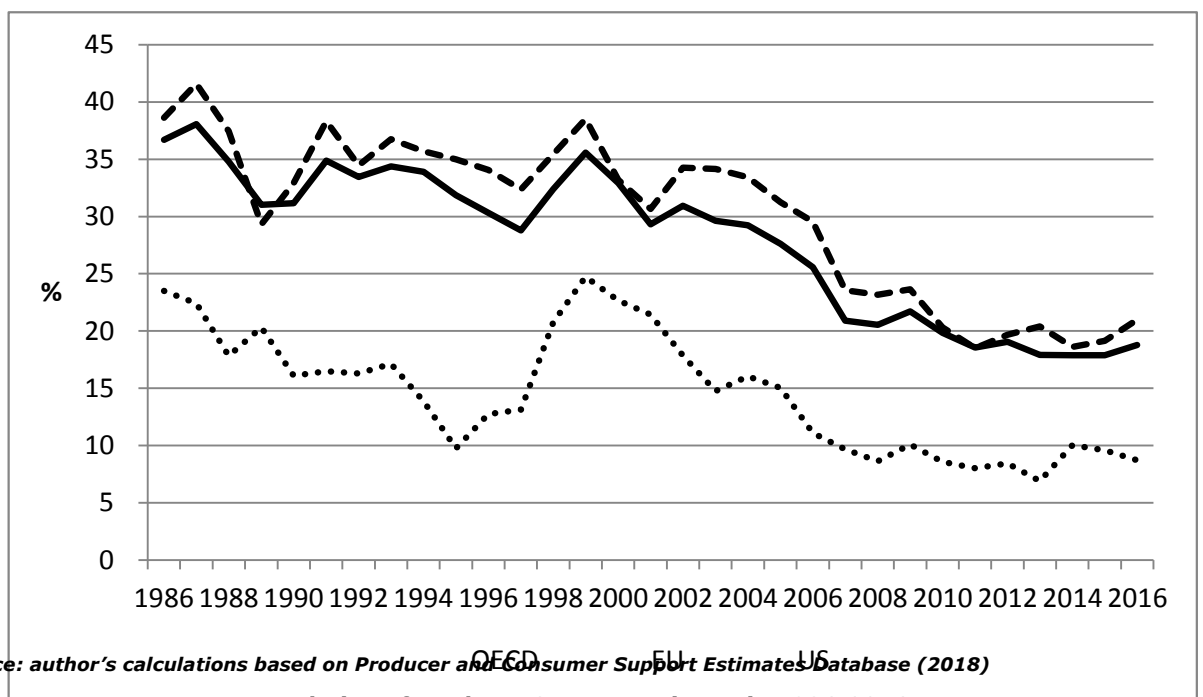
One of the most widely adopted indicators of agricultural support is PSE expressed as a percentage ratio of financial support to the total receipts of agricultural producers. In EU countries and in the US, the levels of agricultural producers support have considerably declined over the last 30 years, from 39.2 % to 19.6 % in the EU and from 21.2 % to 9.5 % of the agricultural producers' receipts in the US<sup>2</sup> (Table 1). Unlike in the US, the EU witnessed a stronger decrease in

<sup>1</sup> For a broader discussion on the levels and structure of support for services provided to agricultural producers collectively in countries at various levels of economical development, including the EU and US, see Kulyk (2013).

<sup>2</sup> Note that support for the US agricultural producers, measured with %PSE, fluctuates strongly because many of the local measures are of an anti-cyclical nature and are increasingly used when prices drop in the global market. This was the case, for instance, in 1999 where the %PSE reached nearly 36 % (Producer and Consumer Support Estimates Database, 2018).



the PSE percentage ratio after 1995, with the most intense downward trend being observed in 2002-2016. In that period, the level of support for agricultural producers dropped by nearly 13.5 percentage points (Figure 1). It is worth noting that although the Agreement on Agriculture requires the signatories to restrict their support measures, the levels of % PSE did not significantly change in the EU upon completion of the implementation period (1995-2000 in the developed countries). On the contrary, a slight growth was experienced in the US. In 2000, the % PSE ratio in the EU and US was 33.2 % and 22.7 %, respectively, which is 6 percentage points less and 1.4 percentage points more than the average levels recorded in 1986-1988 (the reference period for support reduction). The underlying reason could be the division of support measures into three boxes: the green box, blue box and amber box. The restrictions implemented under WTO agreements would only be applicable to amber box instruments which directly impact the production and considerably distort market processes (support measured with AMS, the Aggregate Measurement of Support). Meanwhile, PSE covers a broader scope of support measures classed in all three boxes as well as *de minimis* payments (Poczta-Wajda A., 2013).



Source: author's calculations based on Producer and Consumer Support Estimates Database (2018)

Fig. 1. Evolution of Producer Support Estimate in 1986-2016 (percentage of gross farm receipts)

This fact is proven by the analysis of the structure of support for agricultural producers measured with PSE in the countries covered by this study (Table 3). In the EU, already during the implementation period of the Agreement on Agriculture (1995-1997), there was a considerable reduction of price support (MPS) classed in the amber box. Price support leads to a distortion of domestic prices and, in the case of countries with a high share in world exports (such as the EU and US), of global prices. In the EU, agricultural policy measures responsible for the gap between the price obtained by agricultural producers and the global price represented 85 % and 57 % of PSE in 1986-1988 and in 1995-1997, respectively. In the US, the level of price support in that period (44 % of PSE) was lower than in the EU. However, compared to the 1986-1988 reference period, it grew by 10 percentage points. Only in 2000, it reached 30.9 % (Table 3; Producer and Consumer Support Estimates Database, 2018). In 2014-2016, the importance of agricultural policy measures characterized by MPS (considered to be the most distortionary for trade and market

processes) was even lower, fluctuating around 20 % and 27 % in the EU and US, respectively. In turn, the instruments based on direct support of agricultural incomes grew in importance. Initially, in the EU, these were payments based on current area, animal numbers, farm receipts or farm income by which production is required (with an average share in the PSE structure of 32 % in 1995-1997), and subsequently payments based on non-current area, animal numbers, farm receipts or farm income by which production is not required (42 % of PSE on average in 2014-2016; Table 3). Changes observed in the structure of EU agricultural support reflected the two key CAP reforms from 1992 and 2003. First, compensatory payments were established as a part of MacSharry reforms. Afterwards, they were replaced by a new system of direct decoupled payments. In the 2014-2016 period, compared to levels recorded in 1995-1997, payments based on current area, animal numbers, farm receipts or farm income have been cut by almost two-thirds in favour of direct payments based on non-current criteria without production requirements (OECD, 2017). In the US, there was also a trend towards payments which are less coupled with production decisions. As regards support instruments with a less distorting effect on trade and market processes, the US also used payments based on input use in addition to the two instrument categories listed above. In 2014-2016, the US recorded a similar share of these three PSE components (at a level of 21-24 % of PSE; Table 3).

Table 3

**Composition of the Producer Support Estimate in the EU and US  
 in 1986-2016 ( %)**

Specification	1986-1988		1995-1997		2014-2016	
	EU	US	EU	US	EU	US
<b>PSE, including:</b>	100.0	100.0	100.0	100.0	100.0	100.0
<b>MPS</b>	84.9	34.0	57.3	44.3	20.3	27.2
<b>Payments based on input use</b>	5.2	20.0	7.0	25.9	13.4	21.9
<b>Payments based on current A/An/R/I, production required</b>	3.6	34.6	31.6	7.1	21.6	20.6
<b>Payments based on non-current A/An/R/I, production required</b>	0.0	0.0	0.0	0.0	0.1	0.0
<b>Payments based on non-current A/An/R/I, production not required</b>	0.0	1.0	0.0	14.9	42.0	24.3
<b>Others</b>	6.2	10.5	4.0	7.8	2.6	6.0

*A/An/R/I - Area planted, animal numbers, receipts/income*

*Source: author's calculations based on Producer and Consumer Support Estimates Database (2018)*

The conclusions from the analysis of %PSE levels and dynamics are supported by the Producer Nominal Assistance Coefficient (NAC) analysis. From 1986 to 2016, a strong decrease in the importance of financial support for the total receipts of agricultural producers was observed (in the US and the EU, it was more noticeable before and after 1995, respectively). Afterwards, in mid-2010s, the agricultural receipts in the EU and the US was (respectively) by nearly 25 % and 10 % higher than that the farmers would earn without state aid, compared to 65 % and 27 %, respectively, in the 1986-1988 period (NAC coefficient; Table 1). The author has noted that despite the convergence of NAC coefficients in the study period, the financial instruments supporting the agricultural receipts were slightly more important in the EU than the average OECD level. However, both the EU countries and the US made greater use of instruments supporting the producers' incomes than of instruments distorting the price level in domestic markets (NAC>NPC). Moreover, the support went mainly to large producers, while the income of smaller farmers did not

substantially improve (Swinnen J. et al., 2000; Olper A., 2001; Boulanger P., 2010; Anderson K. et al., 2013; Poczta-Wajda A., 2014). The NPC values compare prices received by countries' producers on average with those prevailing on world markets. It can be noticed that the level of price distortions was generally falling over the period 1986-2016, and prices received by producers both in the EU and US were more closely aligned with those prevailing on world markets, as countries provide a larger share of support through less distorting measures<sup>1</sup>. This was reflected by the decreasing share of price support (MPS) in the PSE structure of countries covered by this study (Table 3). For the EU countries, effective producer prices were, on average, 5 % higher than the world market prices in 2014-2016, compared with around 70 % higher in the mid-1980s (Table 1). The US have made a less substantial progress in aligning process. However, already in the 1986-1988 period, prices obtained by the US agricultural producers were only 12 % higher, on average, than world prices. Finally, in 2014-2016, that gap reached 3 %. With an uneven scale of the converge process, the gap between domestic and world prices has narrowed in both analysed economies, meaning that market signals are becoming more important for producers' decisions (OECD, 2017).

### **Conclusions, proposals, recommendations**

- 1) Over the past decades, both the US and the EU have provided substantial government support for their agricultural sectors. Although in 1986-2016 the overall burden of agricultural support on the EU and US economies has declined, as measured by total support as percentage of GDP, public policy support continues to be important for the agricultural sectors of the EU and US.
- 2) The declining levels of support for EU and US agricultural producers were also reflected by the decreasing values of %PSE. Over the last 30 years, the share of financial support in total receipts of EU agricultural producers has considerably decreased, from 39.2 % in 1986-1988 to 19.6 % in 2014-2016. And yet, it was nearly twice as high as in the US (9.5 % in 2014-2016 compared to 21.2 % in 1986-1988). However, it may be assumed that PSE is not fully reliable in the case of US, as it fails to take account of measures designed to support food consumption (TCT) which exceed the value of support allocated to agricultural producers. Therefore, it may be concluded that the US consumers thus become net beneficiaries of agricultural support programs whereas the burden of financial support for agricultural producers imposed on the EU consumers is usually heavier than what they receive in off-setting benefits.
- 3) In mid-2010s, the agricultural receipts in the EU and the US were (respectively) by nearly 25 % and 10 % higher than that the farmers would earn without state aid, compared to 65 % and 27 % (measured with the NAC coefficient), respectively, in the 1986-1988 period. However, in both economies covered by this analysis, the structure of support has undergone some positive developments: the price support measures have been gradually substituted with payments less distorting to the trade and market processes. As a consequence, prices in domestic markets of these countries have moved ever closer to the world price level. Irrespective of changes to the nature of support which have already taken place, it may be assumed that in the economies considered, there is still a potential to introduce less trade-distorting and more market-oriented policies.
- 4) Higher levels of support for EU agricultural producers are accompanied by higher levels of customs protection of the EU market. Having the above in mind, it may be supposed that (in the

<sup>1</sup> Some authors, however, doubt the effectiveness of these reforms (Cf. e.g. Tangermann S., 2004).

context of the potential resumption of negotiations intended to deepen the transatlantic economic ties and/or to overcome the impasse in multilateral WTO negotiations) the US, expecting a stronger export-driving effect on the economy than in the EU, would be the ones to press harder for an extensive liberalization of trade and for a progressive reduction of domestic support for the agricultural sector. This is because the expected trade creation effects, stronger than in the EU, may drive the strengthening of the US competitive position in bilateral and global trade.

## Acknowledgments

The paper is funded by National Science Centre within the OPUS research project No. 2015/17/B/HS4/00262, titled „Polish agri-food sector under the implementation of the Transatlantic Trade and Investment Partnership agreement (TTIP)“.

## Bibliography

1. Abbott, P.C., Bredahl, M.E. (1994). Competitiveness: Definitions, Useful Concepts and Issues. In: Competitiveness in International Food Markets, M.E. Bredahl, P.C. Abbott, M.R. Reed (eds.). Westview Press, Boulder, San Francisco, Oxford, pp. 11-35.
2. Anderson, K., Croser, J., Sandri, D., Valenzuela, E. (2013). Agricultural Distortion Patterns since the 1950s: What Needs Explaining? In: The Political Economy of Agricultural Price Distortions, K. Anderson (ed.). Cambridge University Press, New York, pp. 25-80.
3. Bienkowski, W. (1995). Reaganomika i jej wpływ na konkurencyjność gospodarki amerykańskiej (Reaganomics and its impact on the competitiveness of the US economy). Wydawnictwo Naukowe PWN, Warszawa, pp. 22-23.
4. Boulanger, p. (2010). Distribution of Agricultural Support: Selected French Evidences. Groupe d'Économie Mondiale (GEM), SciencesPo, OECD, Paris, pp. 55.
5. Brinkman, G.L. (1987): The Competitive Position of Canadian Agriculture. Canadian Journal of Agricultural Economics, Volume 35, Issue 2, pp. 263-288.
6. Dunmore, J.C. (1986): Competitiveness and Comparative Advantage of U.S. Agriculture. Paper presented at the 1986 National Public Policy Education Conference, Denver, Colorado, 16 September 1986, pp. 31.
7. Harrison, R.W., Kennedy, P.L. (1997). A Neoclassical Economic and Strategic Management Approach to Evaluating Global Agribusiness Competitiveness. Competitiveness Review, Volume 7, Issue 1, pp. 14-25.
8. Kulyk, p. (2013). Finansowe wsparcie rolnictwa w krajach o różnym poziomie rozwoju gospodarczego (Financial support to agriculture in countries at different levels of economic development). Wydawnictwo UE w Poznaniu, Poznań, pp. 177-182.
9. OECD (2016). PSE Manual. Retrieved: <http://www.oecd.org/tad/agricultural-policies/psemanual.htm>. Access: 20.01.2018, pp. 194.
10. OECD (2017). Agricultural Policy Monitoring and Evaluation. Retrieved: [http://www.oecd-ilibrary.org/agriculture-and-food/agricultural-policy-monitoring-and-evaluation-2017\\_agr\\_pol-2017-en](http://www.oecd-ilibrary.org/agriculture-and-food/agricultural-policy-monitoring-and-evaluation-2017_agr_pol-2017-en). Access: 23.01.2018, pp. 176.
11. Olper, A. (2001). Determinants of Agricultural Protection: The Role of Democracy and Institutional Setting. Journal of Agricultural Economics, Volume 52, Issue 2, pp. 75-92.
12. Pawlak, K. (2017). Znaczenie wymiany bilateralnej w handlu zagranicznym produktami rolno-spożywczymi UE i USA (The importance of the bilateral turnover to the EU and the US foreign trade in agri-food products). Zeszyty Naukowe Szkoły Głównej Gospodarstwa Wiejskiego w Warszawie – Problemy rolnictwa światowego, Volume 17(XXXII), Issue 2, pp. 199-210.
13. Poczta-Wajda, A. (2013). Measuring Domestic Agricultural Support in Developed Countries in the Light of the WTO Regulations. *Wies i rolnictwo*, Volume 1(158), pp. 44-58.
14. Poczta-Wajda, A. (2014). Assistance to Agriculture in Countries of a Different Development Level and Trends in World Trade with Agricultural Products. *Annals of The Polish Association of Agricultural and Agribusiness Economists*, Volume XVI, Issue 6, pp. 403-408.
15. Poczta-Wajda, A. (2017). Polityka wspierania rolnictwa a problem deprywacji dochodowej rolników w krajach o różnym poziomie rozwoju (The policy of agricultural support and the problem of farmer's income deprivation in countries at different levels of economic development). Wydawnictwo Naukowe PWN, Warszawa, pp. 43-45.
16. Producer and Consumer Support Estimates Database (2018). Retrieved: <http://stats.oecd.org/>. Access: 20.01.2018.
17. Prus, P., Drzadzynska, K. (2017). Farmers' Assessment of Training Services and the Impact of Agricultural Advisory on Selected Developmental Factors Affecting Farming. *Economic Science for Rural Development, Proceedings of the International Scientific Conference, Latvia University of Agriculture, Jelgava*, No. 44, pp. 338-344.

18. Reed, M.R. (2001). *International Trade in Agricultural Products*. Prentice Hall, Upper Saddle River, New Jersey, pp. 235.
19. Reiljan, J., Hinrikus, M., Ivanov, A. (2000). Key Issues in Defining and Analysing the Competitiveness of a Country. University of Tartu Economics and Business Administration Working Paper No. 1. Retrieved: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=418540](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=418540), Access: 20.01.2018, pp. 37-39.
20. Swinnen, J.F.M., de Gorter, H., Rausser, G.C., Banerjee, A.N. (2000). The political economy of public research investment and commodity policies in agriculture: an empirical study. *Agricultural Economics*, Volume 22, pp. 111-122.
21. Tangermann, S. (2004). Agricultural Policies in OECD Countries 10 Years after the Uruguay Round: How Much Progress? In: *Agricultural Policy Reform and the WTO – Where Are We Heading?*, G. Anania, M.E. Bohman, C.A. Carter, A.F. McCalla (eds.). Edward Elgar, Cheltenham (UK) and Northampton (MA), pp. 15-42.
22. UNCTADstat (2018). Retrieved: [http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx?sCS\\_ChosenLang=en](http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx?sCS_ChosenLang=en). Access: 20.01.2018.
23. Van Duren, E., Martin, L., Westgren, R. (1991). Assessing the Competitiveness of Canada's Agrifood Industry. *Canadian Journal of Agricultural Economics*, Volume 39, Issue 4, pp. 727-738.

## THE EVOLUTION OF THE AGRICULTURAL SECTOR IN CENTRAL AND EAST EUROPEAN COUNTRIES AFTER 12 YEARS OF MEMBERSHIP IN THE EU ON THE EXAMPLE OF POLAND

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**Abstract.** Accession to the European Union was one of more important factors determining the scale and rate of changes in the agricultural sector in Central and East European countries in the years 2004-2016. Actions of the European Union arising from the functioning of the Common Agricultural Policy and instruments associated therewith (mainly in the form of structural funds) provided the countries entering the Community after 2004 with a wide range of benefits. Those benefits included a reduction in the number of farms, an increase in the average size of farm, improvement of farm technical equipment, an increase in the exports of agricultural commodities, intensification of organic production, restructuring the markets for agricultural products and services, improvement of living conditions of rural population. The changes observed in the last 12 years did not have a uniform character or rate, which is associated with a distinct variety in level of social and economic development and in environmental conditions of the so-called eastern countries of the Old Continent, that is the Czech Republic, Estonia, Lithuania, Latvia, Hungary, Slovakia, Poland and their regions. Therefore, the aim of this research is to attempt to show selected developmental changes in the agricultural sector in Central and East European countries after 12 years of membership in the European Union as well as to identify and assess the level of agricultural development in the regional arrangement on the example of Poland. The level of development of Polish agriculture in the regional arrangement was assessed using PERKAL's method of standardized sums (which belongs to the group of taxonomic methods), where the starting point was to propose a set of diagnostic features which in a possibly complete manner would allow to assess the level of agricultural development in 16 regions of Poland in the years 2015-2016.

**Keywords:** European Union, agriculture, Polish regions, taxonomic methods, PERKAL index.

**JEL code:** C43, Q51, Q56, R11, R58

### Introduction

The first 21st century enlargement of the EU to the East included in its scope countries of Central and Eastern Europe and led to a situation similar to the full accession of Greece, Spain and Portugal to the European Union in the mid-1980s, known as the Southern Enlargement. In both cases, the enlargements opened up unlimited opportunities for new countries but also created a dilemma for current Member States. These problems were connected with a great potential of agricultural production in new Member States, especially Poland (being the biggest economy among them), and their competitiveness in an area of low cost production. After years of development in the framework of the EU common market, man can say it was not justified. Both previous and new Member States have experienced benefits from common cooperation but adjustments which took place in Mediterranean countries also show that the necessity of structural changes still lies ahead of Polish agriculture.

Last enlargements of the European Union to the East have created more development opportunities for Polish economy and its primary sector, especially now during the greatest economic recession in decades. But last enlargements have also led to a situation where approximately 90 % of the European Union territory is covered by rural areas and over half of the EU population lives there. It means that even today, in the second decade of the 21st century, agriculture is still an important sector of economy, and rural development enhanced by the Common Agriculture Policy still plays an important role in Poland. Agriculture not only plays a significant role in Polish GDP but is very often crucial for improving the standard of living of rural

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communities. Majority of countries located in the Central and Eastern part of Europe, like the Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland and Slovakia, can be described as less developed economies with strong dependence on agricultural production. The position of those countries is somehow underprivileged due to the distance to major European markets. Possibilities of agricultural development in these countries are also limited by scattered agrarian structure, small average area of farms and high variability of environmental factors (i.e. high variability of relief, soil quality classes and water resources) (Mountain areas..., 2004).

Therefore, the aim of this research is to attempt to show selected developmental changes in the agricultural sector in Central and East European countries after 12 years of membership in the European Union as well as to identify and assess the level of agricultural development in the regions of Poland.

### **Data and methods**

Identification of selected changes in the agricultural sector in Central and East European countries (Czech Republic, Estonia, Latvia, Lithuania, Hungary, Slovakia and Poland) was conducted basing on publications and data of the European Statistical Office (EUROSTAT) and of the Central Statistical Office of Poland (CSOP). The carried out analysis of the above-mentioned EU countries from the macroeconomic perspective focused on the years 2004, 2010 and 2016. The level of development of Polish agriculture in the regional arrangement was assessed using PERKAL's method of standardized sums (which belongs to the group of taxonomic methods), where the starting point was to propose a set of diagnostic features which in a possibly complete manner would allow to assess the level of agricultural development in 16 regions of Poland in the years 2015-2016 (Table 1).

The condition for selecting the diagnostic variables was the assumption that they would be reliable, accurate, comparable, adequate and complete with regard to time and space (Grabinski T., 1984). The final list was selected based on a substantive criterion (taking into account the goal, subject and timeframe of the research) as well as a formal criterion (assuming that they should be weakly intercorrelated so as not to copy information, and that they should show a relatively high level of variability, that is higher than 10 %) (Parris T. M. and Kates R. W., 2003).

Table 1

**Final set of diagnostic variables**

<b>Environmental characteristics</b>	
<b>X<sub>1</sub> (S)</b>	share of agricultural land in total area ( %)
<b>X<sub>2</sub> (D)</b>	share of fallow land in total agricultural land area ( %)
<b>X<sub>3</sub> (S)</b>	valorization index of agricultural production area
<b>X<sub>4</sub> (S)</b>	share of the area of organic farms in total agricultural land area ( %)
<b>X<sub>5</sub> (D)</b>	consumption of mineral fertilizers NPK (kg per ha AL)
<b>X<sub>6</sub> (S)</b>	consumption of lime fertilizers (kg per ha AL)
<b>X<sub>7</sub> (S)</b>	share of protected areas in total area ( %)
<b>Economic characteristics</b>	
<b>X<sub>8</sub> (S)</b>	average area of a farm (ha AL)
<b>X<sub>9</sub> (S)</b>	share of large-area farms in total number of farms ( %)
<b>X<sub>10</sub> (S)</b>	share of crops in total area of crops in Poland ( %)
<b>X<sub>11</sub> (S)</b>	share of farm animals in total number of farm animals in Poland ( %)
<b>X<sub>12</sub> (S)</b>	share of commercial agricultural production in the final agricultural production
<b>X<sub>13</sub> (S)</b>	capital expenditures in agriculture and hunting [PLN per ha AL]
<b>X<sub>14</sub> (S)</b>	gross value of fixed assets in agriculture and hunting (million PLN)
<b>X<sub>15</sub> (S)</b>	share of agriculture in the generated gross value added ( %)
<b>Social characteristics</b>	
<b>X<sub>16</sub> (S)</b>	population density in rural areas (people per km <sup>2</sup> )
<b>X<sub>17</sub> (D)</b>	non-working age population per 100 persons of working age
<b>X<sub>18</sub> (S)</b>	migration balance in rural areas
<b>X<sub>19</sub> (S)</b>	number of people employed in agriculture (per 100 ha AL)
<b>X<sub>20</sub> (D)</b>	share of unemployed persons in rural areas in the total number of the unemployed ( %)
<b>X<sub>21</sub> (S)</b>	share of households where income from agriculture constituted > 50 % of total income ( %)
<b>X<sub>22</sub> (S)</b>	share of farms where person in charge has higher education in the total number of farms ( %)

**Source: authors' elaboration based on data from the Central Statistical Office of Poland, 2017**

Identification of the character of diagnostic features assumed for assessment of the investigated phenomenon was carried out by determining whether they represent a positive or negative effect on its course. Investigating their identity led to classifying them into one of two subsets, i.e. the stimulants (S), whose higher values indicate a high level of development of the analysed phenomenon, or the destimulants (D), where high values indicate a distant position in the ranking under construction (Kukula K., 2000). In the case of diagnostic variables assumed for assessment of the level of agricultural development in Polish regions, the set of stimulants was constituted of: X<sub>1</sub>, X<sub>3</sub>, X<sub>4</sub>, X<sub>6</sub>, X<sub>7</sub>, X<sub>8</sub>, X<sub>9</sub>, X<sub>10</sub>, X<sub>11</sub>, X<sub>12</sub>, X<sub>13</sub>, X<sub>14</sub>, X<sub>15</sub>, X<sub>16</sub>, X<sub>18</sub>, X<sub>19</sub>, X<sub>21</sub>, X<sub>22</sub>, while X<sub>2</sub>, X<sub>5</sub>, X<sub>17</sub>, X<sub>20</sub> gained the status of destimulants. Identification of the character of the proposed features formed the basis for the process of their transformation in order to lead to comparability. This is because these features are expressed through different measurement units, with varied accuracy, and their values are characterized by a different range of variability. That is why it was necessary to standardize and set the range of assumed values. The standardization method was the tool which was used to standardize the selected diagnostic features. This method is a form of ratio transformation, where values of a diagnostic feature diminished by its arithmetic mean are compared to the standard deviation (Perkal J., 1954).



$$z_{ij}=(x_{ij} - \bar{x}_j)/S(x_j) \quad x_j \in S, \quad z_{ij}=(\bar{x}_j - x_{ij})/S(x_j) \quad x_j \in D, \quad (1)$$

where:

$z_{ij}$  – value of a diagnostic variable after standardization,  $x_{ij}$  – value of a diagnostic variable,  $\bar{x}_j$  – arithmetic mean,  $S(x_j)$  – standard deviation,  $S$  – set of stimulants,  $D$  – set of destimulants.

The standardized features were then used for constructing PERKAL index (PI) which allows to sort out a complex phenomenon with a single numerical measure, in this case the arithmetic mean (Mlodak A., 2006).

$$PI = \sum_{i=0}^n z_{ij} / n \quad (i = 1, 2, \dots, r) \quad (2)$$

where:

$PI$  – value of PERKAL index,  $z_{ij}$  – value of a diagnostic variable after standardization,  $n$  – number of investigated objects.

The values of determined PERKAL index (PI) allowed to create a ranking of Polish regions according to their level of agricultural development. This index also made it possible to classify the studied objects into three typological groups with a diverse level of agricultural development (Table 2).

Table 2

**Criteria of the division of Polish regions into groups with diverse levels of agricultural development**

Group	Criteria of division
<b>A</b>	$\max(PI) - 1/3[\max - \min(PI)] \leq PI \leq \max(PI)$
<b>B</b>	$\max(PI) - 2/3[\max - \min(PI)] \leq PI \leq \max(PI) - 1/3[\max - \min(PI)]$
<b>C</b>	$\min(PI) \leq PI \leq \max(PI) - 1/3[\max - \min(PI)]$

*Source: authors' elaboration based on Kukula, 2000; Paluch, 2015*

When creating the groups, the minimum and maximum values of PERKAL index (PI) were used. The presented division criteria indicate that the higher the value assumed by the synthetic measure (PI), the higher the level of the phenomenon which characterizes a given object, which caused its classification into a particular group in an ascending order, i.e. group A is composed of objects with the highest level, objects with medium levels were classified into group B, whereas group C comprises objects with the lowest development of the studied phenomenon (Paluch L., 2015).

**Research results and discussion**

Despite all the efforts which have been undertaken in recent years – contrary to the tendencies of developed economies – employment in agriculture is very high, with small farms still dominating, and suffers from a lack of many natural resources, capital and knowledge (Potori N. *et al.*, 2014). As a result, the dominant traditional agriculture is still not adapted to market conditions imposed by common market and is still heavily dependent on agricultural production. This factor, as well as the distance of the mentioned regions from major economic markets, creates a significant barrier to their economic development. It is therefore necessary to change the profile of business activity, by limiting the role of agriculture (which is currently dominant) and shifting the emphasis toward other sectors. Over the past years, a significant structural change has taken place in this area throughout the ongoing outflow of agricultural workers to other sectors of economy, mainly manufacturing or construction (Pogorzelski K., 2014).

Improving the quality of life for local communities will also help to stop negative demographic trends, including migration to more developed regions. In this context many positive changes can

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be noticed in Poland's agriculture. During the last years, we have witnessed, among other things, a spectacular decrease in the contribution of the agricultural sector to the total employment. Along with the decrease in employment, the contribution of the primary sector to the total value added has changed significantly over the last decade. Both changes have led to a major improvement in agriculture production in terms of efficiency. Agriculture in Poland has definitely improved its competitiveness in global food markets, but this is more a result of low cost production than of the effectiveness of the production process.

In 2004, there was more than 6 % of labour force working in the agricultural sector in the EU28 (Table 3). With successive enlargements of the European Union, the number of workers employed in agriculture rose to over 12 million in 2010 (5.4 % of labour force in EU28) and evolved to the level of 10 million in 2016 (4.5 % of labour force in EU28). Those changes in figures for 2010 and 2016 were due to the accession of Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland and Slovakia. But if we take into account only the changes in situation in New Member States, the number of jobs in the agricultural sector is declining rapidly. In those years, employment in Poland decreased from almost 18 % in 2004 to less than 11 % of labour force in 2016.

Table 3

**Employment by sectors in selected countries of Central and Eastern Europe ( % )**

Member State	Agriculture			Industry			Construction			Services		
	2004	2010	2016	2004	2010	2016	2004	2010	2016	2004	2010	2016
<b>EU 28</b>	<b>6.2</b>	<b>5.4</b>	<b>4.5</b>	<b>17.9</b>	<b>15.8</b>	<b>15.3</b>	<b>7.2</b>	<b>7.1</b>	<b>6.3</b>	<b>68.7</b>	<b>71.8</b>	<b>73.9</b>
<b>Czech Rep.</b>	3.9	3.1	3.1	29.9	27.3	29.0	8.8	9.3	7.8	57.4	60.3	60.1
<b>Estonia</b>	5.8	4.2	3.9	26.2	22.2	21.0	7.6	6.7	7.3	60.4	66.9	67.8
<b>Latvia</b>	10.8	7.8	7.6	19.3	16.4	15.9	7.0	6.9	6.8	62.9	68.8	69.7
<b>Lithuania</b>	15.6	8.8	8.0	20.0	17.6	17.5	8.0	7.0	7.6	56.4	66.6	66.9
<b>Hungary</b>	8.8	7.2	5.9	24.4	22.5	19.7	7.1	6.7	6.3	59.7	63.6	68.1
<b>Poland</b>	<b>17.9</b>	<b>13.0</b>	<b>10.6</b>	<b>23.3</b>	<b>22.1</b>	<b>23.7</b>	<b>5.8</b>	<b>7.9</b>	<b>7.2</b>	<b>53.0</b>	<b>56.9</b>	<b>58.5</b>
<b>Slovakia</b>	4.7	3.4	3.1	27.0	23.6	23.9	6.8	8.5	7.2	61.5	64.6	65.8

Source: authors' calculation based on data from the European Statistical Office, 2017

Table 4

**Gross Value Added by sectors in selected countries of Central and Eastern Europe ( % )**

Member State	Agriculture			Industry			Construction			Services		
	2004	2010	2016	2004	2010	2016	2004	2010	2016	2004	2010	2016
<b>EU 28</b>	<b>2.0</b>	<b>1.6</b>	<b>1.5</b>	<b>20.2</b>	<b>19.2</b>	<b>19.4</b>	<b>6.0</b>	<b>5.8</b>	<b>5.3</b>	<b>71.8</b>	<b>73.4</b>	<b>73.7</b>
<b>Czech Rep.</b>	2.5	1.7	2.5	31.0	29.9	32.1	6.6	6.9	5.5	59.8	61.5	59.9
<b>Estonia</b>	3.9	3.2	2.6	21.8	22.0	20.9	7.0	5.9	6.0	67.3	68.8	70.5
<b>Latvia</b>	4.8	4.4	3.9	17.5	18.4	16.0	6.5	5.0	5.3	71.2	72.2	74.7
<b>Lithuania</b>	4.6	3.3	3.3	25.4	23.2	22.2	7.2	5.8	6.5	62.7	67.6	68.0
<b>Hungary</b>	5.0	3.5	4.4	25.7	25.7	26.8	5.3	4.2	3.7	64.0	66.6	65.1
<b>Poland</b>	<b>3.7</b>	<b>2.9</b>	<b>2.7</b>	<b>25.5</b>	<b>24.7</b>	<b>26.5</b>	<b>7.2</b>	<b>8.5</b>	<b>7.2</b>	<b>63.6</b>	<b>63.9</b>	<b>63.6</b>
<b>Slovakia</b>	4.1	2.8	3.7	30.1	26.3	26.9	6.1	8.9	7.9	59.7	62.0	61.5

Source: author's calculation based on the data of European Statistical Office, 2017

According to these data, Polish agriculture lost almost half of its workplaces between 2000 and 2013. This is the most important and ongoing trend, related to global economic developments and

previously observable in all advanced economies, especially in Mediterranean Region. The decrease in agricultural employment affects all Member States but in particular the countries with the highest participation of workplaces in farming. As mentioned above, not only employment but also the share of agriculture, fishing and forestry in total value added of the whole economy has decreased drastically in Poland, even though GVA in agriculture still remained relatively large in comparison with most other European Union economies in 2016, with the level of almost 3 % (Table 4).

One of the crucial structural changes, observed in the primary sector, is the growing size of farms in Poland as an effect of land consolidation (Pasakarnis G. and Maliene V., 2010). During last decade, there has been a steady increase in the number of farms with large utilized agricultural area (UAA) (Table 5). However, there were still evident differences in the structure of agriculture across the EU. There were almost 11 million farms across the European Union in 2013 working with 174,6 million hectares of land (40.0 % of the total land area of the EU). The average size of a farm in EU28 was about 16 hectares, and less than 8 hectares in Central and Eastern countries (approximately 6.4 million farms in the 13 new Member States).

Table 5

**Number of farms according to farm size (UAA) in selected countries of Central and Eastern Europe**

Member State	<2	2-4.9	5-9.9	10-19.9	20-29.9	30-49.9	50-99.9	>100
<b>2005</b>								
<b>Czech Republic</b>	15 240	7 140	4 720	4 370	2 130	2 240	2 150	4 260
<b>Estonia</b>	4 870	7 700	5 570	4 390	1 650	1 300	950	1 320
<b>Latvia</b>	29 590	31 270	30 360	22 260	6 540	4 220	2 520	1 900
<b>Lithuania</b>	26 520	103 400	65 870	36 250	9 020	5 970	3 430	2 470
<b>Hungary</b>	583 850	57 340	28 960	18 990	7 570	6 400	5 650	6 040
<b>Poland</b>	<b>1 217 880</b>	<b>532 990</b>	<b>370 200</b>	<b>237 940</b>	<b>62 860</b>	<b>33 920</b>	<b>13 470</b>	<b>7 230</b>
<b>Slovakia</b>	56 010	5 650	1 920	1 200	520	590	630	1 980
<b>2010</b>								
<b>Czech Republic</b>	2 270	1 260	4 180	3 950	2 060	2 310	2 420	4 420
<b>Estonia</b>	2 360	4 250	4 070	3 470	1 480	1 170	1 090	1 720
<b>Latvia</b>	9 910	18 390	22 660	17 490	5 670	3 950	2 740	2 570
<b>Lithuania</b>	32 570	84 830	39 900	21 470	6 640	5 870	4 830	3 800
<b>Hungary</b>	455 530	46 060	26 540	19 430	7 950	7 440	6 410	7 450
<b>Poland</b>	<b>363 180</b>	<b>468 200</b>	<b>334 950</b>	<b>218 510</b>	<b>59 970</b>	<b>35 310</b>	<b>16 840</b>	<b>9 650</b>
<b>Slovakia</b>	9 460	6 290	2 660	1 630	730	700	780	2 210
<b>2013</b>								
<b>Czech Republic</b>	2 990	1 880	4 940	4 610	2 360	2 370	2 460	4 630
<b>Estonia</b>	2 200	4 140	3 970	3 340	1 400	1 180	1 150	1 790
<b>Latvia</b>	18 710	16 150	16 090	15 790	5 320	4 140	2 700	2 890
<b>Lithuania</b>	24 320	67 100	38 440	20 070	6 520	5 560	5 100	4 680
<b>Hungary</b>	373 010	42 550	25 550	20 160	8 350	7 490	6 590	7 640
<b>Poland</b>	<b>333 590</b>	<b>444 220</b>	<b>308 200</b>	<b>208 990</b>	<b>62 040</b>	<b>40 440</b>	<b>20 570</b>	<b>10 950</b>
<b>Slovakia</b>	7 430	6 450	2 860	2 220	770	730	790	2 310

Source: authors' calculation based on data from the European Statistical Office, 2017

On one hand, there was a large number (5.8 million) of very small farms (less than 2 hectares in size and only with less than 2.5 % of the total land area that was used for farming) in all EU

countries in 2010 (Martins C. and Tosstorff G., 2011). On the other hand, there was a small number (2.7 % of all farms) of very large farms with over 100 hectares of UAA that farmed half of the farmland. In 2013 these differences were even greater, there were 4.9 million (45 %) of very small farms (less than 2 hectares in size and only with 2.0 % of the total land area that was used for farming) and 3.1 % of very large farms with over 100 hectares of UAA that farmed 52 % of the farmland in all countries of the EU. These differences are similar in Poland, where not many farms over 100 ha (0.76 % of total number of farms) owned 21 % of UAA (Table 6). Nevertheless, the ownership of agricultural land is still highly fragmented (Hartvigsen M., 2014).

Table 6

**Share of the area of agricultural land used by farms according to their regional groups in selected countries of Central and Eastern Europe ( %)**

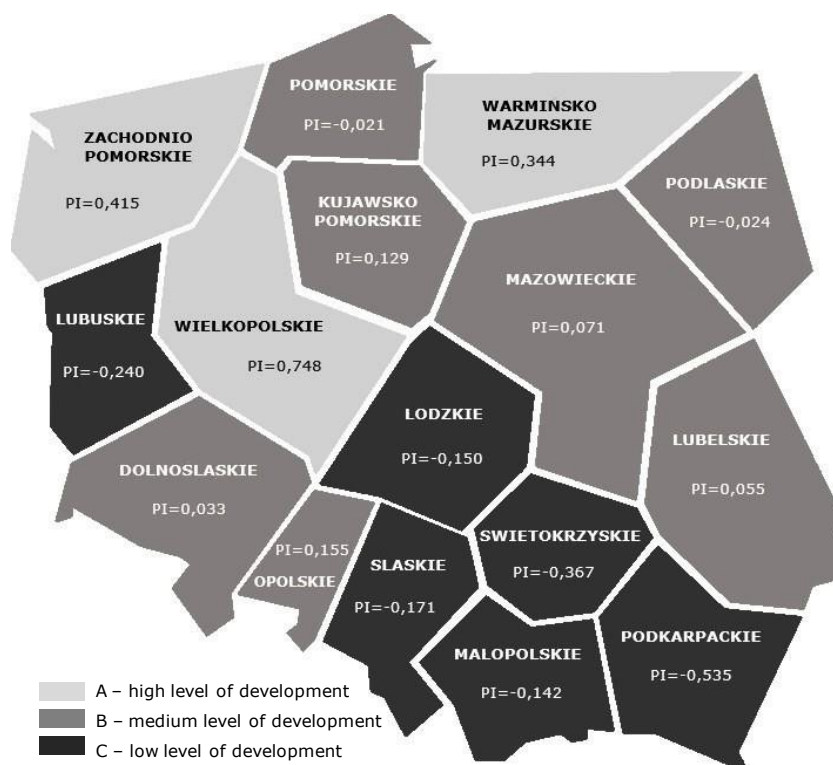
Member State	<2	2-4.9	5-9.9	10-19.9	20-29.9	30-49.9	50-99.9	>100
	2005							
<b>Czech Republic</b>	0.3	0.6	0.9	1.7	1.4	2.4	4.2	88.3
<b>Estonia</b>	0.8	3.0	4.8	7.4	4.8	6.0	7.8	65.4
<b>Latvia</b>	1.5	6.2	12.7	18.1	9.3	9.4	10.2	32.7
<b>Lithuania</b>	1.3	11.8	16.6	17.7	7.7	8.1	8.4	28.4
<b>Hungary</b>	4.3	4.1	4.6	6.1	4.2	5.6	9.1	61.9
<b>Poland</b>	5.9	11.7	17.9	22.1	10.3	8.6	6.1	17.4
<b>Slovakia</b>	1.5	0.9	0.7	0.9	0.7	1.2	2.4	91.8
Member State	2010							
<b>Czech Republic</b>	0.1	0.1	0.8	1.6	1.4	2.5	4.9	88.6
<b>Estonia</b>	0.3	1.5	3.1	5.2	3.8	4.8	8.1	73.2
<b>Latvia</b>	0.5	3.5	9.0	13.5	7.6	8.4	10.4	47.0
<b>Lithuania</b>	1.7	9.7	10.1	10.8	5.9	8.3	12.0	41.6
<b>Hungary</b>	2.9	3.0	3.9	5.7	4.1	6.0	9.5	64.7
<b>Poland</b>	3.3	10.6	16.5	20.8	10.0	9.2	7.9	21.6
<b>Slovakia</b>	0.5	1.0	1.0	1.2	0.9	1.4	2.9	91.1
Member State	2013							
<b>Czech Republic</b>	0.1	0.2	1.0	1.8	1.6	2.6	4.9	87.8
<b>Estonia</b>	0.3	1.4	3.0	5.0	3.6	4.8	8.4	73.5
<b>Latvia</b>	0.8	2.9	6.2	11.7	6.9	8.5	10.0	53.1
<b>Lithuania</b>	1.3	7.5	9.4	9.8	5.5	7.5	12.4	46.6
<b>Hungary</b>	2.5	2.9	3.8	6.0	4.3	6.2	9.8	64.4
<b>Poland</b>	3.0	10.0	15.1	20.0	10.4	10.6	9.7	21.1
<b>Slovakia</b>	0.4	1.1	1.0	1.7	1.0	1.5	3.0	90.4

Source: authors' calculation based on data from the European Statistical Office, 2017

When analysing the transformations in the agricultural sector in EU Member States, it is worth focusing also on the regional aspect. In scientific literature one can find the statement that one of the main factors inhibiting these transformations are the disproportions in the level of socio-economic and environmental development in the countries of the Community, which are even more evident in the regional arrangement (Stec M., 2008; Dominiak J. and Churski P., 2012, Bluszcz A., 2016; Maciejewski M., 2017; Szopik-Depczynska K. et al., 2017). Similar conclusions can be drawn from the results of analysis of the level of agricultural development in Polish provinces. This is because the analysis conducted with the use of PERKAL's index (PI) allowed to indicate three groups of regions representing various types of agriculture in Poland.

The main important feature that distinguishes Polish agriculture from other EU Member States are environmental conditions, which can include mainly soil quality, relief and water conditions. Important for the development of agricultural production in Poland is also spatial diversification of the agrarian structure. Agrarian structure consists of the share (shaped by history and changing over time) of different forms of ownership in land use. It also involves classification according to the share of farms in individual area groups (area size classes), classification of farms according to their economic size, labour force or capital resources. When conducting only the analysis of the agrarian structure (understood as the share of farms of given area size classes) and relating its results to various farm area groups, one can observe considerable structural diversification in agriculture in Poland (Musiał W., 2015).

The conducted analysis shows that the group with the highest level of agricultural development (A) included Wielkopolskie, Zachodnio-Pomorskie and Warminsko-Mazurskie provinces that have clearly the best agrarian structure and better agricultural condition compared to the others (Figure 1). These regions also have the greatest share in commercial production generated in Polish agriculture, which results from the fact that they belong to valuable (in terms of quality) resources of the natural environment. At the same time, these provinces are dominated by large farms built on the foundations of the socialist form of land ownership (functioning between 1949 and 1993), i.e. State Agricultural Farms (Polish: Państwowe Gospodarstwa Rolne - PGR), and their favourable location in relation to domestic and foreign markets allows to reach high profitability from agricultural activities (Ossowska L. and Janiszewska D. A., 2013).



Source: author's elaboration based on the data of Central Statistical Office of Poland, 2017

Fig. 1. Spatial diversification of the level of agricultural development in the regions of Poland

Regions in south-eastern Poland which (along with Lubuskie Province) were classified into the group with the lowest level of development (C) have different conditions for agricultural development. On the background of the country, these provinces are distinguished by exceptionally high agrarian fragmentation and a small average area of farms operating on them. Agricultural

development in these regions is also limited by the occurrence of less-favoured areas (LFA), which include: lowland zones with low productivity; mountain and foothill zones with technological, climatic and topographical difficulties in conducting agricultural production; and areas with specific difficulties generated by, for instance, industry. Therefore, the economic situation of farms located in this region can be regarded as relative technological backwardness with poor and underperforming business entities (Musiał W. and Wojewódzic T., 2015).

The most numerous group of provinces are those with an average level of agricultural development, classified into group B. These regions are also varied within the group they form, which is evidenced by the variability of the determined values of PERKAL's indices (PI). This group includes provinces with favourable conditions for management in the agricultural sector, i.e. with a high share of large-area farms, favourable labour force and a high level of technical equipment of farms which have been showing great dynamism of changes since Poland's accession to the EU. It also includes provinces where the importance of the agricultural sector in shaping the profile of the economy (functioning in areas with difficult environmental-climatic and soil conditions, surrounded by protected areas, i.e. national parks, landscape parks and Natura 2000 areas) at a regional level has been diminishing in recent years. This necessitates responsible and rational management of land resources in a manner reconciling the interests of nature and those of agriculture.

## **Conclusions**

Integration of Central and East European countries with EU structures after 2004 caused clear controversy and raised concerns both in the newly admitted countries and in the so-called "old" Union countries. This is because the newly admitted units belonged to the group of socio-economically less developed countries, the majority of which are the Eastern Bloc countries, characterized by a large share of the agricultural sector in domestic production and employment. Therefore, they posed a serious competitive challenge for the countries forming the then market of the Community. However, over time, these concerns turned out to be groundless, and the impulse generated by accession and the need to satisfy the requirements of the Common Agricultural Policy, and also to compete on the Community market brought benefits both for the existing and new EU countries, forcing (among other things) a range of positive changes in the structure of production and employment in individual sectors of their economy.

This is because results of the conducted research show that the increase in economic level in most of the analyzed central and East European Countries was accompanied by a gradual decline in the share of production and employment in agriculture in favour of industry, and above all the sector of services in the generated gross value added. However, it should be mentioned that these changes did not occur at the same rate and did not reach a similar range, which applies particularly to regions of the studied countries. The conducted assessment of the level of agricultural development using PERKAL's method of standardized sums showed that despite deep developmental transformations taking place in the Polish agricultural sector between 2004 and 2016, regional disproportions in this respect can still be noticed. This is because the above-mentioned issues are a result of intensification of the process of specialization and modernization in agriculture, the best example of which is the increase of the average area of a farm as well as the increase in efficiency and profitability of agricultural production in some regions of Poland.

However, the conducted research focuses on the current state, which is the consequence of dynamic socio-economic transformations taking place in rural areas thanks to the intense inflow of

financial capital from the Community's budget, as a result of both the pre-accession period and the period of Poland's membership. However, such a condition can change after 2020, when the countries that entered the EU after 2004 might strongly feel the effects of a decreased (in terms of the scale) extent and magnitude of financial support. This is because this situation can make the first sector of economy once again become a place where the unemployed will seek their chance and agriculture may once again be regarded as a buffer allowing to absorb potential shocks in the labour market, which can take place in the economies of the Community's countries, particularly taking into account the challenges the Community has to face, to which even now one can include future economic crises, global migration problems or the so-called 'BREXIT'.

### Acknowledgements

The publication was funded by the Ministry of Science and Higher Education of the Republic of Poland.

### Bibliography

1. Bluszcz, A. (2016). Classification of the European Union Member States According to the Relative Level of Sustainable Development. *Quality & Quantity*, No. 50(60), pp. 2591-2605.
2. Dominiak, J., Churski, P. (2012). The Role of Innovation in the Formation of Regions of Development and Those of Economic Stagnation in Poland. *Regional and Local Studies*, No. 4(46), pp. 54-77.
3. Grabinski, T. (1984). Multivariate Comparative Analysis in Research Over Dynamics of Economic Phenomena. Wydawnictwo Akademii Ekonomicznej, Krakow.
4. Hartvigsen, M. (2014). Land Reform and Land Fragmentation in Central and Eastern Europe. *Land Use Policy*, No. 36, p. 331-340.
5. Kukula, K. (2000). Metoda unitaryzacji zerowanej (The Zero-unitarization Method). Wydawnictwo Naukowe PWN, Warszawa.
6. Maciejewski, M. (2017). The Problems of the Economic Development of the European Union Member States. *Studia Ekonomiczne. Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach*, No. 319, pp. 117-126.
7. Martins, C., Tosstorff G. (2011). Large Farms in Europe. *Statistics in Focus*, No. 18, pp. 1-7.
8. Młodak, A. (2006). Analiza taksonomiczna w statystyce regionalnej (Taxonomic Analysis in Regional Statistics). Wydawnictwo Difin, Warszawa.
9. *Mountain areas in Europe: Analysis of Mountain Areas in EU Member States. Acceding and Other European Countries. Final Report.* (2004). Retrieved: [http://ec.europa.eu/regional\\_policy/sources/docgener/studies/pdf/montagne/mount1.pdf](http://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/montagne/mount1.pdf). Access: 25.01.2018.
10. Musiał, W. (2015). Regionalne zroźnicowanie rolnictwa rodzinnego w Polsce - wybrane aspekty (Regional Diversification of Agriculture Family in Poland - Selected Aspects). In: A. Chlebicka (Ed.) *Ekonomiczne mechanizmy wspierania i ochrony rolnictwa rodzinnego w Polsce i innych państwach Unii Europejskiej (Economic Mechanisms to Support and Protect Family Farming in Poland and Other European Union Countries)*. Ministerstwo Rolnictwa i Rozwoju Wsi, Fundacja Programów Pomocowych dla Rolnictwa FAPA, Warszawa, p. 89-108.
11. Musiał, W., Wojewodźc, T. (2015). Zroźnicowanie regionalne rolnictwa rodzinnego i sytuacja produkcyjno-ekonomiczna rodzinnych gospodarstw rolnych funkcjonujących w różnej strukturze agrarnej (Regional Diversification of Family Farming and the Production and Economic Situation of Family Farms Functioning in Various Agrarian Structures). In: M. Podstawka (Ed.), *Ekonomiczne i prawne mechanizmy wspierania i ochrony rolnictwa rodzinnego (Economic and Legal Mechanisms to Support and Protect Family Farming)*. Ministerstwo Rolnictwa i Rozwoju Wsi, Fundacja Programów Pomocowych dla Rolnictwa FAPA, Warszawa, p. 26-45.
12. Ossowska, L., Janiszewska, D. A. (2013). The Production Potential and Agricultural Development Determinants in Zachodniopomorskie Voivodeship. *Zeszyty Naukowe Szkoły Głównej Gospodarstwa Wiejskiego. Problemy Rolnictwa Światowego*, No. 13(2), 68-78. pp. 68-78.
13. Pałuch, Ł. (2015). Zastosowanie taksonomii w procesie pomiaru i oceny poziomu rozwoju społeczno-gospodarczego jako efektu realizowanej polityki społecznej (Application of Taxonomy in the Process of Measuring and Assessing the Level of Socio-economic Development as an Effect of the Implemented Social Policy). In: M. Kowalska (Ed.), *Wybrane aspekty polityki społecznej w Polsce - podręcznik dla studentów kierunków społecznych, ekonomicznych i rolniczych (Selected Aspects of Social Policy in Poland - a Handbook for Students of Social, Economic and Agricultural Studies)*. Wydawnictwo Uniwersytetu Rolniczego, Krakow, p. 199-225.
14. Parris, T. M., Kates, R. W. (2003). Characterizing and Measuring Sustainable Development. *Annual Review of Environment and Resources*, No. 28, pp. 559-586.

15. Pasakarnis, G., Maliene V. (2010). Towards Sustainable Rural Development in Central and Eastern Europe: Applying Land Consolidation, *Land Use Policy*, No. 27, p. 546–548.
16. Perkal, J. (1953). O wskaźnikach antropologicznych (About Anthropological Indicators). *Przegląd antropologiczny*, No. 19, pp. 209-219.
17. Pogorzelski, K. (2014). *Agricultural Development and Structural Change*, IBS Policy Paper 05/2014. Retrieved: [http://ibs.org.pl/app/uploads/2015/10/IBS\\_Policy\\_Paper\\_05\\_2014\\_eng.pdf](http://ibs.org.pl/app/uploads/2015/10/IBS_Policy_Paper_05_2014_eng.pdf). Access: 27.01.2018.
18. Potori, N., Chmielinski, P., Andrew, F. F. (2014). Structural Changes in Polish and Hungarian Agriculture Since EU Accession: Lessons Learned and Implications for the Design of Future Agricultural Policies. *Research Institute of Agricultural Economics*, Budapest, pp. 9-23.
19. Stec, M. (2008). Comparison of European Union Countries by Development Level. *National Economy*, No. 19(7-8), pp. 99-118.



## **DETERMINANTS OF THE ECODEVELOPMENT OF PROTECTED AREAS IN POLAND – LEGAL AND INSTITUTIONAL**

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**Abstract.** The area covered by protected areas in Poland amounts to 33.1 %; the region with the highest percentage of areas covered by them is in the Świętokrzyskie Voivodeship – 62 %. These areas are usually landscape parks and protected landscape areas. The basis of development of protected areas should be based on the production of high quality food and food processing. The aim of this paper is to present the problem of ecodevelopment of protected areas in Poland – legal aspects. The work discusses theoretical issues of instruments and institutions with reference to protected areas of Poland. Following the topic, the role of inhabitants and institutions in ecodevelopment of protected areas has been analysed. The problem of strategic management in the context of ecodevelopment has been raised in this paper. Special attention is paid to the participation of the public institutions and the authorities in ecodevelopment of protected areas. The main problems are law and instruments, which should support ecodevelopment of protected areas. The work ends with a brief conclusion. The conclusion suggests that institutional support is very important for development, especially economic instruments.

**Key words:** legal aspects, economic instruments, protected areas, ecodevelopment, Poland.

**JEL code:** H41

### **INTRODUCTION - THE REVIEW OF THE CHOSEN ECONOMIC INSTRUMENTS IN ENVIRONMENTAL PROTECTION**

The economic instruments take a special place among the means of environmental protection as it is more and more frequently expected to solve the problems of threats for the environment mainly economically. Their purpose is to influence the entities indirectly by affecting their financial results, therefore environmental protection stops being a side effect and becomes an important economic activity in the strict sense. The essence of the ecological application means preventative functions.

Simultaneously, considering the realizations of protection priorities, redistribution of financial resources is also crucial. It is based on collecting and transferring financial resources allocated for environmental protection. Apart from that, the functions of the economic instruments include the following functions: stimulating, transferring (earning income) and regulatory. The aim of this paper is to present the problem of ecodevelopment of protected areas in Poland – legal aspects. This paper presents problem of ecodevelopment of protected areas in Poland in the aspect of institutional support.

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Table 1

**Groups and types of economic instruments in environmental protection**

<b>Groups of instruments</b>	<b>Types of instruments</b>
<b>Ecological charges</b>	For taking over land for non-agricultural and non-forest purposes. For emitting pollution into the air, waste disposal, removal of trees and bushes and for water uptake and pouring sewage and mine waters including chloride and sulphate compounds into the waters belonging to the state (or the ground). Concession fees for looking for and excavating minerals. Administrative charges, for example, for issuing emission allowances. Product charges. Deposit charges.
<b>Subsidies</b>	Subsidies from the National Fund for Environmental Protection and Water Management and voivodeship funds for co-financing undertakings of the pro-ecological character. Preferential lending rules of ventures connected with environmental protection by the National Fund for Environmental Protection and Water Management and the Bank for Environmental Protection. Income tax credits for investment in environmental protection, VAT credits for using waste of reprocessing and agricultural tax credits. Budget subsidies.
<b>Financial incentives of law enforcement</b>	Penalties for polluting the air and discharging sewage into ground waters which do not meet the conditions defined in the so-called report of air protection and water permit, for exceeding permitted noise levels, penalties for inappropriate waste disposal, for removing trees and bushes without the required consent of the local administrative organ and others Collecting penalty interests for untimely payments and ecological penalties Enforced penalties and ecological fees in accordance with the regulations on enforcement procedures in administration
<b>Deposit and guarantee systems</b>	Deposit fee. Guarantee.
<b>Creation of the market</b>	Transferable permits (trade of pollution emission allowance). Interventions in the market mechanisms. Defining financial responsibility and creating the market of insurance against the ecological risk.
<b>Direct regulations</b>	Legal norms. Planning rules. Rules of administrative proceedings concerning the use of the natural environment, including bans and orders.

Source: Gorka K., Poskrobko B, Radecki W., *Ochronasrodowiska. Problemyspoleczne, ekonomiczneiprawne, PWE, Warszawa 2001, p. 78-153*; Bernaciak A., Gaczek W. M., *Ekonomiczneaspektyochronysrodowiska, Wyd. AE, Poznan 2002, p. 134-186*

The economic instruments binding in Poland can be grouped in the following way<sup>1</sup>.

- Fees:
  - for taking over land for non-agricultural and non-forest purposes,
  - for emitting pollution into the air, waste disposal, removal of trees and bushes and for water uptake and pouring sewage and mine waters including chloride and sulphate compounds into the waters belonging to the state (or the ground), the so-called emission charges,
  - concession fees for looking for and excavating minerals,
  - for administrative charges, for example, for issuing emission allowances,
  - product charges which currently refer to packaging and products especially harmful to the environment in Poland. They are charged to entrepreneurs who are obliged to recover and recycle given waste. The difference in the form of this fee is paid by the entrepreneurs and goes to special funds for environmental protection,

<sup>1</sup>Gorka K., *Ekonomiczneaspektyochronysrodowiska*. In: *Ochronasrodowiska. Problemy spoleczne, ekonomiczne i prawne, PWE, Warszawa, 2001, p.23.*

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- deposit fees which burden products harmful to the environment. They are returned if a purchaser returns a used product to the seller. This fee is charged in Poland, for example, to batteries. Deposits burden, for instance, packaging of chemical substances especially damaging to the environment, therefore they are regulated by law. The deposit is returned if the thing burdened with it is returned.
- Subsidies:
  - budget subsidies and loans of the funds for environmental protection and water management for co-financing undertakings of the pro-ecological character,
  - preferential lending rules of ventures connected with environmental protection,
  - income tax credits for investment in environmental protection, VAT credits for using waste of reprocessing and agricultural tax credits,
- financial incentives supporting law enforcement, for example, penalties,
- instruments creating the market (transferable permits, ecological insurance).

Nowadays there is also a fee connected with car recycling, the so-called wreckage fee.

The incentives supporting law enforcement are the instruments active before violation of environmental protection law or after violating it. Two elementary categories of incentives are used: penalties for violation of conditions of environmental protection and ecological deposits used if there is a probability of a breach of regulations in force; however, any subventions, subsidies and grants limit the use of the basic rule in environmental protection that "the polluter pays." The economic instruments are of a price character since they are most often defined in the form of unit fees, which mean a concrete cost burden for the user of the environment increasing together with the degree of environmental use<sup>1</sup>.

## **Institutional support for development of protected areas in Poland<sup>2</sup>**

Development of protected areas is also based on their institutional support. The importance of organizations both governmental and non-governmental is of a great importance for the discussed areas as for the given developmental standards. First of all, cooperation of state institutions with local communities in the protected areas should be based on creation of legal and financial bases to support pro-ecological activity of entities. This support is provided by numerous groups of factors. Improvement of the condition of the environment and its protection would not be possible if the support instruments did not exist. Development of the protected areas is connected with a lot of factors. Nowadays the most essential ones, apart from management and financing of pro-ecological actions in the given area, include the human and social capital. Regardless of the factors which we pay attention to, all of them should be based on the present law and its organs. In order to be able to implement these actions, they have to be previously recognized and included in the local action programmes. The impact of the given developmental factor on the given natural area will also depend on the form of the nature conservation. Different actions will be taken in the area of the national park and others in the area of the protected landscape.

**The economic factors** can be divided into organisational – managing and financial ones. The organisational and managing factors are connected with the institutions supporting development of protected areas. First of all, they are governmental and non-governmental organisations on the local, regional, national and international level. The governmental organisations supporting

<sup>1</sup>Sleszyński J., *Ekonomiczne problemy ochrony środowiska*. Agencja Wydawnicza Aries, Warszawa 2000, p. 122.

<sup>2</sup>This article is part of L. Poplawski's unpublished dissertation in English (The conditions of eco-development of rural communities in the protected areas of the Świętokrzyskie Voivodeship. The publishing house Wyd. Naukowe PWN. Warsaw, 2009).

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development of protected areas cooperate with the Ministry of the Environment and the organs subordinated to it. These organisations include: the Ministry of Agriculture and Rural Development, the Ministry of National Education, the Ministry of Finance, the Ministry of Science and Higher Education, the Ministry of Regional Development, the Agricultural Market Agency (AMA), the Agency for Restructuring and Modernisation of Agriculture (ARMA), the agricultural advisory centres (AAC).

The non-governmental organisations also support pro-ecological actions in the areas covered by protection. According to the data in the National Business Registry Number (REGON), 45.000 associations and over 7.000 foundations are registered in Poland. The total number of the members of these organisations is over 8 million, which makes up 20 % of the whole society. In spite of appearances, this number is not high in comparison with other countries. These organisations function individually or create bigger networks like the Polish Green Network. The organisations cooperate with other entities, for instance, the State Forests, self-governments and public entities. Most of the non-governmental organisations are associations. The main non-governmental organisations operating in Poland include:

- the League for Preservation of Nature (LOP) was formed in Cracow,
- the Polish Ecological Club (PKE) was formed in Cracow in 1980.

Moreover, there are local non-governmental organisations. The funds supporting development of protected areas include, for example:

- the National Fund for Environmental Protection and Water Management (NF) and Voivodeship Funds of Environmental Protection (FOS);
- international organisations supporting environmental protection, for instance: Greenpeace, World Wildlife Fund (WWF), the World Conservation Union (IUCN).

The financial factors concerning the range of financing especially environmental protection have already been presented in the previous subchapter. Furthermore, it should be mentioned here that the existing European resources can and are used for development of protected areas.

**The planning factors** make up the second group, which can be divided into spatial and strategic ones. First of all, the spatial factors include: *the study of conditions and directions for land planning* and *the local plan of land planning*.

*The study of conditions and directions for land planning* is a document defining the planned management of the whole territory of the commune in the general way, which includes information on the localisation of the areas designated for construction, the course of main transport routes, protected areas, etc. The study is accepted by the resolution of the Council of the Commune. It is a basis to elaborate the local land management plan and is a document preceding the realization of this plan. It includes the rules of land policy of the given place and integrates program documents and visions connected with economic and social development. This document includes a very wide scope of information on the natural environment of the commune, its society and economy. The discussed Study includes information in relation to the social and economic situation and directions of spatial development of the commune.

The local land management plan is a basis for "spatial planning" in the commune. According to art. 14 of the act of the 27<sup>th</sup> of March, 2003 on land use planning and management, it is a local legal act the arrangements of which (the local land management plan) take the provisions of special regulations concerning the area of the subject covered in the plan into account. Such special regulations include, for instance: the regulations of the act on environmental protection, the

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regulation concerning the given national park or landscape park as well as the protection plans of the given park. The obligation of drawing up this plan starts at the moment of establishment of the protection plan of the national park or the landscape one. While constructing the local plans, it is crucial to decide on the study of conditions and directions for land planning of the commune, which are binding on pain of invalidity of the plan. The protection plan of the park is superior in relation to the Study.

The self-governmental authorities are obliged to define the possessed natural resources and to valorise each natural element considering its vulnerability to civilisation progress. Its purpose is to elaborate such a land management plan the arrangement of which take natural resources into account to such a degree so that human activities will not contribute to deformation of the structure of natural resources. The communes situated in the protected areas of the Swietokrzyskie Voivodeship do not often have the elaborated land management plans. In individual documents there are the land management plans of the areas of the communes, in which a lot of natural conditions are also considered.

The strategic documents include: the Strategy of development of the communes which comprise of the main aims and conditioning of their development for the next 10-15 years during the changing internal and external conditionings. The strategy of development of the commune is programming of future actions. The essence of the strategy is prioritization of the purposes as there is never a possibility of a simultaneous realization of all the needs. In the first place, the aims making the future development easier should be implemented. The aim of the elaboration of the strategy is to prepare such an own document of the local authorities, owing to which they will be able to organize their future actions reasonably. The strategy should become the basis to conduct proper policy by individual entities acting in the local area, and especially by the public authorities. The basis of the strategy of development of the commune should be a plan of the maximum use of inner resources of the potential of the local entities as well as the advantages of its location. The strategy should be based on the detailed recognition of existing resources of the commune and values of its localization. In case of existing protected areas, the strategy should take spatial planning and programming, realizations and controls of business activity into account in accordance with the principles of sustainable and balanced development.

Legally protected areas express superiority of environmental protection over the entities and business activity in this area. The nature as a whole and its each element separately is a value in its own right in the legally protected areas, which human activity must subordinate to. The national and landscape parks, the nature reserves and the areas of the protected landscape create the national system of the protected areas. This system makes up the spatial structure of mutually completing forms of nature protection, connected with ecological corridors (the Act on protection ... 2004). Therefore, the task of the developmental strategy of the commune in protected areas is to elaborate an appropriate compromise between economic development and protection of natural environment.

The plan of environmental protection is a document taking all the strategic aims of ecological policy into account discussing the issues of natural resources protection and the detailed issues of environmental protection of the given region. According to the Act on the Right to protect the environment, the voivodeship, powiat and commune authorities are obliged to make plans of environmental protection. These plans are prepared every 4 years, including the ecological aims and priorities, the type and the schedule of pro-ecological actions and the resources necessary to

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achieve these goals. Each self-governmental unit has to make a report of feasibility of the plans every 2 years. The following main priority aims are often found in the Programmes of Environmental Protection of the communes in the protected areas of the Swietokrzyskie Voivodeship: improvement of the state of natural environment (supporting development of the infrastructure protecting the environment, constructing water intake stations and water supply systems, organizing waste management, building waste water treatment plants and storage reservoirs, exchanging coal-fired boiler houses into gas ones), increase in ecological awareness (a decrease in harmful pollution emission), improvement of landscape and aesthetic values (development of mining excavations, establishment of nature reserves).

The plan of waste management is drawn up on the basis of the act on waste of 27.04.2001 (the Official Journal no. 62, item 628). This Act introduces the obligation to elaborate the plans on the national, voivodeship, poviast and commune level. The discussed plan defines:

- a present state of waste management,
- foreseen changes in the scope of waste management,
- actions intending to improve the situation in relation with waste management,
- financial instruments for the realization of desired aims,
- a monitoring system and an assessment system of the realization of tasks, and especially a type, number and source of waste, which is to undergo the process of recovery or disposal,
- a localization of existing installations and devices for recovery or disposal of waste together with the list of entities doing business in this scope,
- actions intending to prevent production of waste or limits to the amount of waste and their negative influence on the environment as well as a proper procedure how to manage it, including a limit to the amount of biodegradable waste included in municipal waste brought to landfills,
- a designed system of waste management.

The third group are **the statutory factors**, including legislative ones. The elementary sources of law commonly binding in Poland in the scope of environmental protection are the following: the Constitution of the Republic of Poland, acts, resolutions and provisions as well as other regulations resulting from the acts. The legal acts include the guidelines as for the manner of using the nature, orders, bans and limits. The Polish legal acts are regulated by the international law of environmental protection.

The Constitution of the Republic of Poland of the 2<sup>nd</sup> of April, 1997 (the Official Journal of 1997 no. 78, item 483) "protects the national heritage and provides environmental protection, following the rule of sustainable development" (art. 5). Moreover, the Constitution sanctions the obligation to conduct policy by the authorities providing a contemporary citizen and future generations with ecological security and to support actions of citizens for protection and improvement of the environmental condition, and it imposes an obligation on each citizen to take care of the environment and be responsible for causing the deterioration of the environment (art. 74 and art. 86).

The Polish ecological law regulates the status of the areas and the objects with special natural values. The most important acts in this scope include:

- the Act of environmental protection of the 16<sup>th</sup> April, 2004 (the Official Journal no. 92, item 880),

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- the Act on the Right to protect the environment of the 27<sup>th</sup> of April, 2001 (the Official Journal no. 62 item 627 with subsequent amendments the Official Journal 03.190.1865 of the 7<sup>th</sup> of November 2003).

These acts are the basis to issue provisions and regulations as well as to adopt resolutions concerning the formation of a given type of areas, implement species protection for plants and animals as well as drawing up protection plans for national parks, landscape parks, and nature reservoirs. Here there are also all the obligations resulting from the international agreements and resolutions concerning protected areas.

**The social factors** include welfare and ecological awareness with education.

The important element of the formation process of the field of environmental protection is ecological awareness of society. The provision of common access to information on the environment and ecological education conducted properly can contribute to improvement of the quality of the environment to a greater degree. Such a conduct can also decrease a negative human impact on the nature. A human being has subjects discussing the issues of environmental protection on every level of education. Kindergartens, elementary schools, junior and senior secondary school as well as universities offer subject providing knowledge on this issue in their curriculum. Ecological topics are implemented in certain lessons through popularisation of ecological subject matter, for instance, through solving tasks, preparing wall newspapers in relation to the above mentioned subject area.

The National Strategy of Ecological Education realizes the following aims for sustainable development through:

- Raising complete awareness and increasing interest of the society in commonly connected economic, social, political and ecological issues,
- Enabling each man to acquire knowledge and skills necessary to improve the condition of the environment,
- Creating new models of behaviour, shaping attitudes, values and believes of individuals, groups and societies, taking care about the quality of the environment into consideration.
- School education from kindergarten education to higher one includes the whole range of actions and content, resulting from the age and direction of education as well as the regulations of the Act – the Right to protect the environment of 2001.

Until recently the ecological awareness in Poland was far from satisfactory, for example, devastated forests prove it. The forms of environmental protection limiting the use of some areas contribute to the fact that people start to pay more attention to the natural environment to a greater degree. The cases of devastation of the natural environment are discussed more and more frequently in everyday life, the press, the radio or TV. A lot of organizations are formed supporting development and taking care of protection of the areas especially valuable in terms of the nature. Numerous competitions, exhibitions and trainings concerning environmental protection are organized. The days connected with ecology are celebrated both in the country and in the world.

Education is provided by many institutions dealing with ecological teaching professionally. Those organised by national parks or landscape parks play the special role among various types of educational and information centres. Additionally, schools, plants and ecological organizations prepare ecological competitions. They are of a regional or national character. They are art competitions, for example, promoting a given ecological campaign, photo competitions depicting the beauty of animate and inanimate nature, showing naturally devastated places, music

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competitions such as an ecological song, a competition of ecological knowledge. For example, they are a competition for a slogan promoting the idea of the European Network of Areas NATURA 2000, a contest "the Black Forest" etc. What is more, educational activity is often conducted for tourists and the youth in national and landscape parks as a completion of school education. The national parks have special routes the so-called "didactic paths," museums and ecological education centres. A lot of information and educational materials are published and the access to websites is provided. Currently, 10 Polish parks have educational centres, and 17 parks run museum activity. Educational centres of national parks deal with environmental education of students from local schools of different levels. You can learn in such educational centres what a given entity does for the natural environment and how they try to protect it.

## **Discussion**

First of all, the social factors mean welfare of the country, territorial self-government units and other budget institutions which largely contributes to improvement of living conditions of inhabitants in rural areas, including protected areas. The additional source of income of families such as benefits or disability pensions support the elementary household budget. The appropriately high family budget residing in protected areas conditions their development. The financial resources cover the needs of inhabitants, for instance, connected with the zone of environmental protection such as education (books, trainings, studies, courses), ecological awareness (through the constant access to the Internet). Social benefits from the commune budgets contribute to lowering poverty in these areas, owing to which the general living standards of the local community are enhanced, which consequently leads to development of protected areas. The social help is based on giving and granting benefits such as invalidity, attendance, for single parents, special social benefits, family benefits, for the unemployed, etc. The financial resources can also be allocated from disability pensions: invalidity, attendance, inheritance, as well as from scholarships granted for the students living in given communes from the commune budget and from the European funds. The social financial resources are mainly from the commune budget, the state budget and the European Union one. To a much lesser extent, their source can come from other state and non-governmental institutions, as well as from private persons and foundations. Furthermore, according to a lot of authors, the political factors can be distinguished within the generally accepted factors.

The political approach to the issues of environmental protection is realized by political parties. Sustainable development assumes integration of social, ecological and economic aims, for instance, by implementing the ecological tax reform. These parties indicate the necessity of the effective implementation of the rule the one who pollutes should pay as polluters have to bear full costs of polluting the environment. The implementation of eco-social market economy also brings about development of small and medium-sized enterprises and new workplaces in such sectors of the economy as the power industry of renewable sources of energy, ecological agriculture, ecological building, environmentally-friendly transport. The parties emphasise educational matters of the society, also in the field of environmental protection, waste management and production of electricity from renewable sources.

"Environmental pressures have increased with the economic growth and in order to reduce a negative environmental effect, more attention is paid to the market based on instruments (environmental taxes, tradable permits etc.). Similarly to many countries, the implementation of

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the ecological tax reform has also started in Estonia" (EdaGruner et al., 2009), this sentence is a starting point to consider economic instruments in environmental protection. It should be noted that there is not a standardized system in this scope although the groups of instruments (Table 1) are the same in many countries. The analyses carried out by Th. Panayotou (1994) confirm a vast variety especially in the field of indirect instruments.

One should emphasize that "environmental taxes are still relevant economic instruments to facilitate the development of environmentally friendly behaviour of consumers and producers and to enhance economic efficiency" and they are the most important (EdaGruner et al., 2009; Panayotou Th., 1994). The example of the Czech Republic described by J. Kovar (2018) with regard to economic instruments proves that their use in view of functioning the tax system and the macroeconomic structures is a serious problem in the economy.

The development of protected areas ought to be supported and treated as an alternative source of income for farmsteads and rural areas. A similar point of view was presented by I. Bruksle and R. Zvirgzdina (2017), E. Gaule and G. Zilinskas (2013), M. Parlinska (2016), M. Parlinska and S. Hassani-Taibi (2016), A. Parlinska (2007, 2010) I. Pilvere (2012), and Y. Yusnita et al. (2012).

## Conclusion

The institutional support is an essential element of support of eco-development, therefore the respondents were asked how they evaluate given institutions in the context of development of their communes (Poplawski, 2009). The interviewees in the communes of Złota, Stopnica, Radoszyce, Michalow and Kije indicated that the authorities of all the levels of administration have a positive influence on development of their commune. The lower the level the self-government was, the friendlier authorities of the commune were. Nevertheless, apart from the above mentioned communes, the dwellers of all the other ones assessed their commune authorities very positively, which proves their trust in them (Poplawski, 2009).

Simultaneously, the land management is essential for the introduction of eco-development in protected areas, which conditions all the developmental processes in the long run, but also the instruments of environmental protection. Having analysed only the chosen economic instruments in Poland.

- 1) The conclusions are as follows.
- 2) The economic instruments are a tool to implement the ecological policy of the state and stimulate development of protected areas.
- 3) The tax differentiation applied in Poland frequently seem to be accidental and are not of a coherent character, but the tax system should support ecological attitudes – a lot of actions should be taken in this regard in the future.
- 4) The instruments applied in environmental protection should stimulate or even force protective undertakings, as well as minimise the social expenses of environmental protection, especially in the scope of the entities situated in protected areas.

## Bibliography

1. Bruksle, I., Zvirgzdina, R. (2017). Problems of Pricing as a Competitiveness Tool in Latvian Business Environment,
2. Proceedings of the 2017 International Conference "Economic Sciences for Rural Development" No 45 Jelgava, LLU ESAF, 27-28 April 2017, pp. 21-29.
3. Gaule, E., Zilinskas, G. (2013). E- Governance Development External Factors Analysis: Lithuanian Municipalities On Rural-Urban Divide, Economic Sciences for Rural Development, No. 31 Integrated and Sustainable regional development, Jelgava, pp. 146-152.

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4. Gruner, E., Salu, K., Oras, K., Nommann, T. (2009). *Environmental Taxes- economic Instruments for Environmental Protection*, EestiStatistikaKvartalikir. 3/09. Quarterly Bulletin of Statistics Estonia, pp. 16-21.
5. The Constitution of the Republic of Poland of 2<sup>nd</sup> of April, 1997 (the Official Journal 1997 no. 78, item 483).
6. Parlinska, A., 2007, Tax and Social Security Systems in Polish Agriculture, The Proceedings of The International Conference Competitiveness and European Integration, October 26-27, 2007 CLUJ-NAPOCA, ROMANIA, Regional and Rural Economics, pp. 233-239.
7. Parlinska, A., (2010). Public Administration in Poland, [W:] European Union Public Administration and Development Policies and Variations In V-4 Countries pod redakcja Eleonora Marisova, Slovak University of Agriculture in Nitra, pp. 189-201.
8. Parlinska, M., (2016). Information on the wholesale agricultural market [w:] Materials of the 8th international scientific - practical conference Ganja, Azerbaijan, nr 43, pp. 86-91.
9. Parlinska, M., Hassani, Taibi, S. (2016). Chosen Information Systems for Agriculture in Poland and France [w:] Economic Science for Rural Development, nr 43, pp. 86-91.
10. Pilvere, I. (2012). Support Payment for Agriculture in Latvia Regions, International Journal of Business and Management Studies, Volume 1, No. 1, pp. 553-564.
11. Poplawski, L. (2009). Poplawski`s unpublished dissertation in English (The conditions of eco-development of rural communities in the protected areas of the Swietokrzyskie Voivodeship. The publishing house Wyd. Naukowe PWN. Warsaw.
12. The Act on Environmental Protection of the 16<sup>th</sup> of April, 2004 (the Official Journal no. 92, item 880).
13. The Act the Right to Protect the Environment of the 27<sup>th</sup> of April, 2001 (the Official Journal no. 62 item 627 with subsequent amendments the Official Journal 03.190.1865 dated on 7<sup>th</sup> of November, 2003).
14. Yusnita, Y., Yahaya, I., MohdShaladdin, M., Wan Abd Aziz Wan Mohd Amin (2012). "Community Based Tourism and Quality of Life", Rev. Integr. Bus. Econ. Res. Vol 1(1), [www.sibresearch.org/uploads/2/7/9/9/2799227/riber2012-238\\_335-345.pdf](http://www.sibresearch.org/uploads/2/7/9/9/2799227/riber2012-238_335-345.pdf)/2014-03-19.
15. Panayotou, Th. (1994). *Economic Instruments for Environmental Management and Sustainable Development*, International Environment Program Harvard Institute for International Development Harvard University/[https://www.cbd.int/doc/nbsap/finance/Panayotou1994EconInstEnvMgSusDev\\_199EcInsEnvMgSusDev.pdf](https://www.cbd.int/doc/nbsap/finance/Panayotou1994EconInstEnvMgSusDev_199EcInsEnvMgSusDev.pdf)/2018-03-26.
16. Kovar, J. (2018). *Economic Instruments for Environmental Protection*/[https://www.czp.cuni.cz/knihovna/undp/modra/M14\\_kovar2.htm#IVa/2018-03-26](https://www.czp.cuni.cz/knihovna/undp/modra/M14_kovar2.htm#IVa/2018-03-26).

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## **ABSORPTION OF 2007-2015 EU FUNDING FOR UTILIZATION OF CULTURAL ASSETS IN RURAL AREAS IN SELECTED VOIVODSHIPS OF THE LOWLAND PART OF POLAND**

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**Abstract.** The paper presents the problems of the financing of cultural heritage in rural areas through EU funds in selected voivodships (Wielkopolskie, Lodzkie and Lubuskie) of Central Poland in the years 2007-2015. It examines the structure and the level of differentiation of the utilization of EU funds for projects related to the protection and promotion of cultural heritage depending on the spatial category of beneficiaries: rural communes and small towns, which together are treated as rural areas (separate analyses were conducted for rural areas situated in the vicinity of agglomeration, and for those located outside the sphere of influence of the voivodship capitals), counties, cities with district rights as well voivodship capitals. The study used the database of the projects co-funded by the European Union, which is available in the National System for Information Monitoring and Control (KSI SIMIK 07-13) - information as of 31st December 2015. The paper shows that in rural areas the projects thematically related to the creation of a new tourism product and development of sports and recreation infrastructure played the dominant role, while in voivodship capitals and in urban areas most of the activities were carried out in the field of revaluation of cultural heritage objects.

**Key words:** rural areas, Polish Lowland, EU structural funds, cultural heritage.

**JEL codes:** Z32, Z19, P48

### **Introduction**

In the past, agriculture was the main function of rural areas of the Polish Lowland, which is the central part of Poland. Today, the socio-economic development of this region is more diversified and it sees a dynamic development of non-agricultural functions (Adamowicz A., Zwolinska-Ligaj M., 2009). One of the major factors affecting this state of affairs is an important element of the neighbourhood and dynamic development of towns (Heffner K., 2016; Courtney P., Errington A., 2000). As a result, the main centres and cultural heritage assets are located in the towns and agglomerations of the Polish Lowland. However, cultural heritage objects and assets located in rural areas are also of great importance, since the fact that local communities may need to adjust their principles of life and management to environmental conditions contributed to the emergence of a specific culture of the region (Murzyn-Kupisz M., 2012).

Today, the maintenance of cultural heritage objects in good technical condition often exceeds the financial capacity of the local authorities; that is why the restoration and adjustment of these objects to new socio-economic functions (for example, tourism function) or the implementation of their own tasks (for example, education or administration) brings profits from both cultural and economic perspective. The renovated and restored cultural heritage objects, being the site of operation of the entities in museum education sector, stimulate the labour market and entrepreneurship. First, in the localities with a high cultural heritage potential there arise tourism products, which results in increased tourism movement. This is of great importance not only for the owners of accommodation and catering premises but also for the local trade, as well as for other activities directly or indirectly relating to the market supply of goods that are necessary to meet the needs of tourists (MacDonald R., Jolliffe L., 2003; Gralak K., 2009). Utilization of the restored cultural heritage objects for the implementation of administrative and social tasks promotes the integration of local communities and it positively affects the building of social and human capital of the region (Cawley M., Gillmor D. A., 2008). Thus, on the one hand, the activities aimed at the restoration and management of cultural heritage assets influence the state of preservation of these objects, and on the other hand, they stimulate socio-economic development in the local milieu.

One way of financing the reconstruction and adjustment of cultural heritage assets to new socio-economic functions is the EU financial support (Poweska 2017). One way of financing the reconstruction and adjustment of cultural heritage assets to new socio-economic functions is the EU financial support. In the conducted studies, it was found that the implemented projects positively affected the standards of living of the residents in rural areas (Wojewodzka-Wiewiorska A., 2017; Wojewodzka-Wiewiorska A., Krievina A., Melece L., 2017). In the years 2007-2013 (2015)<sup>1</sup>, this source was utilized for culture-related purposes very rarely. According to the SIMIK database of the Ministry of Infrastructure and Development of the Republic of Poland, in the period 2007-2015 project financing agreements under the EU Structural Funds designed for cultural heritage projects across Poland amounted to less than 2 % of their number and of the value of co-funding awarded. Despite their small share in a general amount of the EU financial support they had a significant effect on the cultural space of the regions.

The aim of the paper is to present the ways of spending of EU funds allocated for the purposes related to cultural assets in rural areas in selected voivodships of lowland Poland against a background of the remaining spatial categories. The study was conducted for the period 2007-2015 in three voivodships of the region: Łódzkie, Wielkopolskie and Lubuskie.

The article defines three research tasks:

- Investigation of the relationship between the overall value of the implementation of projects that are thematically related to culture and the amount of EU funding, depending on the spatial category of the regions;
- Definition of the goals on which EU funds were spent in rural areas in the Łódzkie, Wielkopolskie and Lubuskie Voivodships;
- Examination of the objectives of spending of the European "cultural" funds in rural areas in comparison with urban areas in the voivodships of Central Poland.

### **Methodological assumptions**

European projects thematically related to culture were carried out under four Operational Programmes: Infrastructure and Environment, Human Capital, Innovative Economy and Technical Assistance. The analysis also comprised "cultural" projects implemented in the years 2007-2015 under the Regional Operational Programme for the Wielkopolskie, Łódzkie and Lubuskie Voivodships.

In this paper, cultural assets are understood in the sense included in the Law of 15th February 1962 (Ustawa o ochronie ... 1962). These are tangible and intangible goods, which are a historical and cultural legacy and which – due to their specificity and peculiarity - also play the role of transmitters of aesthetic and artistic values. Other factors playing this important role also include: landscape setting of cultural objects, their popularity, ways of promotion, spatial access, forms of their accessibility and the functions performed by the particular object.

The analysis conducted in the paper takes into account the following features of projects: thematic scope, total value and the amount of the EU co-funding, as well as an area in which the project was implemented. On the basis of a thematic scope of projects, five categories of purposes were distinguished: revaluation of cultural objects, creation of a new tourism product, sports and recreation infrastructure, promotion and others. Based on studies of literature (Rakowska J., 2013) and taking into account the specificity of the selected voivodships of Central Poland, the following

<sup>1</sup> Under the N + 2 rule UE 2007-2013 may be spent by the of 2015.

spatial categories of beneficiaries were distinguished: rural communes and small towns, which together are treated as rural areas (rural areas situated in the vicinity of agglomeration and the areas located outside the sphere of influence of voivodship capitals were analyzed separately), counties, towns with district rights and voivodship capitals. The study was based on the statistical analysis method and the research findings were presented as tables and graphs.

### **The survey area**

The Polish Lowland is a region whose cultural characteristics largely result from the historical influence of agriculture in the process of socio-economic development in the past. Conditions for the development of agriculture, in both the entire Polish Lowland and in the voivodships under study are fairly difficult. Predominance of poor and medium quality soils, mainly soil quality class of the 5th and 6th quality class, adverse and varied climatic conditions, drought periods interlaced with the periods of flooding, as well as frequent weather anomalies occurring in the region have adverse effects on the agricultural production process. At the same time, the lowland terrain, coupled with the absence of natural resources and raw materials, led to a great intensity of cultivation of the agricultural land in the past. Centuries-long tradition of farm management has resulted in high skills of the farmers in the field of farming culture.

At the same time, each of the voivodships under study retained its own specificity and diversity. The Wielkopolskie Voivodship is a leading area, in both the Polish Lowland and in the whole Poland, in terms of the efficiency and the level of global commodity agricultural production. However, the specificity of the Lubuskie Voivodship is the domination of forest areas (over 50 % of its surface), hence the frequent game damage in the vicinity of forests, which adversely affects the agricultural production process. In the Lodzkie Voivodship, agriculture performs not only economic function but also: (1) social function, as a stabilizer and buffer of economic shocks, (2) cultural function because of the protection of tradition and regional and local identity as well as preservation of the rural landscape, and also (3) natural function including the protection of biodiversity or preventing soil erosion.

A very rapid agricultural transformation in the region has been observed over the past decade. Polish farmers using EU Assistance Funds modernized their farms; in many cases they increased the acreage of agricultural land, purchased agricultural equipment and machinery and built new livestock buildings. This led to increases in production levels and to an improvement in competitiveness in the European market. European Funds were also used to finance culture-related projects, which was analysed in this paper.

### **Findings of the study**

In the years 2007-2015, the number of projects relating to cultural heritage assets carried out in Poland with the EU financial support amounted to 1678<sup>1</sup>. This constituted around 2 % of European projects implemented in Poland in all thematic fields. It follows from the above that the potential of cultural heritage assets was not among the major purposes of the EU co-funded investments. Statistics relating to the cultural projects co-financed by EU funds and allocated to the Polish Lowland were similar. Altogether, in the Wielkopolskie, Lodzkie and Lubuskie Voivodships 158 agreements were signed and implemented; this constituted less than 10 % of all cultural projects completed at that time. Most of the agreements were realized in the Wielkopolskie

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Voivodship, but here the value of the projects was relatively lower than that in the Lubuskie and Lodzkie Voivodships (Table 1).

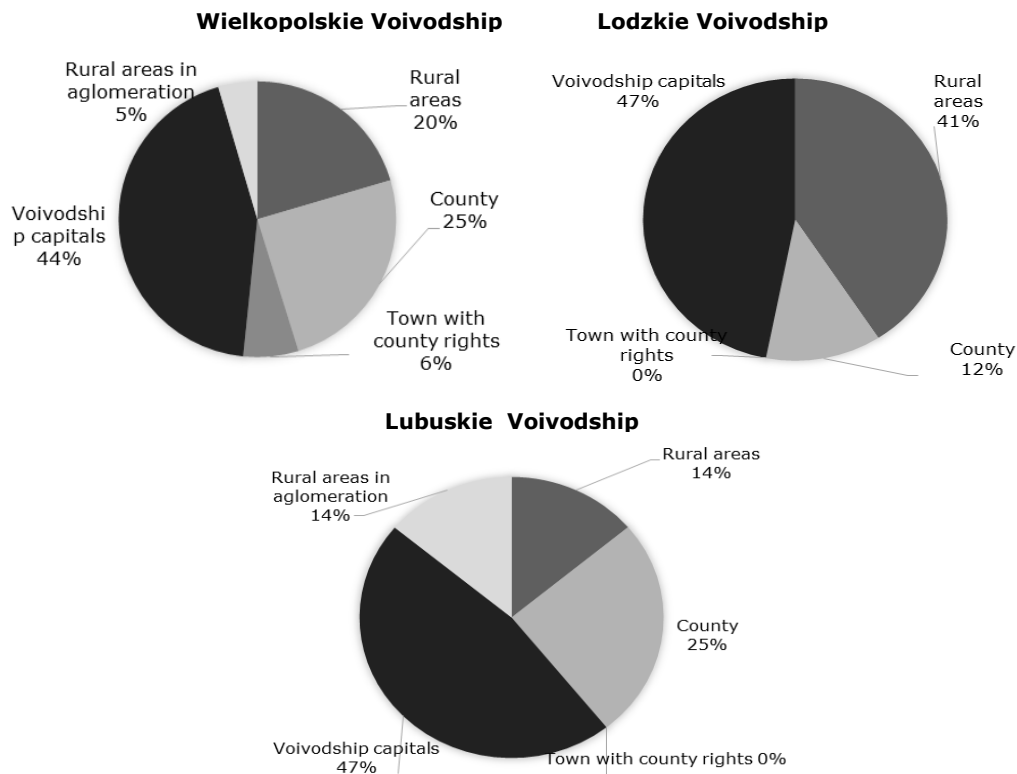
Table 1

**The number and the value of cultural heritage projects co-financed from EU funds in some voivodships of Lowland Poland in the years 2007-2015**

Specification	Number of projects	The total value of projects		Amount of co-funding from the EU funds		%
		total	for 1 project	total	for 1 project	
	total	Thousand EUR				
<b>Lodzkie</b>	25	76354.3	3054.2	46992.0	1879.7	61.5
<b>Lubuskie</b>	16	74462.3	4653.9	25464.0	1591.5	34.2
<b>Wielkopolskie</b>	117	148938.4	1273.0	78840.1	673.8	52.9

Source: author's calculations based on KSI SIMIK 07-13 as of 31 December 2015

An average value of the cultural project completed in the Wielkopolskie Voivodship amounted to EUR 1.27 million, with the support of the EU funds totalling EUR 0.7 million, while in the remaining voivodships this value amounted to EUR 4.6 million and EUR 3.0 million, with the support from the EU budget amounting to EUR 1.6 million and EUR 1.9 million respectively. Projects of lower value were especially allocated to the local milieu, which is very important from the point of view of development of rural areas (Fig. 1).

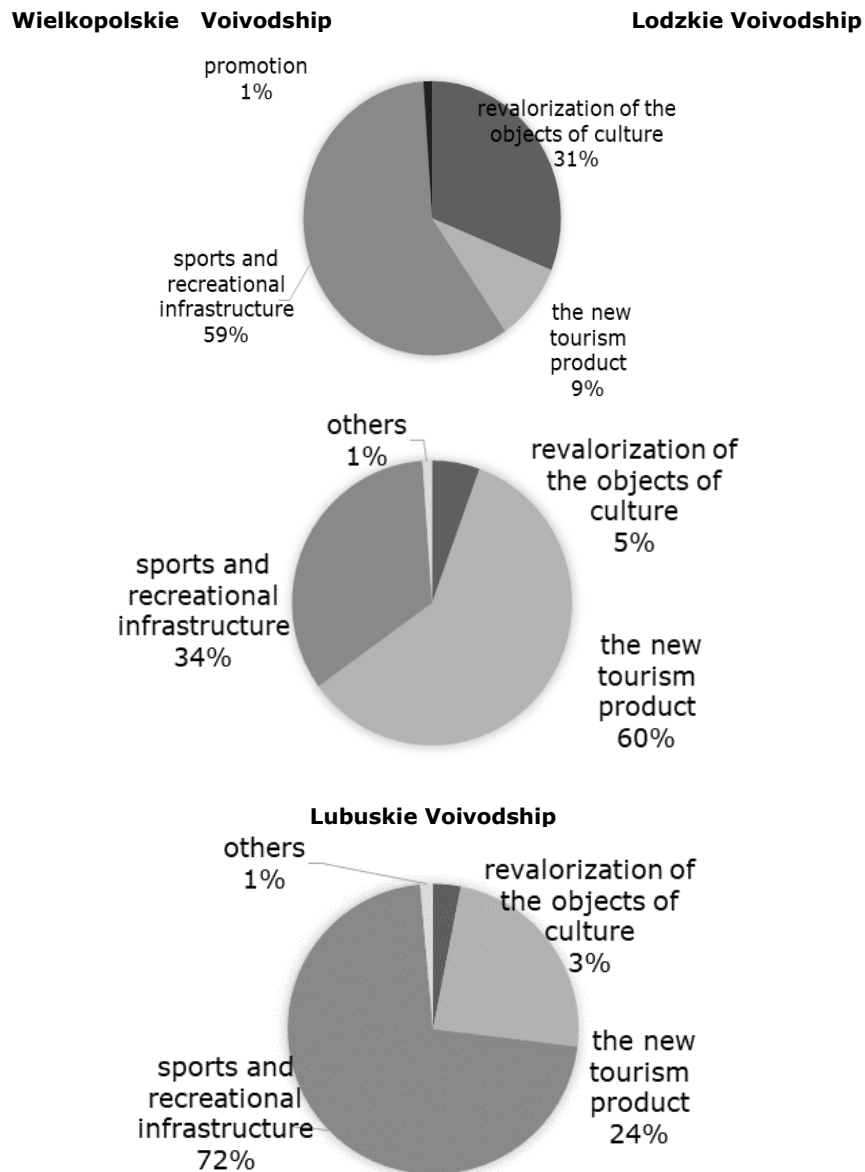


Source: author's calculations based on KSI SIMIK 07-13 as of 31 December 2015

**Fig. 1. The structure of cultural heritage projects co-financed from EU funds in some voivodships of Lowland Poland in the years 2007-2015 by type in areas.**

When analysing the structure of projects across regions, one should point to a clear domination of voivodship capitals, which, together with the adjacent areas situated in agglomerations, accumulated from almost 50 % in the Lodzkie and Wielkopolskie Voivodships to more than 60 % in the Lubuskie Voivodship of the value of EU co-funding for the European cultural projects completed over the 2007-2015 period. In rural areas, however, the largest amount of the EU grants for European projects was reported in the Lodzkie Voivodship (41 %), with 20 % in the Wielkopolskie and 14 % in Lubuskie Voivodship.

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Source: author's calculations based on KSI SIMIK 07-13 as of 31 December 2015

Fig. 2. **The structure of cultural heritage projects co-financed from EU funds implemented in rural areas in some voivodships of Lowland Poland in the years 2007-2015 by type of project**

The analysis of the objectives of the projects implemented with the support of the EU grants and spent in rural areas shows differentiation between voivodships in terms of investments made using European funds (Fig. 2). The activities related to sports and recreation infrastructure were of great importance. In the Lubuskie Voivodship, as much as 72 % of the EU funding was spent on this purpose. 59 % was spent in the Wielkopolskie Voivodship and 34 % in the Lodzkie Voivodship.

An average value of the cultural project completed in the Wielkopolskie Voivodship amounted to EUR 12.7 million, with the support of the EU funds totalling EUR 0.7 million, while in the remaining voivodships this value amounted to EUR 4.7 million and EUR 3.1 million, with the support from the EU budget amounting to EUR 1.6 million and EUR 1.9 million respectively. Projects of lower value were especially allocated to the local milieu, which is very important from the point of view of development of rural areas.

Table 2

**The total value and co-funding from the EU funds of cultural projects co-financed from EU funds in some voivodships of Lowland Poland by type of products and type of area**

Type of area	Voivodship					
	Wielkopolskie		Lubuskie		Lodzkie	
	The total value of cultural projects	Co-funding from the EU funds	The total value of cultural projects	Co-funding from the EU funds	The total value of cultural projects	Co-funding from the EU funds
	thousand EUR	%	thousand EUR	%	thousand EUR	%
<b>Revalorization of the objects of culture</b>						
<b>Rural areas</b>	10 895.9	53.3	226.2	64.0	1 773.0	68.0
<b>County</b>	16 288.8	63.5	3598.8	43.0	3 423.4	53.6
<b>Town with county rights</b>	3 379.4	64.4	0.0		0.0	
<b>Voivodship capitals</b>	20 763.5	64.3	3179.9	82.1	26 957.4	71.1
<b>Rural areas in agglomeration</b>	2 314.0	53.8	1292.3	56.8	0.0	
<b>The new tourism product</b>						
<b>Rural areas</b>	3223.6	57.4	1763.6	43.5	19130.8	66.5
<b>County</b>	3580.0	53.8	7774.6	29.4	3388.1	67.4
<b>Town with county rights</b>	0.0		0.0		0.0	
<b>Voivodship capitals</b>	38205.5	46.3	4751.9	40.93	7538.4	38.3
<b>Rural areas in agglomeration</b>	1188.2	63.3	0.0		0.0	
<b>Sports and recreational infrastructure</b>						
<b>Rural areas</b>	20460.0	39.8	5289.8	49.1	10 873.6	45.9
<b>County</b>	13386.2	46.3	5255.4	50.0	2 916.6	56.8
<b>Town with county rights</b>	3638.9	64.6	0.0		0.0	
<b>Voivodship capitals</b>	1623.8	32.46	35419.8	20.8	0.0	
<b>Rural areas in agglomeration</b>	3709.9	42.7	5803.8	48.5	0.0	
<b>Promotion and others</b>						
<b>Rural areas</b>	382.1	84.5	106.0	29.9	353.2	71.0
<b>County</b>	1439.6	83.7	0.0		0.0	
<b>Town with county rights</b>	639.2	83.9	0.0		0.0	
<b>Voivodship capitals</b>	4049.4	73.5	0.0		0.0	
<b>Rural areas in agglomeration</b>	0.0		0.0		0.0	

Source: author's calculations based on KSI SIMIK 07-13 as of 31 December 2015

It should be stressed that EU grants are particularly important for projects relating to renovation and revaluation of cultural heritage objects in rural areas of Great Poland. The effect of these investments is the improvement of cultural landscape in rural areas of this region. However, a very high share of spending on the development of sports and tourist infrastructure is a consequence of many years of neglect in this field in rural areas (Table 2).



It was reported that the spending on the purposes related to the reconstruction of cultural heritage goods under culture-related projects was the highest, which can be seen especially in the Wielkopolskie and Lodzkie Voivodships. There, EU funding also amounted to 60 % of the total value of projects. In the Lubuskie Voivodship, however, most of the EU funds received under culture-related projects were spent on the development of sports and recreation infrastructure. While voivodship capitals spent most of the funds, beneficiaries in rural areas utilized from about 20 % in the Wielkopolskie Voivodship to 30 % in the Lubuskie Voivodship. Irrespective of the type of area and the voivodship, the highest EU financing was reported in the case of projects thematically related to promotion, where the co-funding amounted to 70-80 % of the total value of projects. However, as regards the purpose of revaluation of cultural heritage objects, the highest funding was reported in voivodship capitals, regardless of the voivodship, and it ranged from 60 to 80 % of the absolute value of the completed projects. When analysing the value of co-funding in the case of purposes comprising a new tourism product and development of tourism infrastructure, it should be noted that the largest EU grant was reported in rural areas and in rural districts where it ranged from 50 to 60 % as compared to the level of co-financing ranging from 20 to 40 % in urban areas. The towns with district rights were the only case where the co-financing exceeding 60 % for projects relating to development of sports and tourist infrastructure was reported.

## Conclusions

The analysis conducted in the study leads to the following conclusions:

- There are differences in the value of EU funding for culture-related projects carried out in the voivodships of the Polish Lowland over the period 2007-2015. The highest share – more than 60 percent – of EU funds in the total value of projects was reported in the Łódzkie Voivodship, while in the remaining voivodships this share amounted to 50 percent and 30 percent respectively in the Wielkopolskie and Lubuskie Voivodships;
- The analysis of the amount of EU funding for culture-related projects depending on the spatial category shows that in all the voivodships of the Polish Lowland much more funds were spent in urban areas (agglomerations, towns with county rights) than in rural areas (small towns, villages and rural districts);
- Among cultural projects implemented in the region and co-funded by the European Union major goals were related to the creation of a tourism product and the development of sports and recreation infrastructure, while in the voivodship capitals and in urban areas most activities focused on the revaluation of cultural heritage objects.

## Bibliography

1. Adamowicz, M. (2009). *Koncepcja wielofunkcyjności jako element zrównowoczonego rozwoju obszarów wiejskich* (The concept of multifunctionality as an element of sustainable development of rural areas). *Polityki europejskie, finanse i marketing*. No. 2 (51 - T. 2). Warsaw: Wydawnictwo SGGW, 2009. p. 11-38.
2. Cawley, M., Gillmor, D.A (2008). *Integrated Rural Tourism: Concepts and Practice*. *Annals of Tourism Research*. Vol. 35, Iss. 2. pp. 316-33.
3. Courtney, P., Errington, A. (2000). *The Role of Small Towns in the Local Economy and Some Implications for Development Policy*, *Local Economy*, Vol. 15, Iss. 4. pp. 280-301.
4. Gralak, K. (2009). *Funkcja turystyczna i jej znaczenie dla rozwoju lokalnego i regionalnego* (Tourism function and its importance for local and regional development). In: H.Powęska (ed), *Sposoby wykorzystania dóbr kultury dla potrzeb rozwoju funkcji turystycznej na Mazowszu przy wsparciu z funduszy strukturalnych*. Wydawnictwo SGGW, Warsaw, pp. 22-35.
5. Heffner, K. (2016). *Obszary wiejskie i małe miasta: czy lokalne centra są potrzebne współczesnej wsi?* (Small towns and rural areas. Do local centres needed by contemporary countryside?). *Studia Ekonomiczne. Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach* No 279. p. 11-22.

6. MacDonald, R., Jolliffe, L. (2002). *Cultural Rural Tourism: Evidence from Canada*. Annals of Tourism Research. Vol.30. Iss. 2. pp. 307-322.
7. Murzyn-Kupisz, M. (2012). Dziedzictwo kulturowe a rozwój lokalny (Cultural Heritage and Local Development). Wydawnictwo Uniwersytetu Ekonomicznego w Krakowie, Krakow, p. 350.
8. Powęska, H., 2017, Absorption 2007-2013(2015) EU funding for utilization of cultural assets in Dolnośląskie Province by spatial categories with special reference to rural areas. Roczniki Naukowe Stowarzyszenia Ekonomistów Rolnictwa i Agrobiznesu, T.XIX, z. 3. pp. 238-243
9. Rakowska, J. (2013). Klasyfikacje obszarów - kryteria, definicje, metody delimitacji. Studium metodologiczno-statystyczne (Classifications of areas - criteria, definitions, methods of delimitation. Methodology and statistics). Wydawnictwo Wiesz Jutra. Warsaw. p. 142.
10. Ustawa o ochronie dóbr kultury z dnia 15 lutego 1962. (Act of February 15 concerning the protection of cultural assets). Dz.U. 1962. Poz. 48.
11. Wojewodzka-Wiewiorska, A., Krievina, A., Melece, L. (2017). Building Social Capital Through Leader Approach 2007-2013: Case of Latvia and Poland. Proceedings of the International Scientific Conference Rural development 2017, Aleksandras Stulginskis University, Kaunas 2017. pp. 1-7, DOI: 10.15544/RD.2017.131.
12. Wojewodzka-Wiewiorska, A. (2017). The Importance of the Leader Programme 2007-2013 in the Rural Areas Development in Poland. Proceedings of the International Scientific Conference Research for Rural Development 2017. Vol. 2. (pp. 97-103). Jelgava, Latvia: Latvia University of Agriculture.
13. <https://www.funduszeuropejskie.2007-2013.gov.pl>. The SIMIK database of the Ministry of Infrastructure and Development of the Republic of Poland.

## FARMERS' OPINIONS ABOUT THE PROSPECTS OF FAMILY FARMING DEVELOPMENT IN POLAND

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**Abstract.** Rural areas are inhabited by a large proportion of Poland's population, and farming production is responsible for a considerable quota of the country's economy. The production is characterized by the occurrence of a large number of individual farms. The quality of life of farmers and other country dwellers plays an important role in sustainable farming and this is why measuring of farmers' satisfaction level, verifying if their production provides them with satisfying income, and defining prospects and development opportunities are so vital. The aim of the study was twofold. The author wanted to check if Polish farmers can see any possibilities of developing their production, and if so, to establish its direction. The data for the study were obtained during 2014 and 2017 and provided by 155 respondents who filled in questionnaires. The study proved that almost half of the farmers were not satisfied with the income they obtained from farming production. At the same time, most of the respondents stressed that they were willing to pursue alternative operations in order to improve their inadequate economic situation.

**Key words:** rural areas, farming, non-farming operations, development opportunities

**JEL code:** D21, O10, Q01, Q12, Q13

### Introduction

Poland's rural areas are inhabited by a large proportion of the country's population. Farming production is responsible for a considerable quota of the country's economy. On one hand, farming determines the country's whole food production and secures its food demand as far as its quality and quantity are concerned (Cordell D., et al., 2009; Foley, J. A., et al., 2011; Godfray H. C. J., et al., 2010; Schmidhuber J., Tubiello F. N. 2007). What is more, it also provides the society with other non-food products used in certain industries (Bonjean A., Le Goffic F., 1999; Kerckow B., et al., 1997; Kim S., Dale B. E., 2004; Kocar G., Civas N., 2013; Smeets, E. M., et al., 2007; White B., Dasgupta A., 2010). On the other hand, farming production must also secure the needs of the farmers and their families (Prus P., 2008). Unfortunately, farming and rural areas experience numerous problems, which stem from the lack of balance between eco-natural, economic and social factors (Koreleska E., 2016). The harmony between the three spheres is the key when it comes to implementing the ideas of sustainable development in rural areas and agriculture (Marsden T., et al., 2002; Olesen J. E., Bindi M., 2002; Pasakarnis G., Maliene V., 2010; Westhoek H. J., et al., 2006). The country has a long history of underdeveloped economy, which remains the most serious obstacle in levelling up the differences in development of rural areas in Poland, and it has negative influence on the undergoing social processes (Wojewodzic T., 2005). In order to meet the contemporary demands of the sustainable economy and achieve complex socio-economical goals, farmers must understand the need to adjust their production to the ever-changing farming market requirements. This can be achieved by means of changing the orientation of their production or integrating with, and creating networks with other farmers in the supply chain (Bojar W., et al., 2017; Sikora M., Bielski I., 2017), which would help them to function more effectively in a dynamic environment.

The fundamental changes which took place in Poland in 1990s demonstrated the weakness and ineffective structure of the Polish farming as well as over-employment in this sector of the country's economy (Mickiewicz A., Mickiewicz B., 2014; Mickiewicz B., Mickiewicz A., 2017; Pawlak J., 2001; Poczta W., Pawlak K., 2010). On the other hand, due to numerous advancements

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in technology, the changes also helped to rationalize the production and develop the agricultural know-how. The farming and non-farming sectors started to compete for land, which resulted in diminishing of the available arable land by 1.4 m ha between 2002 and 2010 in Poland (Marcysiak T., Prus P., 2017).

Sustainable farming regards the quality of life of farmers and other country dwellers as one of its priorities (Prus P., 2008; Kowalska M., et al., 2016). Polish farming production is characterized by the occurrence of a large number individual farms. Checking farmers' satisfaction level, verifying if production provides them with satisfying income, and defining prospects and development opportunities is vital (Roman M., et al., 2018).

The aim of the research was to learn about individual farmers' satisfaction regarding the income obtained from farming production, the opportunities for and the directions in which their farms might develop.

### **Material and the research method**

The study data was collected using the questionnaire method among 155 Master's degree students of Agriculture during 2014 and 2017. They were either farm owners themselves or were soon to take over and run their parents' farms. Therefore, rather than being random, the choice of the sample group was deliberate. The author wanted to discover the opinions of young farmers who are bound to shape the image of Polish farming in the near future. It must be said that the respondents interest in the subject was above the average. Having graduated from secondary schools and having completed the first degree of Agriculture studies, they decided continue their education and enrolled for the master's degree course. Following the opinions of other authors (Dutka B., Mickiewicz B., 2015; Kalinowski S., 2011; Kielbasa B., 2016; Prus P., Drzazdzynska K., 2017; van den Ban A. W., Hawkins H. S., 1996; Zawisza S., Pilarska S., 2005), it can be argued that formal education, professional know-how, practical skills, having access to up-to-date information and professional advice considerably facilitate farm organization and management. These factors also stimulate entrepreneurship because they help farmers recognize potential business opportunities, consequently leading to farm improvements and the overall development of the rural areas.

The empirical data was verified using the statistical hypothesis test. The author tried to determine whether there were any statistically relevant differences between the respondents' answers and the chosen variable in the studied community. He decided that the size of a farm should be used as the variable to differentiate both the groups, as it determines its production potential and development prospects, (Rys-Jurek R., 2008; Rys-Jurek R., 2009; Satola L., et al., 2014). The average size of a farm in the Kujawsko-pomorskie region in the studied period (Srednia powierzchnia ..., 2017) was 15 ha and this value was adopted to distinguish between the two groups.

The statistical analysis was performed in two stages. Firstly, the existence of relationship was tested, followed by determining its force and direction. In order to confirm the relationship between the variables, the author used the Chi-squared test ( $\chi^2$ ). In order to establish its character (direction) and strength, the author established the Pearson contingency coefficient [C] and the convergence coefficient [g], which were calculated twice for both events:  $g_{rc}$  (convergence: row to column) and  $g_{cr}$  (convergence: column to row) (Babbie E., 2003; Dziekanski P., 2016; Dziekanski P., 2017; Gruszczynski L. A., 1986; Sobczyk M., 2004). The conducted statistical

analysis proved that the differences between both groups were statistically relevant. The farmers exhibited different level of satisfaction regarding the profits obtained from farming production. They also had different ideas regarding new ventures aimed at improving their income (Table 1).

Table 1

**Differences in farmers' opinions versus farm size – Chi-squared test results ( $\chi^2$ ), Pearson contingency coefficient (C) and the convergence coefficient (g)**

Respondents' opinions on	$\chi^2$ $\alpha=0,01$	$\chi^2$	C	grc	gcr
income from farming production	13.277	14.329*	0.291	0.100	0.035
the potential for generating additional income	13.277	2.168	-	-	-
actual attempts to obtain additional income	23.209	25.344*	0.283	0.000	0.157

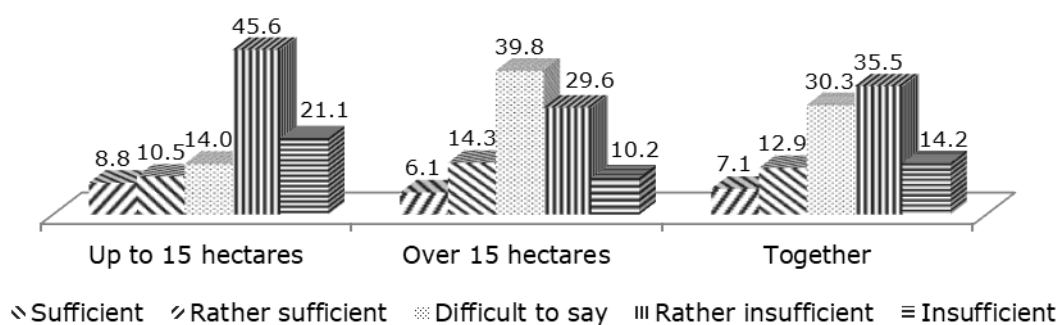
\*Figure is significant for  $\alpha=0.01$

Source: author's calculations based on research

Complementary techniques such as regular and structured interviews were employed in order to increase the cognitive value of the study. The author was able to perform a comprehensive evaluation of the problem by asking a set of supplementary non-standard questions.

**Research results and discussion**

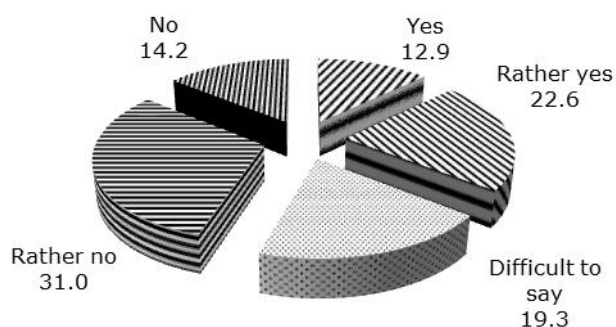
It goes without saying that farm development (buying means of production, machine upkeep and maintenance, planning new investment, etc) depends on the income it generates. Having said that, maintaining a decent standard of life and catering for the needs of their families is equally important for farmers (Prus P., 2010; van den Ban A. W., Hawkins H. S., 1996). Sadly, the research showed (Figure 1) that almost half of the polled (49.7 %) did not believe their income was big enough to satisfy these needs. Only one out of five farmers (20.0 %) was satisfied in that respect, and claimed that their income was satisfactory or near-satisfactory. Significant statistical discrepancies were observed between the two groups in this respect (Table 1). As mentioned earlier, the groups were divided according to the farm size: those measuring less than 15 ha and those measuring more than 15 ha. The two groups exhibited insignificant differences with regards to the satisfaction levels from the profits generated from farming production. The respondents from bigger farms were slightly more satisfied (20.4 %) than their colleagues from smaller farms (19.3 %). However, as far as dissatisfaction levels are concerned, the differences were more pronounced (66.7 % among the smaller farms, and 39.8 % among the bigger farms respectively). It can be explained by the fact that farmers who manage larger areas can increase the scope of production, use labour, buildings, machines and tools more effectively and, consequently, generate more profit (Mickiewicz B., Mickiewicz A. 2017; Prus P., 2010; Satola L., et al., 2014; van den Ban A. W., Hawkins H. S., 1996).



Source: author's calculations based on research

Fig. 1. Respondents' opinions regarding farming production income (%)

Only 35.5 % of the respondents admitted they had the potential to generate additional income, as opposed to 45.2 % who did not see such opportunity. 19.3 % of the respondents were unable to provide a satisfactory answer (Figure 2). The conducted statistical analysis proved (Table 1) that the answers provided by the members belonging to both groups were unrelated.

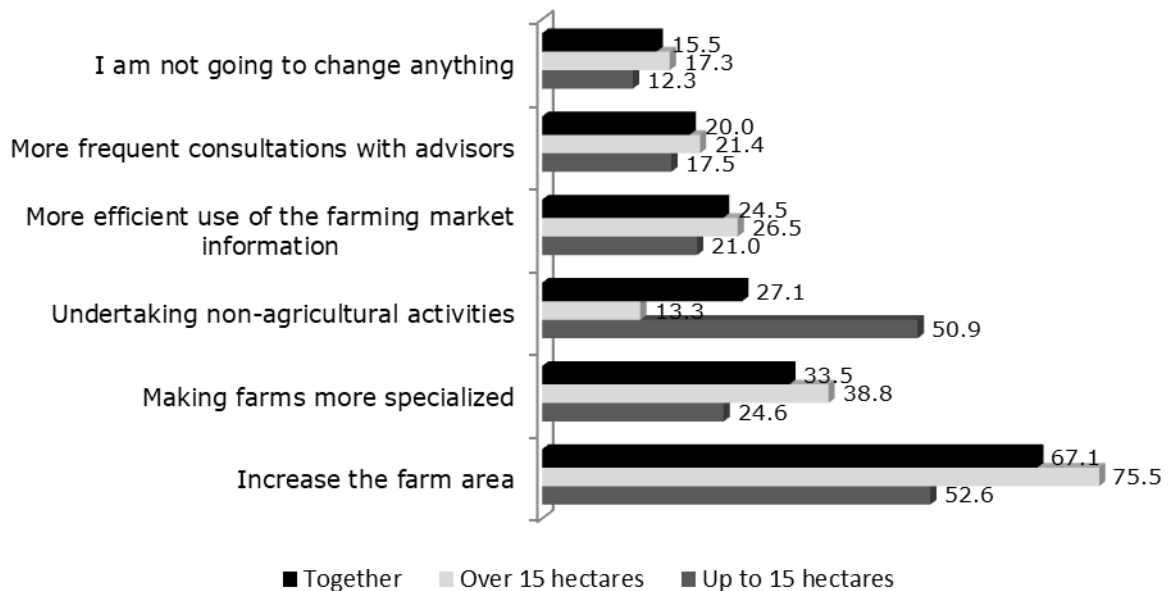


Source: author's calculations based on research

Fig. 2. Farmers' opinions regarding opportunities to increase profits generated by their farms ( %)

The analysis of potential ventures aimed at improving the financial condition of the respondents' farms proved quite interesting (Figure 3). The majority of the farmers (67.1 %) hoped to increase the area of their farms and buy more land, which would help them to increase their production and thus lower the cost of individual products. These answers prove the existence of a phenomenon known as the "greed of land" among the Polish farmers. Regrettably, average prices of land have been increasing steadily, and buying arable land remains costly (Srednie ceny ..., 2017). The soaring prices are fuelled by the growing demand on one hand, and the owners' reluctance to sell either parts or the whole of their land on the other. Surprisingly, even when production becomes limited or it has ceased altogether, land is not transferred between farmers because the owners are not willing to part with it. The reasons for such behaviour may be purely economic (acquiring income from land) or other (sentimental, emotional, social). The mere fact of owning the land, irrespective of whether it is used for farming production or not, makes farmers eligible for different financial subsidies. These benefits often provide the income which exceeds profits from farming production, rendering the latter economically unviable and, understandably, discourage farmers from selling their land (Wojewodzic T., 2017). What is more, farmers are often bonded to their profession and the farm, which has been passed on in their families from generation to generation. Clearly, the land presents sentimental value to them, which was emphasized by the respondents who, during the interviews, referred to their farms using the term "fatherland". Making farms more specialized was the second most popular idea aimed at improving farms' economic situation (33.5 %). The respondents admitted that finding alternative sources of income is especially vital when profits from farming production become insufficient (Kalinowski S., 2016; Osmani F., et al., 2013). They mentioned undertaking non-agricultural activities (27.1 %), making more efficient use of the farming market information (24.5 %), and more frequent counselling provided by the agriculture advisory centres (20.0 %) as potential remedies which might alleviate the unfavourable economic situation of their farms. Having said that, 15.5 % of the respondents claimed that they did not want to change their current situation in the near future. When analysing the answers regarding the improvement of the economic situation of their farms, one can observe a number of significant differences between the two groups of respondents (Figure 3, Table 1). The students from the bigger farms were willing to expand the size of their farms, increase the farms'

specialization, make more efficient use of the farming market information, as well as benefit from the counselling provided by the agriculture advisory centres more often than their colleagues from the smaller farms. At the same time, the respondents from the smaller farms more often considered starting a non-farming job as a complementary activity parallel to farming. Understandably, smaller farms have smaller production potential, which forces the farmers who run them to pursue non-farming occupations in order to increase their earnings.



\*Total exceeds 100 % due to multiple correct answers

Source: author's calculations based on research

Fig. 3. Farmers' intentions to increase the potential of their farms in order to generate additional profits (%)

## Conclusions

- 1) The study proved that almost half of the respondents were not satisfied with the income generated by their farms, and one-third of the group did not have a clear opinion in the matter.
- 2) The majority of the dissatisfied respondents were farmers who managed smaller farms, which proves that the area of a farm determines its development potential and, consequently, the amount of satisfactory income obtained from farming production.
- 3) Despite the fact that only one-third of the polled admitted that they saw the potential to increase their profits, nevertheless the vast majority of all the respondents declared the willingness to pursue activities aimed at improving their economic situation. The most popular ideas intended to bring additional income were increasing the size of the farms' arable land, and making the production more specialized. Other popular ideas included: finding an additional non-farming occupation, making better use of the farming market information or more frequent use of the counselling provided by the agricultural advisory centres.
- 4) It should be emphasized that those interested in pursuing additional non-farming activities were mainly the farmers who managed smaller farms. Having little or no real prospects of increasing their production output, they opted for diversification of activities as the additional source of income.
- 5) Without a doubt, such a task requires one not only to recognize a business opportunity but to pursue the additional venture with skill and competence. This is why the assistance of various institutions is essential in order to provide the necessary support for rural areas, one which can

guarantee their multidimensional development and allow them to embrace new non-farming functions. This will not be possible without further financial support which will help farmers to diversify their activities, and provide them with the necessary information and counselling.

## Bibliography

1. Babbie, E. (2003). *Badania społeczne w praktyce (Social studies in practice)*. PWN, Warszawa.
2. Bojar, W., Sikora, M., Dzieza, G. (2017). Current Challenges of Agricultural Business Against Farming Economic Efficiency and Sustainable Development. *Proceedings of the 8th International Scientific Conference "Rural Development 2017"*, Kaunas, Lithuania. Retrieved <http://conf.rd.asu.lt/index.php/rd/article/view/396/283> Access: 05.02.2018.
3. Bonjean, A., Le Goffic, F. (1999). Camelina - *Camelina sativa* (L.) Crantz: an Opportunity for European Agriculture and Industry. *OCL-OLEAGINEUX CORPS GRAS LIPIDES*, 6 (1), pp. 28-34.
4. Cordell, D., Drangert, J. O., White, S. (2009). The story of phosphorus: global food security and food for thought. *Global Environmental Change-Human and Policy Dimensions*, 19(2), 292-305. doi:10.1016/j.gloenvcha.2008.10.009.
5. Dutka, B., Mickiewicz, B., (2015). Farm advisory service in Poland in light of legal regulations. *Proceedings of the 25th NJF Congress, "Nordic View to Sustainable Rural Development"*, Riga, Latvia, 16-18 June 2015, pp. 504-507.
6. Dziekanski, p. (2016). Spatial changes and assessment of the financial condition of local government units in the context of the income structure. *Conference Proceedings "6th International Conference on Management (ICoM) - Trends of Management in the Contemporary Society"*, Brno, Czech Republic, pp. 154-156.
7. Dziekanski, p. (2017). Economic effectiveness of the activities of local self-government units in the light of the municipality financial resources. *Scientific bulletin of Polissia*, 3(11), pp. 76-82. doi:10.25140/2410-9576-2017-1-3(11)-76-82.
8. Foley, J.A., Ramankutty, N., Brauman, K.A., Cassidy, E. S., Gerber, J.S., Johnston, M., Mueller, N.D., O'Connell, C., Ray, D.K., West, P.C., Balzer, C., Bennett, E.M., Carpenter, S.R., Hill, J., Monfreda, C., Polasky, S., Rockstrom, J., Sheehan, J., Siebert, S., Tilman, D., Zaks, D.P.M. (2011). Solutions for a cultivated planet. *Nature*, 478(7369), pp. 337-342. doi:10.1038/nature10452.
9. Godfray, H.C.J., Beddington, J.R., Crute, I.R., Haddad, L., Lawrence, D., Muir, J.F., Pretty, J., Robinson, S., Thomas, S.M., Toulmin, C. (2010). Food security: the challenge of feeding 9 billion people. *science*, 327(5967), *Science*, 327(5967), 812-818. doi:10.1126/science.1185383.
10. Gruszczynski, L.A. (1986). *Elementy statystyki dla socjologów (Elements of statistics for sociologists)*. Wyd. Uniwersytetu Śląskiego, Katowice.
11. Kalinowski, S. (2011). Education as an element of competitiveness of rural households in the Wielkopolskie Voivodship. *Acta Scientiarum Polonorum Seria Oeconomia*, 10(1), pp. 35-43.
12. Kalinowski, S. (2016). Objective and Subjective Assessments of Living Standards Among Members of the Rural Population. *Annals of Agricultural Economics and Rural Development*, 103(1), pp. 7-13.
13. Kerckow, B., Mangan, C., Breslin, L. (1997). Industrial crops and products and European Union research policy. *Industrial Crops and Products*, 6(3-4), 325-331. doi:10.1016/S0926-6690(97)00023-X.
14. Kielbasa, B. (2016). Overcoming barriers to efficient farm management: The role of knowledge and information management in the rural advisory sector. *Conference proceedings "International Scientific Days (ISD) Conference on Agri Food Value Chain - Challenges for Natural Resources Management Society"*, Nitra, Slovakia, pp. 758-768. doi:10.15414/isd2016.s9.05.
15. Kim, S., Dale, B.E. (2004). Global potential bioethanol production from wasted crops and crop residues. *Biomass and bioenergy*, 26(4), 361-375. doi:10.1016/j.biombioe.2003.08.002.
16. Kocar, G., Civas, N. (2013). An overview of biofuels from energy crops: current status and future prospects. *Renewable and Sustainable Energy Reviews*, 28, 900-916. doi:10.1016/j.rser.2013.08.022.
17. Koreleska, E. (2016). Zachowania niemieckich konsumentów na rynku ekologicznych produktów żywnościowych (Behaviour of German Consumers in the Market for Organic Food Products). *Konsumpcja i Rozwój*, 3(16), pp. 45-57.
18. Kowalska, M., Knapik, W., Bogusz, M. (2016). Farm Education as a Component of Sustainable Development in Selected Countries of the European Union. *Problems of Sustainable Development*, 11(2), pp. 81-88.
19. Marcysiak, T., Prus, p. (2017). Life strategies of rural inhabitants of unfixed economic function. *Proceedings of the 26th International Scientific Conference Agrarian Perspectives XXVI "Competitiveness of European Agriculture and Food Sectors"*, Czech University of Life Sciences Prague, Faculty of Economics and Management, pp. 212-218.
20. Marsden, T., Banks, J., Bristow, G. (2002). The social management of rural nature: understanding agrarian-based rural development. *Environment and planning A*, 34(5), 809-825. doi:10.1068/a3427.
21. Mickiewicz, A., Mickiewicz, B. (2014). Change of the Position of Polish Agriculture in Relation with the European Union in Light of the Agricultural Censuses of 2002 and 2010. *Conference Proceedings "Economic Science for Rural Development: Production and Co-Operation in Agriculture"*, Latvia Univ Agr, Fac Econ & Social Dev, Jelgava, Latvia, 34, pp. 101-111.



22. Mickiewicz, B., Mickiewicz, A. (2017). The Importance Of Land Consolidation In Poland For the Processes of Shaping Agrarian Structure. *Proceedings of the International Scientific Conference Economic Science for Rural Development*, Latvia University of Agriculture, Jelgava, No. 44, pp. 126-135.
23. Olesen, J. E., Bindi, M. (2002). Consequences of climate change for European agricultural productivity, land use and policy. *European journal of agronomy*, 16(4), 239-262. doi:10.1016/S1161-0301(02)00004-7.
24. Osmani, F., Gorton, M., White, J. (2013). Agricultural households, poverty and the rural labour market in Kosovo. *Post-communist economies*, 25(2), pp. 241-252. doi: 10.1080/14631377.2013.787756.
25. Pawlak, J. (2001). Polish agriculture facing the third millennium. *Conference Proceedings 29th Congress of CIOSTA-CIGR V*, Krakow, Poland, pp. 4-17.
26. Pasakarnis, G., Maliene, V. (2010). Towards sustainable rural development in Central and Eastern Europe: Applying land consolidation. *Land Use Policy*, 27(2), 545-549. doi:10.1016/j.landusepol.2009.07.008.
27. Poczta, W., Pawlak, K. (2010). Potencjal polskiego rolnictwa piec lat po akcesji Polski do UE jako przeslanka jego konkurencyjnosci (The potential of Polish agriculture after five years of EU membership as a factor of its competitiveness). *Wies i Rolnictwo*, 1(146), pp. 21-47.
28. Prus, p. (2008). Sustainable development of individual farms based on chosen groups of farmers, *EJPAU*, 11(3), #06. Retrieved: <http://www.ejpau.media.pl/volume11/issue3/art-06.html> Access: 02.02.2018.
29. Prus, p. (2010). Funkcjonowanie indywidualnych gospodarstw rolniczych według zasad zrównoważonego rozwoju (Individual farms functioning according to sustainable development principles). Bydgoszcz, Wydawnictwa Uczelniane UTP w Bydgoszczy.
30. Prus, P., Drzazdzynska, K. (2017). Farmers' Assessment of Training Services and the Impact of Agricultural Advisory on Selected Developmental Factors Affecting Farming. *Proceedings of the International Scientific Conference Economic Science for Rural Development*, Latvia University of Agriculture, Jelgava, No. 44, pp. 338-344.
31. Roman M., Roman M., Roman K. (2018). The forecast of economic processes of selected agricultural products in the development of bioenergy and agritourism activity in Poland. *Proceedings of the International Scientific Conference Hradec Economic Days 2018*, Published University of Hradec Kralove, Faculty of Informatics and Management, Hradec Kralove, vol. 8 (2), pp. 246-247.
32. Rys-Jurek, R. (2008). The output of the average individual farm in Poland and in the European Union countries. An attempt of defining similarity of structures in 2005. *Journal of Agribusiness and Rural Development*, 2(8), pp. 119-133.
33. Rys-Jurek, R. (2009). The relations between the output, income and stock in agricultural farms. *Journal of Agribusiness and Rural Development*, 4(14), pp. 135-148.
34. Satola, L., Wojewodzic, T., Dacko, M. (2014). Do investments and investments determine farm development? *Bulgarian Journal of Agricultural Science*, 20(6), pp. 1281-1288.
35. Schmidhuber, J., Tubiello, F.N. (2007). Global food security under climate change. *Proceedings of the National Academy of Sciences*, 104(50), 19703-19708. doi:10.1073/pnas.0701976104.
36. Sikora, M., Bielski I. (2017). Forming networks strategy in agribusiness. *Proceedings of the 26th International Scientific Conference Agrarian Perspectives XXVI "Competitiveness of European Agriculture and Food Sectors"*, Czech University of Life Sciences Prague, Faculty of Economics and Management, 335-341.
37. Smeets, E.M., Faaij, A.P., Lewandowski, I.M., Turkenburg, W.C. (2007). A bottom-up assessment and review of global bio-energy potentials to 2050. *Progress in Energy and combustion science*, 33(1), 56-106. doi:10.1016/j.pecs.2006.08.001.
38. Sobczyk, M. (ed.) (2004). *Statystyka (Statistics)*. PWN, Warszawa.
39. *Srednia powierzchnia gospodarstwa (Average area of the farm) (2017)*. Retrieved: <http://www.arimr.gov.pl/pomoc-krajowa/srednia-powierzchnia-gospodarstwa.html> Access: 02.02.2018.
40. *Srednie ceny gruntow wg GUS (Average prices of land according to the Central Statistical Office) (2017)*. Retrieved <http://www.arimr.gov.pl/pomoc-krajowa/srednie-ceny-gruntow-wg-gus.html> Access: 02.02.2018.
41. Van den Ban, A.W., Hawkins, H.S. (1996). *Agricultural Extension (2nd ed.)*. Blackwell Science, Oxford.
42. Westhoek, H.J., Van den Berg, M., Bakkes, J.A. (2006). Scenario development to explore the future of Europe's rural areas. *Agriculture, ecosystems & environment*, 114(1), 7-20. doi:10.1016/j.agee.2005.11.005.
43. White, B., Dasgupta, A. (2010). Agrofuels capitalism: a view from political economy. *The Journal of Peasant Studies*, 37(4), 593-607. doi:10.1080/03066150.2010.512449.
44. Wojewodzic, T., (2005). An attempt at construction of a standard of development balancing on the level of local government units. *Proceedings of the 2nd International Scientific Conference on Rural Development: Globalisation and Integration Challenges to Rural Development in Eastern and Central Europe*, Kaunas, Lithuania, Vol 2, Book 1, pp. 184-186.
45. Wojewodzic, T. (2017). Procesy dywesticji i dezagrarnizacji w rolnictwie na obszarach o rozdrobnionej strukturze agrarnej (Divestment and disagrarianization processes in agriculture systems with distributed agrarian structure. *Zeszyty Naukowe Uniwersytetu Rolniczego im. H. Kollataja w Krakowie*, no. 535, dissertation series: z. 412, pp. 287.
46. Zawisza, S., Pilarska, S. (2005). Opinion leadership and information sources in agricultural innovation diffusion processes (on the basis of selected villages in the Kujawsko-Pomorskie province in Poland). *EJPAU*, 8(4), #28. Retrieved: <http://www.ejpau.media.pl/volume8/issue4/art-28.html> Access: 02.02.2018.



## **BUSINESS BENEFITS OF IMPLEMENTING THE DESIGN AND BUILD APPROACH IN THE CONSTRUCTION PROCESS**

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**Abstract.** In the entire construction procurement structure, construction procurement makes up the largest part both by the total number of purchases and by the total volume of public procurement; therefore, construction procurement affects the sector and the construction sector plays an essential role in the overall economy of Latvia and its activities. The design and build approach is considered to be an effective project procurement method in which one organisation, in compliance with the concluded contract, is responsible for both design and construction. It is believed that the design and build approach is a leading trend in the construction industry and it is becoming more and more popular all over the world. The aim of the research is to find out whether the design and build approach is used in Latvia, to describe the past experience, and to identify the benefits for the industry from the use of this approach. Within the framework of the research, the following methods have been used: the analysis method of specialised theoretical literature, empirical data analysis, unstructured interview and comparison method. The main conclusions of the research are the following: using the design and build approach, it is possible to ensure a faster construction process, reduce construction costs, provide a quality construction process. There are also drawbacks: the contracting authority's control over the design and construction process decreases, the hardly predictable contract price etc. In Latvia construction projects, using the design and bid approach are not very common, even in spite of the advantages of the approach.

**Key words:** construction management, public procurement, construction process management, design and build approach.

**JEL code:** L74

### **Introduction**

According to the data compiled and published by the Procurement Monitoring Bureau of the Republic of Latvia, in the entire construction procurement structure, construction procurement makes up the largest part both by the total number of purchases and by the total volume of public procurement. The uniqueness, uncertainty, long-term nature and complexity of construction projects make it difficult to predict time, costs, and project quality. Along with the increasing complexity of construction projects, the choice of an appropriate procurement system is the basis for the success of the project. Thus, the procurement approach plays an important role in ensuring that the project meets its primary objectives of time, cost and quality. The design and build approach is considered to be an effective project procurement method in which one organisation, in compliance with the concluded contract, is responsible for both design and construction. The design and build approach has been proven to be a leading trend in the construction industry, and it is becoming increasingly popular worldwide (Dang N. C., 2016). In the design and construction projects, the contracting authority agrees with the contractor on both design and construction. The design and delivery of the project are combined, which allows overcoming the existing obstacles and problems in the traditional procurement approach. The main difference between the traditional procurement approach and the design and build approach is that in the traditional procurement approach, design is separated from the construction process, but in the projects, where the design and build approach is used, only one organisation is responsible for design and construction.

The aim of the research is to find out whether the design and build approach is used in Latvia, to describe the past experience, and to identify the benefits for the industry from the use of this approach. The following tasks have been set: to analyse public procurement in construction, to

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analyse the theoretical and legal aspects of the design and build projects, as well as to evaluate the design and build practice in Latvia. As a result of the research, conclusions and proposals will be made for the further development of the design and build approach in Latvia.

Within the framework of the research, the following methods have been used: the analysis method of specialised theoretical literature, empirical data analysis, unstructured interview and comparison method. The analysis of empirical data related to the period of 2010–2017 has been performed with the aim of identifying changes in the dynamics and structure of public procurement between 2010 and 2017. The empirical data analysis has been used to assess the development trends in the construction industry. In the practical part of the research, the comparison method has been used – by comparing the three design and build regulations and determining which criteria that promote the effective and qualitative construction process are included in the procurement regulations.

## Research results and discussion

### 1. The Analysis of Public Construction Procurement in Latvia

To determine the place of construction procurement in the entire public procurement system, the structure of public procurement in the period of 2010-2016 has been analysed. The analysis of the structure has been performed by first evaluating the number of public purchases (Table 1), then their volume (Table 2). It should be noted that, in order to determine the changes in the structure of public procurement, data for 2016 have been attributed to the data for 2010 due to the availability of incomplete data for 2017. The above-mentioned considerations apply to Tables 1 and 2.

Table 1

**Public sector procurement structure in Latvia in the period of 2010–2016, %  
of the total number of purchases**

Public procurement sectors	2010	2011	2012	2013	2014	2015	2016	2017	Changes, 2016/2010, percentage points
Construction works	18.11	18.59	18.64	18.01	17.69	16.16	16.42	2.66	-1.69
Petroleum products, fuel, electricity and other energy sources	4.25	4.30	4.80	4.21	4.01	3.71	3.39	0.52	-0.86
Agriculture, forestry, horticulture, aquaculture and beekeeping services	2.08	2.07	1.86	1.99	1.94	2.08	2.02	0.35	-0.06
Financial and insurance services	4.42	1.15	1.78	1.92	1.94	2.15	2.02	0.45	-2.40
Medical devices, pharmaceuticals and personal care products	6.24	5.53	6.03	5.46	5.01	5.15	5.34	1.38	-0.90
Transport equipment and auxiliary transport equipment	3.03	3.15	3.33	3.76	3.74	3.71	3.65	0.62	0.62
Other	61.87	65.21	63.57	64.65	65.69	67.04	67.17	94.01	5.29

Source: The authors' calculations based on the data of the Procurement Monitoring Bureau of the Republic of Latvia

According to the data provided in Table 1, it can be concluded that between 2010 and 2016, the number of purchases decreased in almost all areas. The decrease in the share of construction

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works during the period under review was the second fastest. According to the calculations in Table 1, the authors conclude that in the period from 2010 to 2016, the majority of public procurement involved construction works.

Table 2

**Public sector procurement structure in Latvia in the period of 2010–2016, % of the total procurement volume**

Public procurement sectors	2010	2011	2012	2013	2014	2015	2016	2017	Changes, 2016/2010, percentage points
Construction works	44.06	41.59	47.75	32.17	33.89	24.53	32.49	8.03	-11.57
Petroleum products, fuel, electricity and other energy sources	3.56	7.25	8.83	7.48	11.06	8.80	8.34	0.48	4.78
Agriculture, forestry, horticulture, aquaculture and beekeeping services	8.17	4.00	2.82	10.29	3.55	3.03	1.19	4.68	-6.98
Financial and insurance services	11.89	2.54	2.06	2.07	2.07	1.21	5.25	0.32	-6.64
Medical devices, pharmaceuticals and personal care products	6.35	5.80	5.15	5.62	8.09	7.14	5.07	2.32	-1.28
Transport equipment and auxiliary transport equipment	1.58	3.35	3.58	9.61	3.63	5.09	7.70	1.74	6.12
Other	24.39	35.47	29.81	32.76	37.72	50.19	39.96	82.44	15.57

Source: The authors' calculations based on the data of the Procurement Monitoring Bureau of the Republic of Latvia

According to the results of the authors' calculations summarised in Table 2, it can be concluded that construction works made up the largest part in the total volume of public procurement. By 2012, in the total volume of public procurement the construction procurement accounted for slightly more than a half, exceeding the share of other sectors. Since 2013, the share of construction procurement has been uneven in the total volume of public procurement, but retained a significant share. Assessing the change in the share of construction works in the total volume of public procurement, it can be concluded that the share decreased by 11.57 percentage points, but still was a very significant public contribution to both the industry and the national economy as a whole. Taking into account the defined procurement structure for the period from 2010 to 2016, the authors conclude that the construction sector is the most important area of public procurement and its further development directly affects the country's economic development.

## 2. Theoretical aspects of the design and build contract

In general, construction procurement can be implemented using one of the following approaches:

- design-bid-build (DBB) – a traditional approach that is based on the contracting authority's separate contractual obligations with the architect and contractor. The project is implemented on the basis of competitive supply of construction works made in accordance with the procedure stipulated in the regulatory enactments for a fully developed and approved construction project;
- construction management – the organisation of the construction process is outsourced to the construction manager who takes on the risk of project delivery, mediation;

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- design and build (DB) contract – implies only one contract for the development of the construction project and the execution of construction works;
- integrated project delivery – the cooperation process between the contracting authority, building users, managers, designers, builders, consultants, manufacturers and other parties involved in the project, which promotes the maximum capacity of all participants and the use of the information base to achieve effective and sustainable results at all stages of construction (Projekta..., 2015).

The DB is considered to be an effective project procurement approach, in which one organisation or consortium is responsible for both design and construction in compliance with the contract concluded (Songer E., 1997). The DB approach has been shown to be a leading trend in the construction industry, and it is becoming increasingly popular worldwide (Dang N. C., 2016). In DB projects, the owner agrees on a single entity to carry out both a specific project design and construction (Hale D. R., 2009). DB contractor offers both design and construction services to the owner. The design and delivery of the project are combined, which allows overcoming the existing obstacles and problems in the traditional DBB approach (Dang N. C., 2016). Konchar and Sanvido define the concept of DB as a project system, in which the owner concludes a contract with one organisation that carries out both the design of a building and its construction within a single contract (Konchar M., 1998). DB is the acquisition of a building from a single contractor who is responsible for both design and construction (Akintoye A., 1995).

The main difference between DBB and DB projects is that in DBB projects, design is separated from the construction processes, but in DB projects only one organisation is responsible for both design and construction (Lu W., 2017). Contrary to the traditional procurement procedure, where the construction project is initially drawn up, then the construction procurement is carried out, the DB is a type of construction, in which one person – usually the construction company or the contractor – is responsible for the design and construction works. In this case, both services are simultaneously purchased from one person. The advantage of such a contract is that one person is responsible for the entire construction process, including design. This reduces the risks associated with disputes among the designer, contractor and contracting authority (Rokasgramatas, 2017). Different materials, with the exception of scientific publications, highlight the advantages and disadvantages of the DB. Advantages and disadvantages of the DB are summarised in Table 3.

DB provides the opportunity to reduce project costs, which can be explained by the possibility of developing alternative, cheaper project solutions in the construction process. Faster delivery of the DB is due to the fact that there is no “empty” stage between the project design, its completion and the start of construction. Construction can be started at the early stages of the project, before the 100 % developed project. It is possible to use the latest technologies in the DB process. The DB contractor chooses the equipment and designs the building using the equipment selected. There is the possibility to receive support from equipment manufacturers who are willing to “test in practice” the new equipment and technologies (Design, 2017).

Although, while summarising and analysing the theoretical and methodological aspects of the DB, it has been concluded that regardless of the scientists’ knowledge, the nature of the DB is explained in a similar way, according to the authors of the research, there are various factors that influence the successful implementation of the DB project. The uniqueness, uncertainty, long-term nature and complexity of construction projects make it difficult to predict time, costs, and project

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quality (Attalla M., 2003). Along with the increasing complexity of construction projects, the choice of an appropriate procurement system is the basis for the success of the project (Mafakheri F., 2007). The procurement approach plays an important role in ensuring that the project meets its primary objectives of time, cost and quality (Yong Y. C., 2012).

Table 3

**Advantages and disadvantages of the DB**

<b>Advantages</b>	<b>Disadvantages</b>
<b>One person is responsible to the contracting authority</b>	Less control
<b>Reducing the risk of disputes among the contracting authority, designer, builder</b>	Project requirements have to be defined in advance
<b>Faster process</b>	
<b>Greater clarity about total costs</b>	Difficult selection and attraction of subcontractors
<b>Project optimisation</b>	
<b>Opportunity to incorporate innovations</b>	The result of the project may be far away of the expected result
<b>Quality</b>	
<b>Fast conflict resolution</b>	
<b>Possible cost reduction</b>	A project that is not scheduled correctly can be delayed significantly
<b>Possibility to faster foresee costs</b>	
<b>Reducing administrative burden</b>	An inexperienced team can make mistakes, which may require expensive repairs
<b>Easy to adapt to real circumstances</b>	

Source:

*Learn About Using Design-Build Contracts. Retrieved: <https://www.thebalance.com/when-to-use-design-build-contracts-844914>, Access: 21.11.2017., Design and Build Contract (DB). Retrieved:*

*<https://www.thebalance.com/when-to-use-design-build-contracts-844914>. Access: 21.11.2017., Designing and build procurement route.*

*Retrieved: [https://www.designingbuildings.co.uk/wiki/Design\\_and\\_build\\_procurement\\_route](https://www.designingbuildings.co.uk/wiki/Design_and_build_procurement_route). Access: 21.11.2017.*

*Rokasgramatas projekts apvienoto projektēšanas un būvdarbu iepirkumu veikšanai (Handbook for design and build construction works). Retrieved: <http://www.latvijaszibuvnieki.lv/position/rokasgramatas-projekts-apvienotajiem-projektet-un-buvet-iepirkumiem/>. Access: 28.10.2017.*

All development stages of the construction project correspond to the traditional method of project delivery. The delivery of construction projects is a contractual relationship between the owner (contracting authority) and other parties involved in the construction (Hale D. R., 2009).

The delivery method of a construction project is a system of practical measures for organising, managing and financing activities related to the implementation of the project – the pre-project stage, project development, construction procurement, construction works, construction exploitation and maintenance. The criteria for choosing a method include safety, costs, quality, time, site context and compliance with the set goals, as well as an assessment of all risks. The project delivery method is closely related to the procurement strategy, contract terms, types of payment, and the project management and coordination implemented by the architect (Lam E. W. M., 2008).

The success of the project is the goal of almost all project participants in any construction project. However, in recent years, project participants have been facing difficulty in achieving success of construction projects in cases when traditional procurement or DBB is used. The DBB process is based on the contracting authority's separate contractual obligations with the architect and the contractor. The project is implemented in compliance with a specific supply of construction works made in accordance with the procedure specified by regulatory enactments for a fully developed and approved construction project. Project stages are implemented in a linear order. The architect's qualification and experience are the main criteria for choosing an architect (project)

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(Chan A. P. C., 2004). However, the study performed by Dang and Le-Hoai states that customers are dissatisfied with this procurement approach, as it involves a complicated, uncertain and dynamic nature of construction projects. Therefore, the authors propose using a less traditional method in the delivery of a construction project – the DB (Dang N. C., 2006).

The success of the project is the function of project characteristics, procedures, management strategies, participants, work atmosphere and environmental interaction (Dang N. C., 2006).

Analysing the theoretical aspects and success factors of the DB, the authors of the research conclude that various scientists and specialists explain the DB project in a very similar way – the construction process, in which design and construction are carried out by one organisation. Using the DB, it is possible to ensure a faster construction process, reduce construction costs, provide a quality construction process. However, there are also disadvantages, such as the contracting authority's control over the design and construction process decreases etc.

### **3. Legal aspects of the design and build contract**

The authors of the research have concluded that the construction projects implemented on the basis of the DB are governed by the same regulatory enactments that regulate general public procurement. The most important regulatory enactment is the Public Procurement Law (PPL), which was adopted on 12 December 2016 and came in force on 1 March 2017 (Publisko..., 2017). The aim of the PPL is to ensure procurement transparency, free competition of suppliers, as well as equal and fair treatment of them and effective use of the contracting authority's funds, maximally reducing their risk (Publisko..., 2017).

The new PPL in the construction sector envisages the abandonment of the lowest cost principle in favour of economic profit, following the guidelines developed for the evaluation of the most economically advantageous tender; in construction procurement there are essential prerequisites not only for reducing the shadow economy in the construction sector but also for promoting the quality of construction. Transparent, fair and competitive procurement practices undoubtedly create business opportunities and jobs, as well as contribute to economic growth. However, in the procurement sphere one should not stop at just a legal procurement procedure, but try to use public procurement as a strategic tool in promoting innovations, making targeted public resource investments, investing in sustainable resources, and choosing sustainable solutions.

To improve the quality of DB procurement, the Partnership of Latvian Contractors in cooperation with the Latvian Association of Architects has developed guidelines for evaluating the most advantageous tender in the DB and DBB procurement. The criteria included in the guidelines are of a recommendatory nature. The specific criteria that the contracting authority will use in a particular procurement will be chosen by the contracting authority on the basis of specific conditions that characterise the procurement. To evaluate the economic benefit of DB procurement, it is recommended to apply the following criteria: DB construction costs; project management structure; the experience of the responsible personnel in similar construction sites; experience of the responsible staff in a specific area; BIM system usage; team experience in the past cooperation.

### **4. The design and build approach practice in Latvia**

Until the present research, the most significant DB purchases, in the framework of which the contracts have been concluded, are the development, construction and author's supervision of the

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first stage of technical project of the Academic Centre of the University of Latvia (UL) in Torņkalns, Riga; the development, author's supervision and construction works of technical projects of Ziedoņdārzs and Grīziņkalns Park revitalization plans; development of the reconstruction project of Daugava Stadium's Western Tier, author's supervision and construction. Having interviewed the contracting authorities and analysed the procurement regulations, the authors of the research have obtained the following information. In the construction process of both Daugava Stadium's Western Tier and the UL Academic Centre in Torņkalns, the DB procurement approach was used. The choice of this approach was based on time saving in the whole project delivery. In the DB process of Daugava Stadium's Western Tier, six months were saved compared to the traditional procurement method. It should be noted that time saving is also emphasised by such authors as N.C. Dang and L. Le-Hoai, who in their research "Critical Success Factors for Implementation Process of Design – Build Projects in Vietnam" (2016) have found that time saving of DB projects is related to such project management factors as efficient planning of overall management work, organisation management and control, effective monitoring and approval mechanism of structural changes, control mechanisms of subcontractors' working efficiency, appropriate organisational structure, culture, roles and levels of authority.

Comparison of the three DB procurement regulations and the analysis of the data obtained from the interviews have enabled the authors to conclude that, to a large extent, time saving in DB projects in Latvia can be explained by factors such as management planning, organisation, administration and control, which consist in requiring tenderers to develop a detailed work plan for the design and build project broken down by calendar days. This way, the contracting authority has the opportunity to control whether the planned works will be carried out within the specified deadlines and whether the delay of the project will occur. It should be noted that meeting deadlines is ensured by imposing on contractors' penalties for delinquencies.

By conducting the interviews and analysing the procurement regulations, it has been found that the quality of the construction project can be achieved in two ways. Firstly, for each procurement a minimum guarantee period is set, where a higher evaluation of the tenderer is obtained if the tenderer offers a longer guarantee period to the contracting authority. However, the analysed scientific literature has not demonstrated a criterion – a guarantee that would characterise the success and qualitative implementation of the DB project. According to N. C. Dang and L. Le-Hoai (2016), qualitative implementation implies the competence of the parties involved. According to the interviews conducted, the competence of the parties involved has scarcely been mentioned; however, in the procurement regulations analysed, the authors have found that general contractors were imposed obligations taking into account their previously performed design and construction works, financial status, qualification and experience of the staff involved in the project delivery.

### **Conclusions, proposals and recommendations**

- 1) In Latvia, the most important area of public procurement during the period of 2010-2016 was construction works, which was demonstrated by the ratio of public construction procurement to the total volume of public procurement.
- 2) The DB project is explained as a construction process, in which design and construction is carried out by one organisation. By using DB, it is possible to ensure a faster construction process, reduce construction costs, provide a quality construction process. However, there are

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also disadvantages, such as the contracting authority's control over the design and construction process decreases etc.

- 3) One of the main factors influencing the effective delivery of the DB project is the costs.
- 4) In DB projects, time saving is related to such project management factors as efficient planning of overall management work, organisation management and control, effective monitoring and approval mechanism of structural changes, control mechanisms of subcontractors' working efficiency, appropriate organisational structure, culture, roles and levels of authority.
- 5) In Latvia, construction projects on the basis of the DB approach are not widely used, even though the approach has the advantages, such as time saving, the possibility of project delivery at the prices affordable to the contracting authority, the contractors' experience and other benefits.

## Bibliography

1. Akintoye, A., Fitzgerald, E. (1995) Design and Build: a Survey of Architects' views. Engineering, Construction and Architectural Management, vol.2, No.1, pp. 27 – 44.
2. Attalla, M., Hagazy, T. (2003) Predicting Cost Deviations in Reconstruction Projects: Artificial Neural Networks Versus Regression. Journal of Construction Engineering and Management, Vol.129., No.4., pp. 405-411
3. Chan, A.P.C., Scott, D., Chan, A.P.L. (2004) Factors Affecting the Success of a Construction Project. Journal of Construction Engineering and Management., Vol.130., No.1., pp. 153-155
4. Dang, N.C., Le-Hoai, L. (2016) Critical Success Factors for Implementation Process of Design-Build Projects in Vietnam. Journal of Engineering, Design and Technology, Vol.14, No.1., pp. 17-32.
5. Design and Build Procurement Route. Retrieved: [https://www.designingbuildings.co.uk/wiki/Design\\_and\\_build\\_procurement\\_route](https://www.designingbuildings.co.uk/wiki/Design_and_build_procurement_route). Access: 21.11.2017.
6. Design and Build Contract (DB). Retrieved: <https://www.thebalance.com/when-to-use-design-build-contracts-844914>. Access: 21.11.2017.
7. Hale, D.R., Shrestha, P.P., Gibson, G.E., Migliaccio, G.C. (2009) Empirical Comparison of Design/Build and Design/Bid/Build Project Delivery Methods. Journal of Construction Engineering and Management, Vol.135, No.7, pp. 579-587
8. Hale, D.R., Shrestha, P.P., Gibson, G.E., Migliaccio, G.C. (2009) Empirical Comparison of Design/Build and Design/Bid/Build Project Delivery Methods. Journal of Construction Engineering and Management, Vol.135, No.7, pp. 579-587
9. Konchar, M., Sanvido, V. (1998) Comparison of US Project Delivery Systems. Journal of Construction Engineering and Management., Vol.124, No.6, pp. 435-444
10. Lam, E.W.M., Chan, A.P.C., Chan, D.W.M. (2008) Determinants of Successful Design-Build Projects. Journal of Construction Engineering and Management., Vol.134, No.5, pp. 333-341
11. Learn About Using Design-Build Contracts. Retrieved: <https://www.thebalance.com/when-to-use-design-build-contracts-844914>, Access: 21.11.2017.
12. Lu, W., Hua, Y., Zhang, S. (2017) Logistics Regression Analysis for Factors Influencing Cost Performance of Design-bid-builds and Design-build Projects. Engineering, Construction and Architectural Management., Vol.24, No.1, pp. 118-132
13. Mafakheri, F., Dai, L., Slezek, D., Nasiri, F. (2007) Project Delivery System Under Uncertainty: Multilevel Decision Aid Model. Journal of Management in Engineering. Vol.23, No.4, pp. 200-206.
14. Projekta stadijas projekta īstenošanas process. Project Implementation Phase - Project Phases (2015). Retrieved: [http://www.latarh.lv/f/profesijas\\_standarts.pdf](http://www.latarh.lv/f/profesijas_standarts.pdf). Access: 21.11.2017.
15. Publisko iepirkumu likums. Public procurement law. (2017) Retrieved: <https://likumi.lv/doc.php?id=287760>. Access: 24.10.2017.
16. Rokasgramatas projekts apvienoto projektēšanas un būvdarbu iepirkumu veikšanai. Handbook for Design and Build Construction Works. Retrieved: <http://www.latvijasbuvnieki.lv/position/rokasgramatas-projekts-apvienotajiem-projektet-un-buvet-iepirkumiem/>. Access: 28.10.2017.
17. Songer, A.D., Molenaar, K.R. (1997) Project Characteristics for Successful Public-sector Design-build. Journal of Construction Engineering and Management, Vol.123, No.1, pp. 34-40
18. Yong, Y.C., Mustaffa, N.E. (2012) Analysis of Factors Critical to Construction Project Success in Malaysia. Engineering Construction and Architectural Management, Vol.19, No.5, pp. 543-556

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## PROPERTY MANAGEMENT SERVICE DEBTS AND THEIR IMPACT ON ENTREPRENEURSHIP

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**Abstract.** The present research examines the causes and risks of property management service and utility debt collection and their impact on the operation of the management company.

Every day, civil relations arise in the society from the liabilities of the parties. By providing property management services, civil contracts are concluded in order to achieve a certain economic result – the fulfilment of specific work. The other party is usually interested in remuneration for the services provided.

The data of the Portal of the Latvian Court of Justice [www.manas.tiesas.lv](http://www.manas.tiesas.lv) have been used to determine the current situation. Both the judicial authorities and the judgements have been chosen on a random basis. During the research, the court judgements and verdicts on debt collection, the regulatory enactments regulating the recovery of debts in Latvia, publications related to entrepreneurship and debt recovery issues have been reviewed.

The aim of the research is to investigate the current situation of property management service and utility debt collection, determine the causes of debts, the possibilities for debt recovery, and the risks of bad debts, as well as their impact on the operation of the management company.

The research analyses the results obtained by considering 17 court judgements of the Republic of Latvia. In the end, proposals are formulated for the management company's further activities to improve the fulfilment of the liabilities.

Analytical and quantitative methods have been used within the framework of the research.

**Key words:** debt collection, property management and utilities, causes of debt, risks of bad debts, entrepreneurship.

**JEL code:** K15, L26, L85

### Introduction

Every company that provides property management and utility services struggles against debtors individually and, unfortunately, there are no data on the topicality of the issue nowadays, because no statistical study has been carried out so far at the national level, except for the informative report of the Ministry of Economics on measures addressing the recovery of property use debts. However, it should be noted that the information in the report has already become obsolete, as it analysed data from 2006 to 2010, and the data only concerned heat supply (Ministry of Economics, 2012). The website of the Ministry of Economics provides informative reports on the situation regarding heat supply services in 2015 (Ministry of Economics, 2016), in 2014 (Ministry of Economics, 2015) and in 2013 (Ministry of Economics, 2014), which analyse the dynamics of heat supply debt formation. This also indicates that at the national level only outstanding commitments for heat supply services are being investigated, but there are no data on water supply and sewage debts or on property management service debts.

The aim of the research is to investigate the current situation of property management service and utility debt collection, determine the causes of debts, the possibilities for debt recovery, and the risks of bad debts, as well as their impact on the operation of the management company.

The tasks of the research are the following:

- 1) to study statistics on the recovery of debts and determine the current situation of property management service and utility debt collection;
- 2) to investigate and determine the ways and procedure of debt recovery in the Republic of Latvia;
- 3) to examine the causes of property management service and utility debt formation, the procedure of debt collection and determine the risks of bad debts;

4) to draw conclusions and formulate proposals based on the research conducted.

To assess the topicality of the issue related to property management service and utility debt recovery, it is necessary to consider statistical indicators. Data of the Portal of the Latvian Court of Justice [www.manas.tiesas.lv](http://www.manas.tiesas.lv) have been used to obtain the statistical data.

Within the framework of the research, the authors have analysed the following judgements made from January to June 2017 by Rezekne City Court, Daugavpils City Court, Kurzeme District Court of the City of Riga, Latgale District Court of the City of Riga, Vidzeme District Court of the City of Riga, Northern District Court of the City of Riga, Valmiera District Court, Aluksne District Court, Valka District Court, Bauska District Court, Jelgava City Court, Kuldīga District Court, Ventspils City Court, and Liepāja City Court (Latvian Court of Justice, 2017). A total of 500 judgements have been examined.

The following research methods have been used: the cognitive method – analytical one, by analysing legal acts, and the logically constructive method – by analysing results and making decisions, as well as the quantitative method: the statistical method using statistical data.

## **Research Results and Discussion**

The position of real estate market phase in cycle is determined by a variety of indicators that have a great significance for business planning (Kauskale, L., Geipele, I., 2016).

Entrepreneurship is a highly dynamic and fast growing scholarly field of research with a long intellectual tradition. Its intellectual roots can be traced back to the work of economists (Chandra, Y., 2018) such as Cantillon (Cantillon, R., 1959), Smith (Smith, A., 2007), Knight (Knight, F. 2012), and Schumpeter (Schumpeter, J. A. 1982), who laid the foundations by defining entrepreneurship and its relationship with innovation, economic growth and uncertainty. After a rather sluggish growth for decades, entrepreneurship research has gained some momentum with an emphasis on the person-centric approach, which attributes psychological traits and people's characteristics as predictors of entrepreneurship (Hornaday, J. A, Aboud, J., 1971).

The personnel engaged in the real estate management industry should be professional and, at the same time, flexible, by concluding mutual agreements, empathic, (Daud, S. N., Abdullah, M., Hassan, N.A., 2017); they should also have the ability to recognise the progress of the process, the problems, as well as use their opportunities.

The conclusion of agreements for the provision of services and the fulfilment of their liabilities is one of the indicators for assessing the efficiency of the company's performance.

The Civil Law states that a contract legally entered into shall impose on a contracting party a duty to perform that which was promised, and neither the exceptional difficulty of the transaction, nor difficulties in performance arising later, shall give the right to one party to withdraw from the contract, even if the other party is compensated for losses (Legislation of the Republic of Latvia, 1937). One party may not withdraw from a contract without the consent of the other party, even if the latter fails to perform it and due to the failure to perform it (Law of the Republic of Latvia, 1937). However, often a situation arises when one party fails to fulfil its liabilities; as a result, nowadays non-fulfilment of liabilities is a common case. Real estate management and utilities sector are no exception.

In cases when the payment is not made in compliance with the terms of the concluded agreement, in accordance with the Civil Law, the terms shall be considered as not fulfilled. As the Civil Law states, each obligation shall be fulfilled in full, and no one may be forced to accept the

fulfilment of only part of the obligation, even when the subject-matter of the obligation is divisible (Legislation of the Republic of Latvia, 1937). As a result, a situation arises when the manager has to resolve issues about payment collection.

### **1. The Current situation of the sector in debt recovery**

To assess the topicality of the issue related to property management service and utility debt recovery, it is necessary to consider statistical indicators. Data of the Portal of the Latvian Court of Justice [www.manas.tiesas.lv](http://www.manas.tiesas.lv) have been used to obtain the statistical data.

Summarising the results obtained, all judgements have been divided into six groups:

- 1) action for damages;
- 2) action for recovery of loan;
- 3) action for recovery of arrears of maintenance;
- 4) action for declaration of insolvency proceedings;
- 5) action for repayment of debts for the property management, administration services and utilities (water and heat supply, electricity and gas supply, waste management);
- 6) action for other types of debt recovery (repayment of advance payments, payment of goods, reimbursement of wages etc.).

Having examined the information available at the website of the Latvian Court of Justice, it can be stated that the most common action is taken to recover debts for the property management, administration services and utilities (water and heat supply, electricity and gas supply, waste management): out of 500 examined judgements, they comprise 34.20 % or 170 cases. The least common action is taken to recover other types of debt: 7.40 % or 37 cases. The action for recovery of loan was taken in 90 cases (17.80 %); the action for damages was taken in 42 cases (8.40 %), the action for recovery of arrears of maintenance – in 102 cases (20.40 %), and the action for declaration of insolvency proceedings – in 59 cases (11.80 %).

Such a quantitative result demonstrates that the issue of property management service and utility debt recovery is very topical, since it exceeded all categories related to the recovery of debts. However, according to the qualitative result, this action amounts only to 20.47 % of the total amount claimed and takes the second place after the action for recovery of loan. This suggests that the debts for management, administration services and utilities apply to a fairly large group of low-income and low-solvency persons in Latvia. In this assessment, the action for recovery of arrears of maintenance and the action for declaration of insolvency proceedings are not taken into account because they do not specify the total amount claimed and, accordingly, they cannot be compared to the rest of the court actions by the quality indicator. The total amount of claims from the examined judgements is EUR 1 123 086.94.

Table 1 shows that the total amount of claims for property management, administration services and utilities received (water and heat supply, electricity and gas supply, waste management) is EUR 229 122.19. Provided that according to the data of the Central Statistical Bureau of Latvia, at present the population of Latvia is 1 941.3 (thou) (Central Statistical Bureau, 2017\*), data for June 2017, of which 386 541 are children up to 19 years (Central Statistical Bureau, 2017\*\*), it is probable that each resident of Latvia who is older than 19 years theoretically has a debt for property management services and utilities in the amount of EUR 0.15.

According to the services provided to ensure property maintenance and, on the basis of debt collectors' data, debts can be divided into the following groups:

- 1) property management service and utility debt (a debt collector is a company providing management and administration services, ensuring water supply and sewerage, as well as acts as an intermediary in the process of domestic waste removal);
- 2) heat supply debt (a debt collector is a company producing and supplying heat);
- 3) electricity supply debt (a debt collector is a company supplying electricity);
- 4) gas supply debt (a debt collector is a company supplying gas).

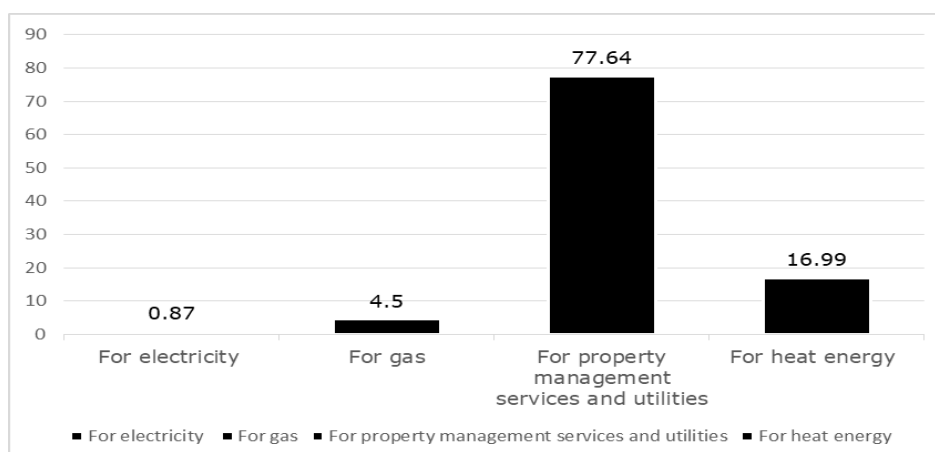
Table 1

**Breakdown of total amount claimed by judgement groups in Latvia**

No.	Judgement group	Amount claimed (EUR)	% of the total amount claimed
1	Action for damages	58479.06	5.21
2	Action for recovery of loan	776216.11	69.03
3	Action for repayment of debts for the property management, administration services and utilities	229122.19	20.47
4	Action for other types of debt recovery	59269.58	5.29
<b>Total</b>		<b>1123086.94</b>	<b>100</b>

Source: the authors' calculations based on the data available at [www.manas.tiesas.lv](http://www.manas.tiesas.lv)

The amount claimed shows that the lowest debt is for electricity (total amount claimed accounts for EUR 2 000.32) and for gas (total amount claimed in the examined judgements is EUR 10 315.72). The highest debts are for property management services and utilities; the total amount claimed is EUR 177 883.60. The total amount claimed for heat energy is EUR 38 922.55. Figure 1 demonstrates that the property management service and utility debt makes up 77.64 %, the heat energy debt is 16.99 %, the gas debt – 4.50 %, and the electricity debt is only 0.87 % of the total amount claimed. This indicator shows how actively debt collectors work with debtors. The percentage breakdown clearly illustrates that the most advanced programme for dealing with debtors has been introduced for companies engaged in electricity and gas supply. These programmes are more proactive in pursuit of preventive measures aimed at avoiding debt trap, rather than taking corrective actions devoted to debt recovery. The indicators of 4.50 % and 0.87 % indicate that the programmes are implemented and work efficiently; accordingly, there is no need for companies to spend resources on debt recovery.



Source: the authors' calculations based on the data available at [www.manas.tiesas.lv](http://www.manas.tiesas.lv)

Fig. 1. The percentage breakdown of property management, administration service and utility debt in Latvia

Thus, it can be concluded that the issue of property management service and utility debt recovery is very topical, because it exceeded quantitatively all categories considered in the area of

debt recovery. In fact, the situation has arisen that in the court about one of the three decisions on debt recovery is taken for the recovery of property management service and utility debts.

## **2. The causes of debts and risks of bad debts**

Within the framework of the research, the authors have conducted a survey of 10 experts of residential property management companies on the research topic. Based on the results of an expert survey, the following causes of debts can be identified:

- 1) long-term status of unemployed person;
- 2) weak payment discipline;
- 3) family income is lower than the minimum subsistence level;
- 4) unforeseen family expenses related to family members' illnesses, funerals, unforeseen repair of the apartment for the purpose of eliminating the accident consequences.

The results of the survey show that the main reason of debts is related to payment expenses. The most frequently mentioned reason is unemployment or low income, which indicates economic problems in the area. The so-called "unforeseen expenses" are also mentioned among others. The explanation may be related to increased costs, lack of money, and the owners' priorities, where the payment of property management services and utility bills is not always one of the first priorities for expenditure. However, the weak payment discipline indicates that a company that provides property management services poorly and untimely works with its clients in order to ensure that regular payments are made.

There are always bad debts in the sphere of debt collection. An important risk arises when the debtor is an insolvent person and s/he has insufficient income to which the debt can be recovered. In this case, the decision to enforce payment obligations has been taken, but the office of the court is not able to recover the debt because the debtor either conceals his/her real income, or s/he is unemployed and s/he has been given a status of low-income person. In such a case, in order to prevent a debt increase, if the debtor is a tenant, there is a possibility to take an action not only for debt recovery, but also for the termination of the rental agreement and the debtor's expulsion from the dwelling. But, unfortunately, this does not solve the problem because often the insolvent debtor meets a certain status stipulated in the Law "On Municipal Assistance in Solving Apartment Matters", and accordingly the municipality once again leases housing units owned by the municipality to the debtor, but the debtor continues not to pay. As a result, it has a negative impact on payment discipline for other clients, and the amount of debt continues to increase.

If the debtor is the owner of the apartment, a debt recovery claim is made against property or real estate. In this case, there is a risk that the debt can practically become irrecoverable if the debtor has a mortgage or other debt obligations, since the Civil Procedure Law states that if the amount recovered from the debtor is insufficient to satisfy all claims pursuant to the execution documents, this amount shall be divided among the debt collectors in the order prescribed by law, if in a separate law there are no benefits for any debt collectors and any successive claims are satisfied after full payment of the previous claims (Legislation of the Republic of Latvia, 1998). From the money received for selling encumbered property, the costs of execution of the judgment shall be paid first, then the claims shall be satisfied in the following order: 1) the collateral security; 2) other claims in the order prescribed by the Civil Procedure Law (Legislation of the Republic of Latvia, 1998). First, the first-order claims (claims for child or parent maintenance) are satisfied. Then the second-order (claims for tax and non-tax payments in the budget), the third-

order (claims for damages caused by a criminal or administrative offense) and only then the fourth-order claims (all other claims) are satisfied, which also refer to property management service and utility debts.

The third significant risk is associated with persons who do not have movable or non-movable property, because after their death a debt becomes irrecoverable. This has an adverse effect on the pensioners' payment discipline, despite the fact that pensioners are considered to be the most disciplined clients, often a situation arises when payment of utility bills is no longer a priority for them, since a person who does not have heirs is a lonely person with a pension that is often lower than the subsistence minimum.

All risks are based on a low social level, as in Latvia there is a high rate of unemployment, especially in the regions. The risks are also affected by the level of education of the population, as people with a low level of education have fewer opportunities to find work and, at the same time, they are unable to qualitatively improve it (for example, to obtain higher education) due to their poor financial situation.

In general, low- and middle-income people predominantly have debts, for example, when in the family with children only one of the parents is employed, or there has been a long period of unemployment due to illness, dismissal or other reasons.

Debts are recoverable, it is only necessary to develop and implement effective preventive and corrective actions. However, this group of debtors is heavily dependent on external factors that may adversely affect their level of income: tax increases, inflation, liquidation of the enterprise and job cuts, and on internal family factors that influence family expense planning, such as illness of family members, funerals, and other family events that require unforeseen expenses, because they do not have the savings they could count on in emergency situations.

However, wealthy people also have property management service and utility debts. There is a small share of such debtors, and the amount of their debts is minimal. It is easy to recover debts from these debtors, as they are formed only due to a weak payment discipline, for example, the payment is made only partially or irregularly. Thanks to such debtors, there may be successful and fast debt recovery, as receiving notification they immediately pay for their debts in full without waiting for the processing of the claim and enforcement of judgment.

Based on the results of the research, it can be concluded that both the external and the internal factors influence the property management service and utility debts. External factors are tariff increases and inflation, tax increases, liquidation of companies and increase in the unemployment rate. Internal factors are the deterioration of tenant/owner payment discipline, income reduction, lack of savings due to low income, unforeseen expenses (course of treatment, funerals, payment of fines etc.).

### **3. The impact of customer debts on business**

In accordance with the Law On Administration of Residential Houses, the residential house owner shall assign the administrative task to an administrator, entering into a residential house administration contract with him or her in writing. When assigning an administrator with the administrative task, the residential house owner has a duty to provide the financing necessary for the fulfilment of the task (Legislation of the Republic of Latvia, 2009). In the administration contract, the parties agree on the amount of expenses and terms of payment for the administration of a residential house.



The residential house owner or the tenant concludes contracts for water supply and sewerage services, heat supply, removal of solid municipal waste, by agreeing on the amount and terms of payment for services. As stipulated by the Law On Residential Property, the apartment owner shall cover residential house management expenses and pay for the services received associated with the use of the apartment (Law of the Republic of Latvia, 2010). The tenant is obliged to pay rent and service fees prescribed in the residential lease contract and, in accordance with the Law on Residential Tenancy, a rent is a fixed amount of money paid for the use of an apartment and the types of services received by the tenant during the use of the apartment (Legislation of the Republic of Latvia, 1993).

Ensuring that the terms of the contract are fulfilled, the company has to provide professional staff, facilities and equipment, as well as an office for administrative work and customer reception. This requires funding. In the absence of the planned funding, the company faces economic problems.

One of the problems: the impact on company's profit. Depending on the amount of the profit, a company is able to pay its employees additional remuneration for the work done, there are funds to invest in the development of its business by purchasing new and up-to-date equipment, developing information technologies (website creation, maintenance, modernisation, e-service creation, remote reading, computer programs etc.). Profit is the key to the company's performance. However, the non-fulfilment of commitments by customers, especially in the case of small and medium-sized enterprises, can often lead to a risk that the company is no longer able to pay its suppliers, employees and, as a result, insolvency is claimed either by the company itself or by one of the suppliers.

If a company faces problems with the fulfilment of its obligations and lacks funds, there is a risk that it will not be able to hire professional staff, which in turn will lead to the risk of poor services provided. Consequently, there is an opportunity for competitors to actively engage in client solicitation. It can lead to the deterioration of the company's publicity, public image and a decrease in the number of clients; once again the risk of insolvency arises.

### **Conclusions, proposals, recommendations**

- 1) A real estate management company operates in the business segment for the consumer, which means that the service is sold to the consumer. For the services provided, it is expected that the customer will pay the full amount. The research demonstrates that one of the most important actions in the Court of Justice is the action for repayment of debts for the property management services and utilities.
- 2) To avoid new customers' debts and facilitate the recovery of debts for any company engaged in the management of residential buildings and the provision of utilities, it is necessary not only to take corrective but also preventive measures.
- 3) Proposals for preventive measures:
  - to develop and implement preventive measures in order to prevent the emergence of new debts. For example, to keep an active dialogue with the public, explaining how timely payments are important for the qualitative fulfilment of management tasks;
  - to strictly follow a payment discipline. For example, to develop and implement an electronic reminder program that sends a reminder letter to a customer's e-mail or phone when the payment is not made in due time;

- in co-operation with the municipality, to develop and implement a social program that will help not only low-income and poor persons, but also the families in which one of the two adult members of the family lost their jobs; however, income does not allow for the acquisition of a low-income family status.
- 4) The proposal for corrective measures: to develop and implement an effective debt recovery procedure, which will stipulate the activities to be taken for debt recovery, deadlines and the responsible person. It is especially important to set deadlines for debt recovery, for example, within 3 months from the creation of a debt, as a debt will only increase with time and will be more difficult to recover.

## Bibliography

1. Cantillon, R. (1959). *Essay on the Nature of Commerce*. London: MacMillan. p. 43.
2. Central Statistical Bureau. Iedzīvotāju skaits un dabiskās kustības rādītāji.- Retrieved: <http://www.csb.gov.lv/statistikas-temas/iedzivotaji-galvenie-raditaji-30260.html>. Access: 07.12.2017.
3. Central Statistical Bureau. Berni Latvija. - Retrieved: [http://www.csb.gov.lv/sites/default/files/nr\\_12\\_berni\\_latvija\\_2016\\_16\\_00\\_lv\\_en.pdf](http://www.csb.gov.lv/sites/default/files/nr_12_berni_latvija_2016_16_00_lv_en.pdf). Access: 07.12.2017.
4. Chandra, Y. (2018). Mapping the Evaluation Entrepreneurship as a Field of Research (1990 – 2013.): A Scientometric Analysis. *Plos One*. Volume 13. Issue 1. - Retrieved: <https://doi.org/10.1371/journal.pone.0190228>
5. Daud, S.N., Abdullah, M., Hassan, N.A. (2017). The Demand of Entrepreneurship Training Program for Engineering Students. *2017 IEEE 6th International Conference on Teaching, Assessment, and Learning for Engineering (TALE)*. pp. 372 – 376
6. Hornaday, J.A., Aboud, J. (1971). *Characteristics of Successful Entrepreneurs*. Personnel Psychology. p. 141.
7. Kauškalē, L., Geipele, I. (2016). Influence of Economic and Real Estate Market Fluctuations on Real Estate Entrepreneurship in Latvia. In: *Proceedings of the Sixth International Conference on Industrial Engineering and Operations Management*, Malaysia, Kuala Lumpur, 8-10 March, 2016. Kuala Lumpur: pp. 851-862.
8. Knight, F. (2012). *Risk, Uncertainty and Profit*. New York: Hart, Schaffner and Marx. p. 448.
9. Latvian Court of Justice. Anonimizētu nolēmumu atlase. - Retrieved: <https://manas.tiesas.lv/eTiesasMvc/nolemumi>. Access: 04.01.2018.
10. Legislation of the Republic of Latvia (1937). *Civillikums. Ceturta daļa. Saistību tiesības* [The Civil Law]. - Retrieved: <https://likumi.lv/doc.php?id=90220>. Access: 06.01.2018.
11. Legislation of the Republic of Latvia (1998). *Civilprocesa likums* [Civil Procedure Law] . - Retrieved: <https://likumi.lv/doc.php?id=50500>. Access: 07.01.2018.
12. Legislation of the Republic of Latvia (2009). *Dzīvojamā mājā parvaldīšanas likums*. [Law On Administration of Residential Houses]. - Retrieved: <https://likumi.lv/doc.php?id=193573>. Access: 07.01.2018.
13. Legislation of the Republic of Latvia (2011). *Dzīvokļa īpašuma likums*. [Law of Residential Properties]- Retrieved: <http://likumi.lv/doc.php?id=221382>. Access: 08.01.2018.
14. Legislation of the Republic of Latvia (1993) *Par dzīvojamā telpu īri likums* [Law on Residential Tenancy] Retrieved <https://likumi.lv/doc.php?id=56863>. Access: 08.01.2018.
15. Ministry of Economics (2012). EMZino\_280212\_paradi. Informatīvais ziņojums par pasākumiem ar dzīvokļa īpašuma lietotāju saistīto problēmas risināšanai.- Retrieved: [https://www.em.gov.lv/lv/nozares\\_politika/majokli/informativie\\_zinojumi/](https://www.em.gov.lv/lv/nozares_politika/majokli/informativie_zinojumi/). Access: 04.01.2018.
16. Ministry of Economics (2014). Informatīvais ziņojums par situāciju saistībā ar siltumapgādes pakalpojumiem 2013. gada. - Retrieved: [https://www.em.gov.lv/lv/nozares\\_politika/majokli/informativie\\_zinojumi/](https://www.em.gov.lv/lv/nozares_politika/majokli/informativie_zinojumi/). Access: 04.01.2018.
17. Ministry of Economics (2015). Informatīvais ziņojums par situāciju saistībā ar siltumapgādes pakalpojumiem 2014. gada. - Retrieved: [https://www.em.gov.lv/lv/nozares\\_politika/majokli/informativie\\_zinojumi/](https://www.em.gov.lv/lv/nozares_politika/majokli/informativie_zinojumi/). Access: 04.01.2018.
18. Ministry of Economics (2016). Informatīvais ziņojums par situāciju saistībā ar siltumapgādes pakalpojumiem 2015. gada. - Retrieved: [https://www.em.gov.lv/lv/nozares\\_politika/majokli/informativie\\_zinojumi/](https://www.em.gov.lv/lv/nozares_politika/majokli/informativie_zinojumi/). Access: 04.01.2018.
19. Schumpeter, J. A. (1982). *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle*. Rutgers. New Jersey: Transaction Publishers. p. 244.
20. Smith, A. (2007). *An Inquiry into the Nature and Causes of the Wealth of Nations*. London: Strahan and Cadell. p. 754.

## SELECTED ISSUES REGARDING THE IMPLEMENTATION OF CSR IN POLISH AGRIBUSINESS ENTERPRISES: CASE STUDY

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**Abstract.** The purpose of this elaboration is the presentation of selected issues related to the implementation of CSR in agribusiness enterprises from rural areas of the Mazowieckie voivodeship. Research on the opinion of entrepreneurs on the concept of CSR, its scope and application of the principles of social responsibility were carried out at the turn of 2017 and 2018 and included 325 micro (0-9 people), small (10-49 employees) and medium (50-249 employees) agribusiness enterprises conducting economic activity in rural areas of the Mazowieckie voivodeship. The research was carried out by means of a diagnostic survey, and the basic research tool was an electronic questionnaire that was sent to the surveyed entities. The survey was sent to all agribusiness entities operating in the studied voivodeship - 325 questionnaires were fully and correctly completed. The material obtained in this way was subjected to mathematical - statistical analysis. The arithmetic mean, independence test  $\chi^2$ , Chuprov convergence coefficient and C. Pearson coefficient (corrected and regular) were used. Social responsibility in the organizational structure of the surveyed companies was hardly visible because there were no people responsible for developing the CSR concept related to the subject of the activity and the specificity of the company. Only every third respondent stated that actions were being taken for the benefit of broadly understood environment and they were inscribed in the company's business strategy.

**Key words:** SME, agribusiness, corporate social responsibility, rural areas, strategy.

**JEL code:** O12, O13, O18

### Introduction

Corporate social responsibility (CSR) is a concept, according to which enterprise at the stage of strategy building voluntarily takes into account social interests and environmental protection, as well as relations with their stakeholders (Ratajczak, Woloszyn, Stawicka 2012). Nowadays, more and more attention is paid to the fact that corporate social responsibility is of strategic and dynamic character and is based on constant (continuous) improvement, as well as cooperation with all stakeholders of the company (Carroll, 1974).

Therefore, the importance of CSR in management science becomes more and more crucial. In the economic practice, on the other hand, it generates a dialogue process, learning mutual expectations and opportunities, close monitoring and improving strategies within a broadly understood partnership (Willard, 2002).

Social responsibility is also defined as a moral and lawful duty towards the entire environment, both internal and external to the enterprise - the social responsibility of the company means that it is morally responsible and obliged to account for the law and society from its activities. It is responsible towards the owners, clients, employees, shareholders, creditors, ecological movements, suppliers, cooperators, banks and state administration (Vogel, 2005; Garriga, Mele, 2004).

It is also necessary to pay attention to the fact that CSR leads to building a competitive advantage strategy, based on providing long-lasting value for both shareholders and other partners-stakeholders, especially those important in the agribusiness sector (Gasparski, 2004; Waddock, 2008; Madra-Sawicka, 2016; Wysokinski, Dziwulski, 2013).

It should be stated that social responsibility should be taken into account both inside and outside the enterprise, as the basis of business, and not as additional actions and ethical procedures undertaken in selected areas and activities of the organization. Comprehensive

activities of enterprises regarding employees, society or the natural environment, having a consistent system of values on which all company's activities are based, provide the possibility of its stable and proper functioning (Zemigała, 2007; Ratajczak, 2014; Rokicki, 2016).

The European Commission defines social responsibility as an idea in which companies voluntarily incorporate social and environmental issues into their business activities and into relations with their stakeholder groups (Green Paper, 2001; Roome, 2009).

It should be mentioned that in addition to the definitions referred to above, in May 2010 at the ISO (International Standard Organization) plenary session, the first international standard of corporate social responsibility was adopted - ISO 26000, which was officially translated and presented in Poland in the second half of 2012 (Global Compact, 2010, Esty, Simmons, 2011). In its content, apart from the principles of social responsibility, a description of the basic seven CSR areas relating to: organizational order, human rights, relations with employees, the natural environment, market practices, consumer issues and social involvement and development was presented (Banerjee, 2011; Baran and Rokicki, 2015; Ratajczak, 2013).

Corporate social responsibility in Poland is a relatively little-known initiative and is not yet permanently implemented in the minds of Polish entrepreneurs, especially in the sphere of SMEs and local communities. Professional CSR tools, code of ethics, social reporting, audits and certification are mainly used by large enterprises (Gorecka and Rokicki, 2014; MCWilliams, 2001, Sethi, 1979, Reich, 2008).

The aim of the article is to present selected issues related to the implementation of CSR in the studied agribusiness enterprises from rural areas of the Mazowieckie voivodeship. The basic question about research is: is the CSR strategy implemented in Polish agribusiness enterprises and what factors influence this?

## **Materials and methods**

Research on the opinion of entrepreneurs on the concept of CSR, its scope and application of the principles of social responsibility were carried out at the turn of 2017 and 2018 and included 325 micro (0-9 people), small (10-49 employees) and medium (50-249 employees) agribusiness enterprises conducting economic activity in rural areas of the Mazowieckie voivodeship.

The research was carried out by means of a diagnostic survey, and the basic research tool was an electronic questionnaire addressed to the surveyed entities. The survey was sent to all agribusiness entities operating in the studied voivodeship - 325 questionnaires were fully completed correctly. The material obtained in this way was subjected to mathematical - statistical analysis. The arithmetic mean,  $\chi^2$  independence test, Chuprov convergence coefficient and C. Pearson coefficient (corrected and regular) were used.

Small companies dominated in the analysed sample - they accounted for 64.7 %, micro enterprises - 29.7 %, respectively, and medium enterprises - 5.6 %. Men owned 58.7 % of analysed enterprises, and women 41.3 % of business entities from the agribusiness sector. The structure of owners of the surveyed enterprises by their education was advantageous. The managers of 62 % of companies had higher education - this is definitely a positive phenomenon considering the trend of migration of educated people from villages to large urban agglomerations. Over 32 % of respondents had secondary education. The remaining subjects were characterized by primary education and accounted for about 6 % of the respondents.

Nearly 66 % of the respondents were active in the industrial processing section, which is characteristic for small and medium-sized agribusiness companies on a national scale, especially in rural areas. Every fourth respondent dealt with wholesale and retail trade, which resulted from frequent localization of business entities in rural areas near large urban agglomerations (distribution and sale of offered goods), especially in the vicinity of Warsaw, Radom, Skierniewice, Ciechanow or Plock. The remaining two sections, agriculture and transport, accounted for around 10 % in the structure of the surveyed entrepreneurs.

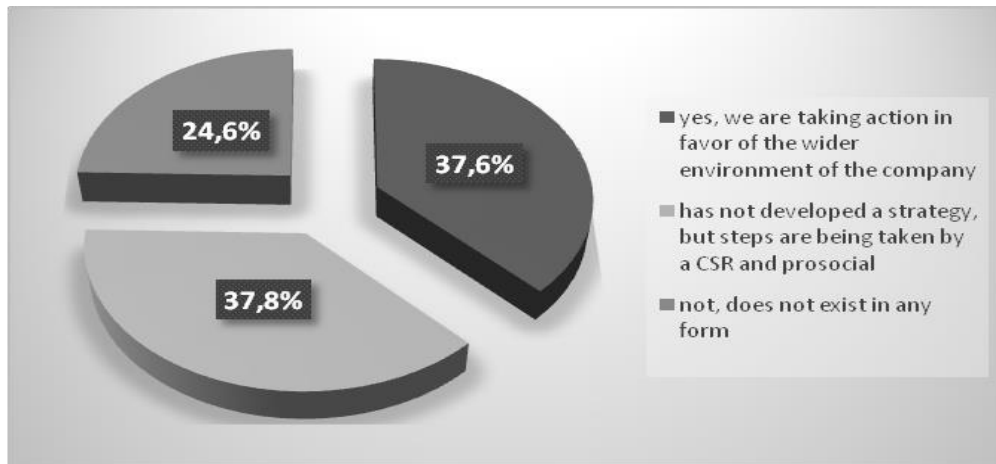
The largest number of studied enterprises (almost 56 %) functioned as natural persons conducting economic activity - this form is also the most common in the whole country in rural areas. In other cases, these entities were registered as limited liability companies, civil (every eleventh entity) and general partnerships (approximately 10 % of the surveyed population).

### **Research results and discussion**

The results of research carried out in small and medium-sized agribusiness companies in the Mazowieckie Voivodeship showed that almost 25 % of entrepreneurs do not take actions in the field of CSR in their policy (Figure 1). Unfortunately, in the case of such business entities, we can talk about the attitude of resistance to CSR and related changes. Only every third respondent stated that activities are undertaken for the broadly understood environment and they are inscribed in the company's strategy. In the case of these enterprises, one can speak of a conscious attitude of social contribution and actions aimed at improving the quality of life of citizens. On the other hand, almost 38 % of respondents declared taking steps of a CSR and prosocial character, but rather in an occasional way, if they were asked for it.

In order to determine the statistical independence between the education of the owners of the surveyed enterprises and having the CSR strategy, the  $\chi^2$  independence test was carried out, which showed that the analysed variables are mutually dependent (Table 1). Activities for the broadly understood business environment were implemented primarily by owners with higher education and CSR steps, but without a strategy, were undertaken by entrepreneurs with secondary education. Practically, no elements of the CSR strategy existed in people with elementary education. It should also be emphasized that the calculated indices show a moderate strength of the relationship between the variables studied.

Statistical independence was also determined between the activity section and having a corporate social responsibility strategy (Table 2). The  $\chi^2$  independence test carried out for this purpose showed that the variables under study are not mutually independent. In a wide range of CSR activities in the context of the company's environment, they were undertaken by small and medium-sized enterprises from the industrial processing sector as well as wholesale and retail trade. Prosocial steps were taken primarily by economic entities from the agricultural section, and in the smallest scope such activities were carried out by transport companies. The strength of the relationship between the analysed variables is relatively strong, as illustrated by the calculated coefficients.



Source: authors' elaboration

Fig. 1. Possession of CSR strategy by surveyed agribusiness companies ( %)

Table 1

**Determination of statistical independence between surveyed business owners' education and possession of social responsibility strategy**

$\chi^2$ TEST OF INDEPENDENCE	
<b>Hypothesis:</b> H <sub>0</sub> : [tested variables are independent] H <sub>1</sub> : [tested variables are not independent]	
$\chi^2 = 12.45 > \chi^2_{\alpha} = 5.65$ the null hypothesis H <sub>0</sub> is rejected in favour of alternative hypothesis H <sub>1</sub> at $\alpha = 0.05$	
T Chuprov convergence coefficient	Txy = 0.65
C Pearson contingency coefficient - simple	Cxy = 0.72
C Pearson contingency coefficient - corrected	skorCxy = 0.85
Variable X: Enterprises owners' education Variable Y: Corporate social responsibility strategy possession	

Source: authors' elaboration

Table 2

**Determination of statistical independence between the section of activity (NACE) and possession of social responsibility strategy**

$\chi^2$ TEST OF INDEPENDENCE	
<b>Hypothesis:</b> H <sub>0</sub> : [tested variables are independent] H <sub>1</sub> : [tested variables are not independent]	
$\chi^2 = 23.77 > \chi^2_{\alpha} = 11.54$ the null hypothesis H <sub>0</sub> is rejected in favour of alternative hypothesis H <sub>1</sub> at $\alpha = 0.05$	
T Chuprov convergence coefficient	Txy = 0.69
C Pearson contingency coefficient - simple	Cxy = 0.77
C Pearson contingency coefficient - corrected	skorCxy = 0.87
Variable X: Activity section (NACE) Variable Y: Corporate social responsibility strategy possession	

Source: authors' elaboration

The validity of the above-mentioned independence test is demonstrated by the data on possession of a responsible business strategy according to the section of the economy. The analyses carried out show that activities in favor of the broadly understood business environment occurred mainly in industrial processing enterprises (over 72 % of responses) and commercial companies (over half of indications). In turn, the steps of CSR character, but without the strategy

developed, took place primarily in companies from the agricultural sector - about 44 % of responses. It should also be noted that in the transport industry over 76 % of the surveyed entrepreneurs do not have any CSR strategy in any form.

An important issue is also the possession of a CSR strategy according to the size of the enterprise. Only 9 % of micro-enterprises had a strategy of responsible business, and about 13 % of them took pro-social activities. A more positive trend was observed in the activity of small and medium-sized business entities - over 57 % of surveyed business owners indicated possession of a formal CSR strategy, and about 38 % undertook extensive activities to build social responsibility of their company, which is certainly very important, especially in the agribusiness sector in Poland. In this group of companies, only about 4 % of respondents did not undertake any activities aimed at building a CSR strategy.

Table 3

**Determination of statistical independence between the year of company establishment and social responsibility strategy possession**

<b>χ<sup>2</sup> TEST OF INDEPENDENCE</b>	
<b>Hypothesis:</b>	
<b>H0: [tested variables are independent]</b>	
<b>H1: [tested variables are not independent]</b>	
<b><math>\chi^2 = 17.89 &gt; \chi^2_{\alpha} = 5.56</math> the null hypothesis H0 is rejected in favour of alternative hypothesis H1 at <math>\alpha = 0.05</math></b>	
<b>T Chuprov convergence coefficient</b>	Txy = 0.65
<b>C Pearson contingency coefficient - simple</b>	Cxy = 0.71
<b>C Pearson contingency coefficient - corrected</b>	skorCxy = 0.88
<b>Variable X: Year of company establishment</b>	
<b>Variable Y: Corporate social responsibility strategy possession</b>	

*Source: authors' elaboration*

Statistical independence was also examined between the company's year of establishment and possession of a social responsibility strategy (Table 3). Also in this case, the  $\chi^2$  independence test showed that the variables studied are interdependent. The CSR strategy was mainly present in companies established in 1990-1999, and also before 1989. In contrast, in enterprises that had a shorter period of existence on the market, the frequency of occurrence of CSR strategy elements was much less frequent, especially in entities established after 2004. The coefficients calculated for this purpose show that the strength of dependence of these features was strongly moderate - the highest value was achieved by the corrected Pearson's contingency coefficient.

Very often it happens so that the implementation of CSR principles depends, to a large extent, on the attitude of the person managing the enterprise and those responsible for compliance with these principles in business practice. Over 27 % of respondents confirmed that the company does not have a person responsible for activities related to social responsibility. Almost 60 % of entrepreneurs declared that persons responsible for CSR activities also have a different scope of professional responsibilities or deal with these issues temporarily. The implementation and execution of these principles becomes an additional duty and may lead to discrepancies in their implementation in practice. It should also be emphasized that only 13 % of the respondents confirmed that there is an independent position for CSR in the company and this person aims to prepare all elements related to the implementation of responsible business in the enterprise.

## Conclusions

If we take into account only the formal side of the CSR concept functioning in the surveyed agribusiness enterprises, it should be stated that the social responsibility in the organizational structure was not very visible because there were no people responsible for developing the CSR concept related to the subject of the activity and the company's specificity. Only every third respondent stated that actions are being taken for broadly understood environment and they are inscribed in the company's business strategy. In a wide range of CSR activities, in the aspect of the company's environment, they were undertaken by small and medium-sized enterprises from the industrial processing and wholesale and retail trade sectors. It is certainly disturbing that in the economic entities from the agricultural and transport industries, the activities in the field of responsible business were taken very rarely, or they were not there at all. In the agribusiness sector, these are very important issues and should be properly promoted and popularized.

Summarizing the above considerations, it should be stated that entrepreneurs in their companies must try to implement instruments of social responsibility policy, including by creating a uniform strategy in this area. In practice, declarations that are recorded and followed give a much greater guarantee of quality and inspire confidence among stakeholders.

The precisely defined scope of the CSR strategy and its form will also allow it to be adapted to the type of business activity conducted, especially in the agribusiness sector, which is crucial for the economy of each country. In this way, it will be easier to engage employees in such activities by showing key elements of socially responsible business and encouraging them to be active in this area. Certainly, the interest and tendency to implement CSR in Poland is improving every year, but much more attention should be paid to this in rural areas, as demonstrated by research in this field.

## Bibliography

1. Baran, J., Rokicki, T. (2015). *Productivity and Efficiency of US Metal Industry in 2006-2014*, In Metal 2015: 24th International Conference on Metallurgy and Materials. Conference Proceedings. Ostrava: TANGER, 2015, pp. 1841-1846.
2. Carroll, A. (1974). Corporate Social Responsibility: its Managerial Impact and Implications. *Journal of Business Research*, Nr 2, pp. 75-90.
3. Esty, D., Simmons, p. (2011). *The Green to Gold Business Playbook – How to Implement Sustainability Practices for Bottom Line Results in Every Business Function*, Willey & Sons, Hoboken, NJ.
4. Garriga, E., Mele, D. (2004). *Corporate Social Responsibility Theories – Mapping the Territory*, *Journal of Business Ethics*, Nr 53, pp. 51-68.
5. Gasparski, W., Lewicka-Strzalecka, A., Rok, B., Szulczewski, G. (2004). *Odpowiedzialność społeczna i etyka biznesu w polskim życiu gospodarczym, Wstępny raport z badań (Social Responsibility and Business Ethics in Polish Business Life, Preliminary Research Report)*, Wydawnictwo IFiS PAN – Centrum Etyki Biznesu L. Kozminkiego, Warszawa, p. 18.
6. Gorecka, A., Rokicki, T. (2014). *The Significance of Transportation in Agribusiness Companies*. CLC 2013: Carpathian Logistics Congress - Congress Proceedings, pp. 24-30.
7. Mądra-Sawicka M. (2016). Samofinansowanie działalności w przedsiębiorstwach rolniczych (Self-financing of Activities in Agricultural Enterprises), *Finanse, Rynki Finansowe, Ubezpieczenia*, Nr 4, Wydawnictwo SGGW, Warszawa, pp. 425-435.
8. McWilliams, A., Siegel, D. (2001). *Corporate Social Responsibility – a Theory of the Firm Perspective*, *Academy of Management Review*, Nr 26, pp. 117-130.
9. Promotion of the European Project for Corporate Social Responsibility, European Commission, Green Paper - final version, 2001.
10. Ratajczak, M. (2013). *Działania CSR wobec pracowników na przykładzie przedsiębiorstw agrobiznesu z Warmii i Mazur (CSR Activities Towards Employees on the Example of Agribusiness Companies from Warmia and Mazury)*, *Przegląd Organizacji*, Nr 12, pp. 14-19, Warszawa.
11. Ratajczak, M. (2014). The Implementation of Selected Elements of the CSR Concept on the Example of Agribusiness Enterprises from Warmia and Mazury, *Management*, Vol. 18, Nr 1, pp. 109-123, Zielona Góra.



12. Ratajczak, M., Wołoszyn J., Stawicka, E. (2012). *Spoleczna odpowiedzialnosc malych i srednich przedsiebiorstw agrobiznesu z obszarow wiejskich* (Social Responsibility of Small and Medium-sized Agribusiness Enterprises from Rural Areas), Wydawnictwo SGGW, Warszawa, pp. 26-27.
13. Reich, R. (2008). *The Case Against Corporate Social Responsibility*, Goldman School of Public Policy Working Papers, nr 3.
14. Rokicki T., (2016). *Sustainable Development in Energy Sector in the European Union Countries*, Economic Science for Rural Development. Proceedings of the International Scientific Conference, No 43, pp. 108-116.
15. Roome, N. (2009). *Company Strategies for Corporate Responsibility and Sustainability in an era of Fragmented Globalization, Challenges and practices*, Stockholm, pp. 25-34.
16. Sethi, p. (1979). *Dimensions of Corporate Social Responsibility*, Californian Management Review, Nr 17 (3), pp. 57-65.
17. United Nations Global Compact: A New Era of Sustainability, UN Global Compact Accenture CEO Study, New York 2010.
18. Vogel, D. (2005). *The Market for Virtue – the Potential and Limits of Corporate Social Responsibility*, Washington: DC Brookings Institution Press, Washington.
19. Waddock S. (2008). *Building a New Institutional Infrastructure for Corporate Responsibility*, Academy of Management Perspectives, No 22 (3), pp. 87-107.
20. Willard, B. (2002). *The Sustainability Advantage – Seven Business Case Benefits of a Triple Bottom Line*, Gabriola Island: New Society Publishers.
21. Wysokinski, M., Dziwulski, M. (2013). *Land as Main Production Factor on Dairy Farms in Poland*. Economic Science for Rural Development: production and cooperation in agriculture / finance and taxes. Proceedings of the International Scientific Conference, Issue 30, pp. 128-133.
22. Zemigala, M. (2007). *Spoleczna odpowiedzialnosc przedsiebiorstwa. Budowanie zdrowej, efektywnej organizacji* (Corporate Social Responsibility. Building a Healthy, Effective Organization), Oficyna Wolters Kluwer, Krakow, p. 99.

## THE ENERGY DEMAND OF AGRITOURISM FARMS IN POLAND

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**Abstract.** The purpose of the article was to present the importance of agritourism as a non-agricultural business activity in rural areas. Particular attention has been paid to elements of agritourism innovation, as a basic form of recreation in rural areas. The innovation development can be based on natural resources, cultural heritage of the area and the involvement of institutions and the local community. The sustainable economic development as a part of innovativeness development leads to improvement of the living standard of the rural community. The example of the innovation is usage of heat pumps, which could be placed in rural buildings. Transformation of the energy stored in the ground into thermal energy is the purpose of described devices. The annual total operating costs of space heating in the agritourism farm were also calculated in presented article. Based on the collected data the formula for the energy needs in agritourism facilities was presented. The value of energy demand of agritourism farms in Poland in the years 1998-2015 amounted to 5 035 816.8 TJ.

**Key words:** rural tourism, agritourism, rural areas, innovations, heat pumps, Poland.

**JEL code:** Q12, Q13, Q40, Q42, Q43, Q47

### Introduction

Agritourism is the basic form of recreation in rural areas, using its own accommodation base on the farm, along with the possibilities of feeding tourists and implementation of agricultural program, cultural and recreational education in the natural environment (Roman M., Niedziolka A., 2017). The development is based on natural resources, cultural heritage of the area and the involvement of institutions and the local community (Gospodarek J., 2001). Because the air pollution in cities is still increasing, there is also growing interest of health awareness and the desire to use the values of rural life such as fresh air, the possibility of active rest, stress-free situations, safety and friendly attitude of rural residents to tourists (Ollenburg C., Buckley R., 2007). Currently, the tourists are looking for seclusion and relaxation on nature areas, enforcing to spend the vacations with the possibility of countryside short rest (Sikora J., 1999).

The attractiveness of agritourism come from the advantages of rural areas (the value of internal and external agricultural and forest areas environment) such as clean air and water, natural wealth of the vegetable and animal world, monuments of rural architecture, local and regional cuisine, folk culture, history, hospitality of local hosts and other residents of the village, peaceful and security.

However, the great importance lies in the innovative ways of agritourism development, which considers the modernity and competitiveness growth (Wielewska I., 2017). It also requires support with knowledge that can be provided by professional advisory services (Prus P., Drzazdzynska K., 2017). These are an indispensable element of agritourism economy increase. In many cases, the new form of applied solutions can improve the work in rural buildings, using the renewable energy sources such as heat pumps.

### Material and the research method

The purpose of the article was to present the importance of agritourism as a non-agricultural business activity in rural areas. Particular attention has been paid to elements of agritourism innovation, presenting the heat pumps usage in the agritourism facilities. Applied innovation should be profitable, that is why the total annual financial burden was calculated. The study contains the review based on literature documents and authors' own experience. The proposed calculation of

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total annual financial burden connect with energy consumption costs (ECC), capital costs (CC) and depreciation costs (DC).

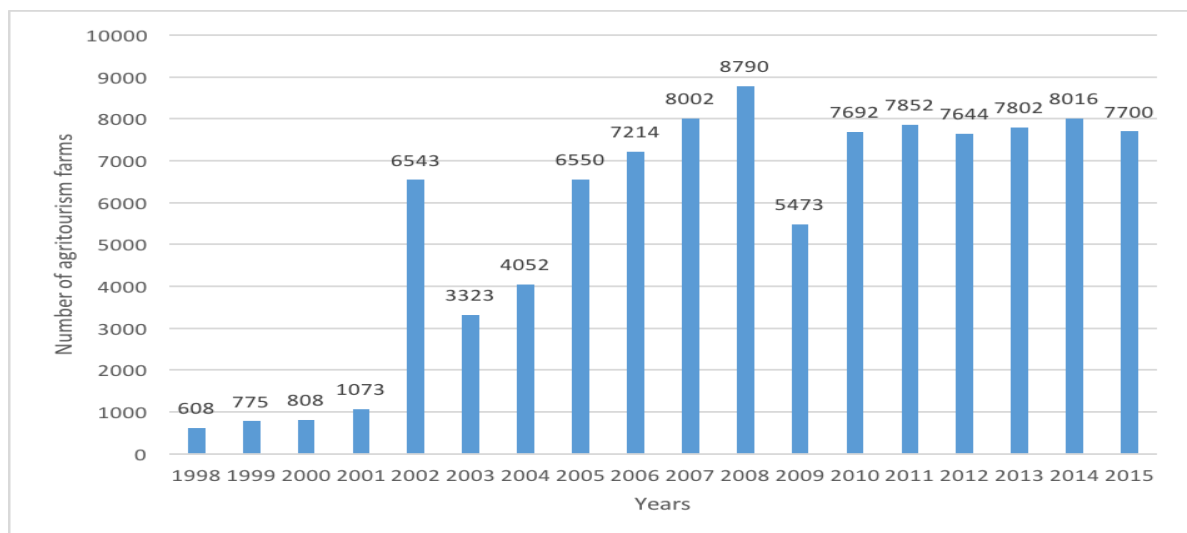
### **Agritourism as a factor of rural development**

Agritourism activity should be considered from the supply and demand side (Golebiewska B., 2015). The supply side is represented by the "interests" of active farms, providing services based on a tourist product and its competitiveness (Philip S., Hunter C., Blackstock K., 2010). Second side concerns tourists, which reports the demand and level of the satisfaction according to the offered tourism product and its attractiveness (Roman M., Roman M., Roman K., 2018). Agritourism consists of two parts: agro (Greek agros - role, agronomos - referring to the agricultural property management) and tourism (a form of active rest away from the place of residence and employment, which is inspired by cognitive, recreational, healing and cognitive needs, sports, entertainment, commitments to family, friends and institutions, including religious) (Sznajder M., Przeborska L., 2006). In the implementation of recreational, cognitive, health, sentimental or family purposes, advantages of local cultural heritage and natural diversity are used (Roman M., Roman M., 2014). The basic functions can be specified (Knecht D., 2009; Roman M., Niedziolka A., 2017):

- profitable (additional source of income as non-agricultural activities);
- cognitive (learning about life, culture, professions of the local community);
- activation of rural areas;
- educational, including ecological (maintaining cleanliness and nature learning);
- conservation of natural and cultural resources;
- sport recreation (active recreation, improvement of health condition).

Over the years, the agritourism in Poland developed dynamically. Detailed data are presented in

Figure 1.



\* Data for 2008 were estimated.

Source: authors' study based on the data of the Central Statistical Office "Tourism", series: "Information and Statistical Studies" from 1998, 1999, 2000, 2001, 2009, 2010, 2011, 2012, 2013, 2014, 2015, data of the Institute of Tourism from 2002, 2003, 2004, 2005, 2006, 2007, data obtained from agricultural advisory centres in Poland.

Fig. 1. Number of agritourism farms in Poland in 1998-2015

Information about numbers of agritourism farms each year was collected by various institutions, like Ministry of Agriculture and Rural Development, Institute of Tourism or Central Statistical Office. The dynamic increase in the number of agritourism farms to nearly 8.000 facilities in 2015 can be noticed. Location of agritourism farms in Poland was presented in Figure 2.

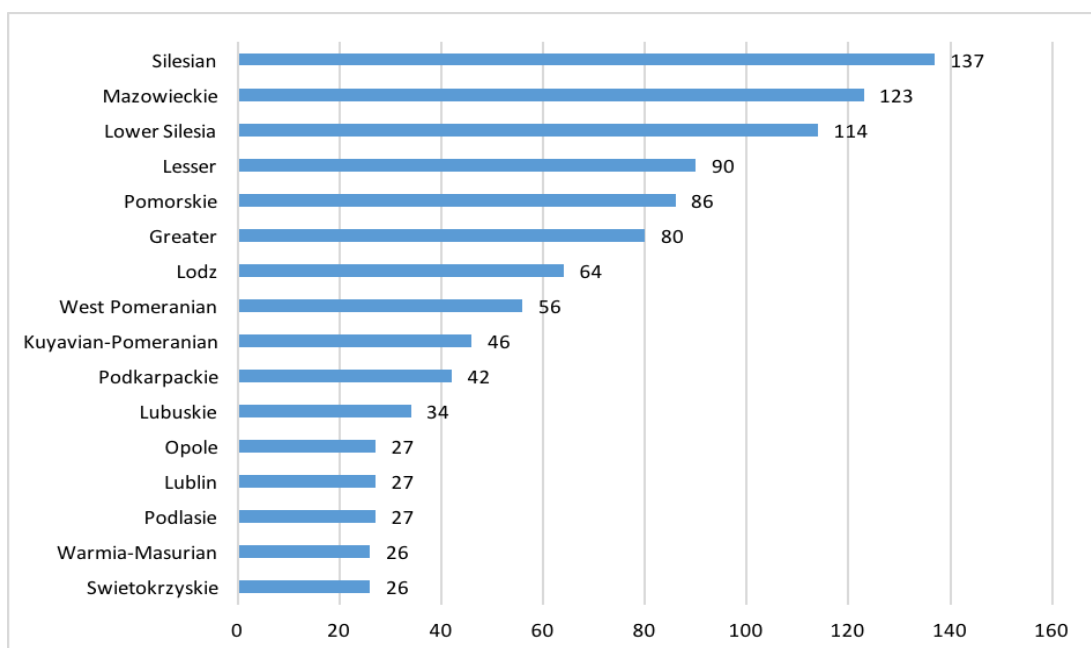


Source: Bednarek-Szczepanska M., Banski J., 2014

Fig. 2. Distribution of agritourism farms in Poland

Most agritourism farms are located on natural-valuable areas with good environmental conditions (i.e. mountains, sea, Masuria). Most of objects are located in the eastern part of Poland in Podlasie, Lubelskie and Podkarpackie voivodeship.

The example of the innovation is usage of heat pumps, which could be placed in rural buildings. Transformation of the energy stored in the ground into thermal energy. The heating system is very effective and ecological during the hot water preparation (<http://www.gospodarzzenergia.pl/gruntowe-pompy-tupla>, access 26/11/2017). Integrated system can operate nonstop, acquiring accumulated energy stored in soil, subsurface waters, atmosphere and geothermal energy. The studied energy sources are characterized as lower heat sources (<http://www.nowoczesnegrzanie.pl/pompy-ciepla.html>, access 26/11/2017). Heat pumps are supplied with electricity, most frequently through compressor supply.



Source: <http://www.baza-firm.com.pl> (access 26/11/2017)

Fig. 3. The number of registered companies in individual voivodships of Poland

Market analysis according to Business Navigator (BN) website was made. BN website contains the data of 1005 verified companies that produce the heat pumps. The number of registered companies in individual voivodships is presented in Figure 3.

Operating costs and capital expenditures of heat pumps usage can be determined by comparing their total installation cost in agritourism buildings. The average area of building should have 200 m<sup>2</sup> and should use at least in 15 % of renewable energy from the heat pumps work. It was assumed that the standard heat power is about 70 kWh/m<sup>2</sup> per year. The two variants of applied heat pumps were compared during performed calculations. The SPF efficiency factor of air-to-water heat pump was equal 3.3; for the brine-water type SPF factor reached 4.3. The ground heat exchanger was applied on the 350 m<sup>2</sup> of surface. The list of costs of investment elements for the considered case is presented in Table 1.

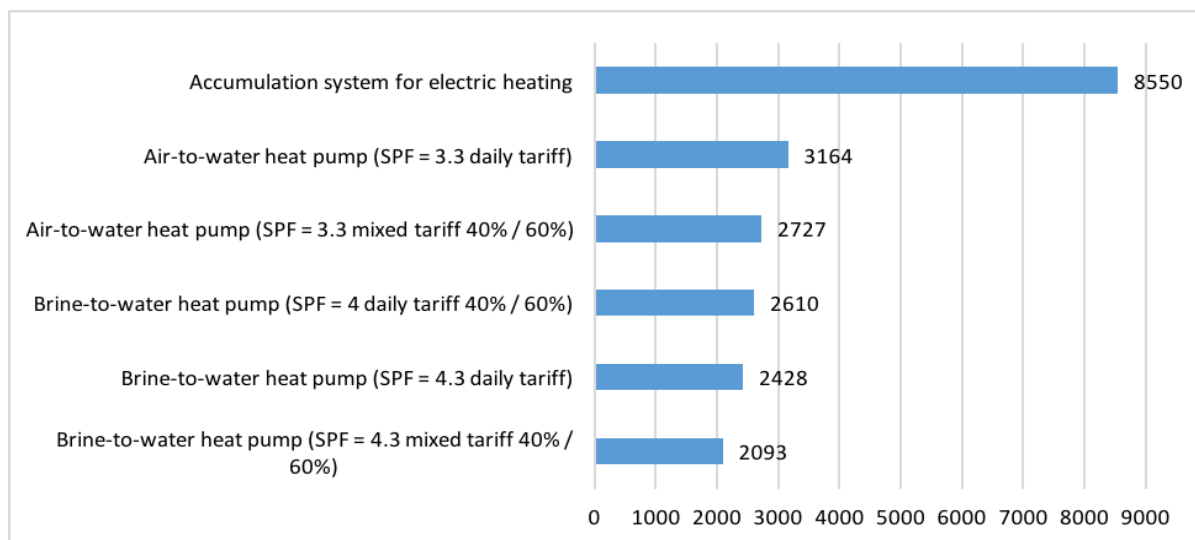
Table 1

**List of costs of investment elements for the case under consideration (PLN)**

Type of investment element	Standard period of use, years	Example I	Example II
Heat pumps	20	26 000	27 000
Lower source	50	2 000	12 000
Electrical installation with control	20	3 000	3 000
Central heating installation costs	40	17 000	17 000

Source: data of the Renewable Energy Institute

The overall operating costs of space heating and hot utility water are around 80 % per year. The choice of a heating installation mostly depends on the cost of maintaining the facility. The presentation of electricity costs for a compressor heat pump in the daily G11 and mixed G12 tariff is presented in Figure 4.

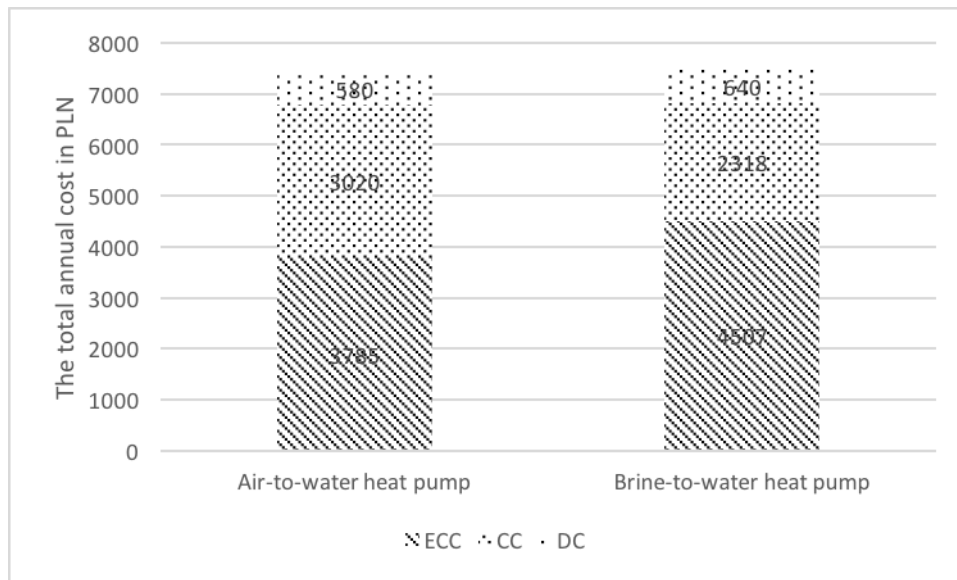


Source: data of the Renewable Energy Institute

Fig. 4. List of electricity costs for a compressor heat pump in the daily tariff G11 and mixed tariff G12 - Cost of heating hot water in a building with an area of 200 m<sup>2</sup> (PLN/year)

The economic analysis of applied heat pumps in the agritourism facility considered the total costs comparing. The comparison of total equivalent annual costs (alternative assumptions) enables correct characterization of incurred costs. The guidelines of the Association of German Engineers VDI 2067 are a tool designed for economic analysis that compares selected heating technologies (Data of the Institute for Renewable Energy). The guidelines were especially appreciated in Germany.

Energy consumption costs (ECC), capital costs (CC) and depreciation costs (DC) are the total annual financial burden that was taken into account during calculation. The capital costs concern the chosen elements work (boiler room, lower source and heat pump) in a selected operation period. The investment costs (IC) are the annual incurred fixed capital costs. The value of IC should be multiplied by a coefficient determining the equivalent annual cost or a factor characterizing the annual fees, which contain the value resulting from the use in a given period of individual investment elements and the loan interest rate. A summary of the total annual costs of using heat pumps at an agritourism farm is presented in Figure 5.



Source: data of the Renewable Energy Institute

Fig. 5. Summary of total annual costs of heat pump operation in an agritourism farm

The value of incurred costs resulting from servicing of the operating installation was presented in Figure 5. Estimation was based on the VDI 2067 guidelines. According to VDI 2067, the value of the heat pump annual maintenance is from 2 to 3 % of the total investment costs. The research about FAWA heat pump exploitation that was performed in Switzerland shows that the annual service costs are significantly lower than those assumed by VDI 2067 and do not exceed the level of 1 %.

In the further part of the article, the energy demand (Z) of agritourism farms in Poland in the years 1998-015 was estimated. Based on the above data, the formula for the energy needs in agritourism facilities was presented:

$$Z = \sum_{i=1}^{18} (SPH * L * AF) \quad (1)$$

where:

Z - energy demand in agritourism farms in years, J×a,

SHP - heat power standard, kWh / m<sup>2</sup>,

L - average area of the farm, m<sup>2</sup>,

AF - number of agritourism farms in a given year.

It was estimated that every single agritourism farm for heat uses about 50.4 [TJ] energy per year. The analyses show that the energy demand of agritourism farms in the years 1998-2015 amounted to 5 035 816.8 TJ. This applies to the heating of agritourism facilities in Poland, which was adopted on the basis of the average area of the farm.

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## Conclusions

The sustainable economic development as a part of innovativeness development leads to improvement of the living standard of the rural community. The example of the innovation is usage of heat pumps, which could be placed in rural buildings. Transformation of the energy stored in the ground into thermal energy is the purpose of described devices. The value of energy demand of agritourism farms in Poland in the years 1998-2015 amounted to 5 035 816.8 TJ.

It is very important to develop the innovation. The presented example of installation of heat pumps in agro-tourist facilities is a new solution that can improve the work in this type of entities. Regardless of the climate, the system can work nonstop, collecting energy from soil, surface waters, atmosphere and geothermal energy.

## Bibliography

1. Bednarek-Szczepanska, M., Banski, J. (2014). Lokalizacyjne uwarunkowania oferty gospodarstw agroturystycznych w Polsce (Location conditions of the offer of agritourism farms in Poland). *Przeglad Geograficzny*, 86 (2), pp. 243-260.
2. Dane Głównego Urzędu Statystycznego pt. Turystyka – Informacje i Opracowania Statystyczne z lat: 1998, 1999, 2000, 2001, 2009, 2010, 2011, 2012, 2013, 2014, 2015 (Data of the Central Statistical Office Tourism - Information and Statistical Studies from 1998, 1999, 2000, 2001, 2009, 2010, 2011, 2012, 2013, 2014, 2015).
3. Dane Instytutu Energetyki Odnawialnej (Data of the Renewable Energy Institute).
4. Dane Instytutu Turystyki z lat: 2002, 2003, 2004, 2005, 2006, 2007 (Data of the Institute of Tourism from 2002, 2003, 2004, 2005, 2006, 2007).
5. Dane ośrodków doradztwa rolniczego w Polsce (Data of agricultural advisory centres in Poland).
6. Dane Polskiej Organizacji Rozwoju Technologii Pomp Ciepła (Data of the Polish Heat Pump Technology Development Organization).
7. Gaworecki, W.W. (2003). *Turystyka (Tourism)*. PWE, Warszawa.
8. Golebiewska, B. (2015). Economic conditions of development of Polish agritourism. In: *Hradec Economic Days 2015-Part IV. Vol 5(4)*. Hradec Králové, Gaudeamus, pp. 167-168. ISBN 978-80-7435-549-3.
9. Gospodarek, J. (2001). *Prawo turystyczne (Tourist law)*. Wydawnictwa Prawnicze PWN, Warszawa.
10. Jedrysiak, T. (2010). *Wiejska turystyka kulturowa (Rural cultural tourism)*. PWE, Warszawa.
11. Knecht, D. (2009). *Agroturystyka w agrobiznesie (Agritourism in agribusiness)*. Wydawnictwo C. H. Beck, Warszawa.
12. Kozuchowska, B. (2000). Podstawowe pojęcia, cechy, składniki agroturystyki oraz formy samoorganizacji usługodawców. (*Basic concepts, features, components of agritourism and forms of self-organization of agritourism farm owners*) In: Świątkowska U. (red.). *Agroturystyka (Agritourism)*. Wydawnictwo FAPA, Warszawa, pp. 23-24.
13. Ollenburg, C., Buckley, R. (2007). Stated economic and social motivations for farm tourism operators. *Journal of Travel Research*, 45, 444-445.
14. Philip, S., Hunter, C., Blackstock, K. (2010). A typology for defining agritourism. *Tourism Management*, 31, pp. 754-755.
15. Prus, P., Drzazdzynska, K. (2017). Farmers' Assessment of Training Services and the Impact of Agricultural Advisory on Selected Developmental Factors Affecting Farming. *Proceedings of the International Scientific Conference Economic Science for Rural Development*, Latvia University of Agriculture, Jelgava, No. 44, pp. 338-344.
16. Roman, M., Niedziolka, A. (2017). Agroturystyka jako forma przedsiębiorczości na obszarach wiejskich (Agritourism as a form of entrepreneurship in rural areas). Wydawnictwo SGGW, Warszawa.
17. Roman, M., Roman, M. (2014). Bicycle transport as an opportunity to develop urban tourism – Warsaw example. *Procedia – Social and Behavioral Sciences*, 151, pp. 295-297.
18. Roman, M., Roman, M., Roman, K. (2018). The forecast of economic processes of selected agricultural products in the development of bioenergy and agritourism activity in Poland. In: Double-blind peer-reviewed proceedings part II of the International Scientific Conference Hradec Economic Days. Published University of Hradec Kralove, Faculty of Informatics and Management, Hradec Kralove, vol. 8 (2), pp. 246-247.
19. Rozycki, p. (2006). *Zarys wiedzy o turystyce (Outline of knowledge about tourism)*. Proksenia, Krakow.
20. Sikora, J. (1999). *Organizacja ruchu turystycznego na wsi (Organization of tourism in the countryside)*. Wydawnictwo WSiP, Warszawa.
21. Sznajder, M., Przezbórska, L. (2006). *Agroturystyka (Agritourism)*. PWE, Warszawa.
22. Wielewska, I. (2017). Eco-innovations and sustainable development of businesses in rural areas of Kujawsko-pomorskie Province of Poland. *Economic Science for Rural Development. Proceedings of the International Scientific Conference, Integrated and Sustainable Regional Development Production and Co-operation in Agriculture*. Jelgava: Latvia University of Agriculture. No 44, pp. 205-211.

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23. Baza firm pom ciepła w Polsce (Database of heat pump companies in Poland) (2017).  
Retrieved: <http://www.baza-firm.com.pl> Access: 26.11.2017.
24. *Charakterystyka budowy pompy ciepła (Characteristics of the heat pump's construction)* (2017).  
Retrieved: <http://www.gospodarzenergia.pl/gruntowe-pompy-ciepła> Access: 26.11.2017.
25. *Pompy ciepła w Polsce (Heat pumps in Poland)* (2017).  
Retrieved: <http://www.nowoczesnegrzanie.pl/pompy-ciepła.html> Access: 26.11.2017.



## FISH PROCESSING INDUSTRY MODERNIZATION AND CO-EXTRUSION METHOD IN FISH PRODUCT ASSORTMENT DIVERSIFICATION

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**Abstract.** In Latvia and across the world, modernisation of fish processing industry has been quite slow. The processing methods remain significantly based on the traditional approach and often cannot supply products which are demanded by a modern consumer. The need for innovative solutions is shaped by the highly increased pace of a daily life and changing eating habits, especially in big cities, which created an upward trend in demand for diversely processed value added, convenient, fish-based products. From the producers' perspective, innovative fish processing provides an access to a value added production and profit increase. The paper aims to explore the potential of the co-extrusion method implementation in the fish processing industry. The scholarly arguments and empirical evidences advocate the importance of innovative techniques to the food processing arena, and particularly to the fish industry and represent the scientific background for the implemented project on an innovative fish-based product, *fish bites*, obtained by using the co-extrusion method. Commercialisation potential of the innovative method introduction to the expanding segment is also explored in the article.

**Key words:** co-extrusion method, fish processing, food industry, profit improvement.

**JEL code:** Q22

### Introduction

One of the most important factors pushing fish processing industry modernisation is a reshaped eating behaviour associated with the rapid changes of a daily life tempo, especially in the Western world. This factor created a pronounced upward trend in demand for diversely processed value added, convenient food, nutritious snacks and semi-prepared dishes, including frozen food. In addition, the common habits of eating away from home has spurred the demand in the HORECA sector. The hotel, restaurant and catering sector is one of the fastest growing in Europe. In Latvia, this tendency is even more apparent because the sector itself is relatively new (Diedzina, 2004). This determined the expanding demand for food products diversification aimed at addressing the current needs of customers, especially in big cities.

Another associated tendency among customers is pursuing modern understanding of a healthy diet and routinely choosing healthier options, as well as demanding value for money. Consumers around the world increased consumption of fish and fish product in recent years due to recognition of their nutritional value (Wang et al., 2009). As described by Abramova (1997), for modern consumer the importance of products from hydrobionts, fish-based products in particular, is that they contain high value proteins of animal origin (content 16-20 %), fats - the only natural sources of unsaturated fatty acids, minerals, as well as group B vitamins, and, PP and A vitamins. Thus, there is wide scope to increase the consumption by developing value added products. For instance, there is a great demand for seafood based products, especially value added products, ready-to-eat convenience form, prominent among them is the group of battered and breaded products (Pagarkar et al., 2013). According to FAO (2017) projections, fish consumption will reach 177 tons by 2026 with more pronounced upward trends in developing nations compared to the developed world, where the decline in consumption trends will maintain. Due to fast population growth (2.3 % per annum during 2010-2030), total fish consumption will increase significantly, by 30 % until 2030 (The World Bank, 2013). For these purposes, fish based products is a promising option for assortment diversification given its steady demand increase.

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On the other hand, estimated production rise is marginal, which indicates the potential of innovative fish processing techniques in meeting market demand. The fish processing industry is constantly exploring new techniques to improve and increase the supply to meet the rising market demand for convenience products. Currently, many research on food products diversification are looking for the development of such products that combine both the notion of proper nutrition and address traditional consumer needs, as well as have a strong economic rationale.

As noted by Vanshin (2011), one of the main directions of the technological processes intensification in the food industry is the change in the physicochemical properties of raw materials when exposed. Co-extrusion is a progressive method of obtaining high-quality and balanced food products, the main advantages of which are the flexibility of its technological schemes, high productivity and compactness of equipment, process continuity, low production costs. Today, the use of the co-extrusion technology is common across such segments of food manufacturing as meat processing and confectionary production due to a number of advantages over traditional food and feed processing methods. Fish-based engineered food items also have significant health and economic implications, *inter alia*, high productivity and quality, lower production cost, product shape, energy efficiency, new food items, no effluents. As a result of the project, the efficiency of the co-extrusion technique has been demonstrated for fish product assortment diversification. Namely, a nutritious snack *fish bites* has been developed and introduced to production as well as to the market. Nonetheless, it should be noted that principles of modelling products with predetermined indicators of nutritional value and specific technological properties based on fish raw materials are insufficiently studied and needs further development and concretization.

### **Fish processing industry modernization and profit increase driven by assortment expand**

The modernization of fish processing technologies mainly refers to up-gradation of existing technologies, assurance of quality, and diversification; thus, there has been a rising demand for fish/fish-based convenience food items in ready-to-eat or ready to-cook forms. Another factor refers to value addition activities that have generated important international conversations within the food manufacturing industry, including the fish processing sector, primarily in light of major opportunities to earn foreign exchange. Value addition is a good approach to increase the profitability of the fish processing sector, which presently is focused on quality assurance. Although product range diversification into niche offerings has begun, it has not yet achieved critical mass.

Despite being a driver of income increase, product assortment diversification in the fish processing segment is particularly difficult because a number of factors must be considered before making any decision, potentially more pronounced than in other food industry. Some major market participants have explored product diversification options by using the same fish species. However, a vast majority of companies are reluctant to operate substantial changes because these require investment, studies, and risks. In this sector, market diversification needs to be approached carefully in the sense that businesses must examine consumer preferences and taste adaptation, and consequently adjust the current supply or develop new products.

Starting from the seminal work of Markowitz (1952), originally focused on portfolio analyses in the *securities market*, scholars have extended the theory to various assets such as agricultural crops and natural resources, and proved its applicability to downstream market segments, including the food processing industry. By engineering a more diverse product portfolio, processors

can achieve two goals. First, profits can be maximized via a larger array of production options, matched with the intrinsic features of the raw product. These companies would be positioned to modify the structure of output-products to best manage the risk and profitability related to the natural variability in fish characteristics; such a strategy can lead to profit growth and decrease the risks attached to seasonal volatility in the biological features of raw inputs.

### **Co-extrusion method potential in fish food industry**

Fish, a raw material with a very sensitive market in fresh condition, can be efficiently used for co-extrusion. Fish minced meat is one of the most convenient products for combining with other raw materials, which makes it possible to obtain a diverse range of finished products with good taste qualities (Dementieva, 2005). To prepare forcemeat usually is used fish which, for certain reasons, is unsuitable for canned products requiring defined pieces or carcasses (Pankina, 2007). At present, a large number of methods for processing minced fish meat have been developed: lobules of minced fish in tomato sauce, cabbage rolls, fish cutlets with vegetable garnish, various meatballs, etc. The sharp evolution of minced fish technology over the past decades is likely to make a significant contribution to the rising exploitation via value addition of sea varieties.

The two models that are becoming highly popular within the worldwide food processing arena, especially in the food and feed segments are extrusion and co-extrusion methods. For instance, in countries with a developed food industry, there has been a steady increase in the consumption of extruded food products. The statistics shows that in Europe the consumption is between 3 and 7 kg per year per person (Vanshin, 2011).

Rigorous analyses on the extrusion process that engineers new fish-based products can be traced back to the 1980s. Various scholars (e.g. Gogoi et al., 1996; Suknark et al., 2001) detailed the successful incorporation of fish into starch-based foods via extrusion techniques to deliver nutritious new products. Extrusion is a continuous process that combines heating a raw material above 100C with a subsequent subjecting to increased pressure and forcing through one or more restricted openings (dies). Extrusion processes lead to granular or powdered raw material transformation into pieces of larger size. The examples of the technology implementation include low-density ready-to-eat products such as fish pastes, surimi, semi-moist and expanded pet food. This method has been exploited for fish product processing due to comparatively low producing costs and a wide variety of potential products that can be obtained (Gry, 1981; Fellows, 2009).

Co-extrusion process is an extrusion process aimed at obtaining a product combining two different textures: that is, two different materials are extruded to produce one combined product enabling a sweet, savoury or fruit centre filling to be added to the extrudate before it is shaped into pillows, tubes, bars or wafers. For example, a crispy cereal outer shell can be co-extruded together with sweet or salty stuffing. Coated food products can be obtained, for example, by co-extruding the shell material and the food material based on meat, fish, fruit or other vegetables through concentric conduits into the co-extruder, such that, at the coextruder outlet, the extruded food product is covered with a thin film of the shell material. Then the shell material is converted into a durable shell material by treating it with suitable chemicals (Wianecki, 2007).

In the fish industry, the co-extrusion method has not yet been widely implemented, however, there are several examples being found. Murray et al. (1980) produced co-extrudates from a combination of soy and fish proteins and explored the impact of source and protein level of processing components. The study highlighted that co-extrudates texture is highly influenced by

both the ratio of protein to water and vegetable to fish protein, suggesting a significant potential to final product diversification by changing raw material combinations. However, as the authors mention, the sensory analysis indicated that the final product would probably be rejected by consumers because of too intense persistent fish flavour and odour, thus, further experiments are required. Gry (1981) work described a standard framework for the optimal co-extrusion of minced cod, and wheat and potato flour. Maga and Reddy (1985) underlined that the co-extrusion of rice flour and varying amounts of minced carp (10 %-35 %) led to a precooked product with no detectable odours with a shelf life of six months stored at room temperature.

Choudhury (1994) detailed the co-extrusion of pink salmon muscle and rice flour to obtain a new product. Years later, Choudhury et al. (1998) documented that the co-extrusion of fish mince with starchy components with the use of single and twin-screw extruders increased the nutritional value of products. Rhee et al. (2004) produced a snack food by applying the co-extrusion method to a blend of minced catfish, corn and soya flour, largely accepted by consumers, and argued that co-extrusion techniques diminish the distinct odour of fish.

Using of co-extrusion method for the innovative product, *fish bites*, allowed to produce restructured fish products with fillings, thus combining both the fish itself and the garnish/sauce. In contrast with the extrusion process, co-extrusion does not involve pressure or temperature impact, but rather a product moulding by forming. The organoleptic testings demonstrated that the product is quite welcomed by potential customers, indicating its potential.

Thus, given the versatility of the co-extrusion technique allowing a quick change of key parts, the innovative approach opens up a completely new niche in the fish processing sector. Nonetheless, despite co-extrusion technologies being widely used by the food processing sector, within the fisheries market these are still at an early stage (Surasani, 2016). Many scholars advocate for the development of sensorially acceptable fish-based co-extruded food items; however, some technical issues such as fish odour and flavour and oxidative changes need to be removed for the successful exploitation of the co-extrusion method. One of the main advantages of producing fish-based food products by the co-extrusion method is the savings due to the fact that the final product is obtained via single process. In addition, co-extrusion technology provides non-waste production and allows to significantly expand marketing opportunities along with a product range.

### **Commercialization potential**

Co-extrusion techniques are used worldwide in the food processing industry to obtain new products with unique characteristics. This method enables the delivery of a myriad of co-extruded food items via the manipulation of structure and process variables. Given that within the fish market a large amount of fish catch is not used for human consumption because of a number of unattractive features, co-extrusion technologies, for instance, allow for the utilization of the fish mince/muscle recovered from such underutilized batches (Choudhury et al., 1996). On the other hand, the usage of high quality fish (i.e. cod) with no undermining features unfolds a new niche of superior quality range products addressing the demands of a modern consumer living in a high-pace environment.

The application of co-extrusion method to offer fish-based snacks and texturized protein has a vast commercial and economic potential, which has not been yet exploited at its full. For instance,

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practical evidences indicate that twin screw extruders are highly promising in the creation of snacks and other see food-based items (Pagarkar et al., 2007).

The development of innovative products using cereal flours and fish mince improves the nutritional value of the final food item. The mixing of these via co-extrusion techniques delivers nutritionally balanced food items with various properties. In some regions, co-extrusion of fish with carbohydrate ingredients can also be largely accepted as finger snack foods or as products that need little preparation before consumption. These techniques increase the economic value of such fish catch.

On the retail market, the co-extruded fish-based products, including *fish bites*, provide an alternative for traditional and currently growing market of frozen semi-finished products like fishfingers, semi-prepared fish and meat dishes, etc. Conducted market research data (2017) show that, i.e. in store chain "Maxima" alone, in the Latvian market, the sales of the indicated product group amounted to more than 250t per year. According to Popluga et al. (2012) calculations, the market share of "Maxima" is approximately 20 %; other main retail chains ("Rimi", "Vesco", "Mego", "LaTS", "Elvi") constitute up to 50 % of the market together. Taking into account that co-extruded inovative fish-based products has not been extensively present on the market yet, but on the other hand there is a pronounced demand for this kind of products, the most realistic market share within 2 years is estimated at 15 % of the frozen semi-finished products segment. Based on these calculations, the company profit is expected to reach EUR 1.6 mln on the Latvian market and up to EUR 4.8 mln in the Baltics. Thus, the modernisation of fish processing industry, in particular, introduction of the innovative co-extrusion method, holds a significant economic potential.

Table 1

**Economic potential of innovative fish-based products as substitutes for frozen semi-finished products in Latvia and across the Baltic region**

Market	Consumption of frozen semi-prepared products, tonnes per year	Substitution tonnes (15 %)	Substitution items	Turnover, m EUR	Profit, m EUR
"Maxima", retail chain	250.62	37.59	4 26 965	€ 839 177.01	€ 266 907.22
Main retail chains, total	751.86	112.78	1 280 895	€ 2 517 531.02	€ 800 721.66
Market, total	1503.71	225.56	2 561790	€ 5 035 062.05	€ 1 601 443.32
Baltic region (6.1 mln people), total	4 511.14	676.67	7 685 370	€ 15 105 186.15	€ 4 804 329.96

Source: authors' calculations based on the data of retail companies' websites, conducted market research

To the authors' knowledge, both on regional and on the global market there are no analogues for the products developed within the project. The co-extrusion method has not yet been implemented anywhere in the world for the production of preserved products and specifically for the production of HoReCa fish-based products. Structured products are much more complex in manufacturing, because it requires more advanced equipment, food additive systems (containing more than 15 substances). In addition, given that the raw material parameters are often changing both equipment and the additives should be adjusted accordingly. Nonetheless, the new product has already proved its ability to penetrate new unconventional market and offer a high profitability. Currently, it has been already successfully exported to Poland, Estonia and Netherlands and proved

its potential. The target markets include Scandinavian and Central European markets, as well as Asian markets. The demand for innovative fish-based snacks is on the rise particularly in developing nations, where fish-based snacks are commonly known as fish crackers (Suknark et al. 1998), more common across Asian consumers compared to American consumers. Co-extrusion technologies that enable the combination of various ingredients to develop new products can also serve the developing functional food markets (Pagarkar et al., 2007).

The scholarly arguments and empirical evidences advocating the importance of the co-extrusion technique to the food processing arena, and particularly to the fish industry detailed above represent the scientific background for the implemented project on an innovative fish-based product, *fish bites*, by using the co-extrusion method.

## Conclusions

- 1) Food co-extrusion is a highly versatile technique used to develop convenient and nutritious food items with a peculiar taste and texture via combining two different products. Virtually it allows to produce an endless assortment of filled products. Commercially available co-extruded products are mainly found in confectionary and meat processing industries. The use of fish and fish portion within co-extrusion processes have not been yet so widespread, however, the existing evidence suggests that this approach implementation increases the nutritive parameters of such products and adds value to the fish catch of both premium and lower value.
- 2) Co-extruders enable the development of innovative food items of high nutritional importance. The ability of co-extruders to mix various ingredients to create novel products is essential in the creation of functional foods meeting the demands of contemporary customers, especially living in big cities in the western countries.
- 3) Co-extrusion represents a major avenue for new fish uses and increased consumption. Fish-based co-extruded products have an impressive marketing potential, but are yet to gain popularity across the world. The product developed within the project has demonstrated its exporting potential, however, much work is still needed in terms of developing appropriate types of foods based on different fish mince blends, eye-catching packages or market researches to achieve mass acceptance.

## Acknowledgements

In accordance with the contract No. 1.2.1.1/16/A/004 between "Latvian Food Competence Centre" Ltd. and the Central Finance and Contracting Agency, signed on 11th of October, 2016, the study is conducted by "Piejūra" with support from the European Regional Development Fund (ERDF) within the framework of the project "Latvian Food Industry Competence Centre".

## Bibliography

1. Abramova L. S. Technology of Minced Meat and Stuffed Products from Pond and Sea Fishes Preparation// Materials of the Sectoral Meeting on the Introduction of New Sanitary Rules and Norms Relating to New Types of Products' Quality and Release (translated from Russian). - St. Petersburg, 1997, 50 - 56.
2. Choudhury, G., 1994. Application of Extrusion Technology to Process Fish Muscle. In *Nutrition and Utilization Technology in Aquaculture* (D. Sessa and C. Lim, Eds.) American Oil Chemists Society, Champaign, 233-245.
3. Choudhury, G., Gogoi, B., Oswalt, A., 1998. Twin Screw Extrusion of Pink Salmon Muscle and Rice Flour Blends: Effects of Kneading Elements. *Journal of Aquatic Food Product Technology*, 7(2), 69-91.
4. Dementieva N.V. Development of Technology for Fermented Fish Minced Meat and Moulded Products Based on It. Dis. Ph.D., - Vladivostok, 2005.

5. Diedzina S. (2004. 15. 06.). Rapid Growth is Predicted for HORECA Sector (translated from Latvian). Dienas Bizness electronic source <http://www.db.lv/zinas/horeca-segmentam-prognoze-strauju-izaugsmi-112036>. Retrieved 19.02.2018.
6. FAO and OECD, 2017. OECD-FAO Agricultural Outlook 2017-2026. Special Focus: Southeast Asia. <http://www.fao.org/publications/oecd-fao-agricultural-outlook/en/>
7. FAO, 2014. The State of World Fisheries and Aquaculture. Food and Agriculture Organization of the United Nations, Rome.
8. Fellows P.J. Food Processing Technology. Principle and Practice. 3rd edition, Woodhead Publishing, 2009
9. Goes, E., Souza, M., Campelo, D., Yoshida, G., Xavier, T., Moura, L., Monteiro, A., 2015. Extruded Snacks with the Addition of Different Fish Meals. Food Science and Technology, 35(4), 683-689.
10. Gogoi, B., Oswalt, A., Choudhury, G., 1996. Reverse Screw Element(s) and Feed Composition Effects During Twin-Screw Extrusion of Rice Flour and Fish Muscle Blends. Journal of Food Science, 61, 590-595.
11. Gry, p. 1981. Extrusion of Fish/Starch Mixture. Extrusion of foods-SIK Rapport No. 492, 18-19.
12. Maga, J., Reddy, T., 1985. Co-Extrusion of Carp (*Cyprinus Carpio*) and Rice Flour. Journal of Food Processing and Preservation, 9, 121-128.
13. Markowitz, H., 1952. Portfolio Selection. Journal of Finance, 7, 77-91.
14. Murray, B., Stanley, D., Gill, T., 1980. Improved Utilization of Fish Protein-Co-Extrusion of Mechanically Deboned Salted Minced Fish. Canadian Institute of Food Science and Technology Journal, 13(3), 125-130.
15. Pagarkar, A., Basu, S., Mitra, A., 2005. Extrusion Technology: An Approach to Fish-Based Snack Food. Fishing Chime, 25(7), 54-58.
16. Pagarkar, A., Basu, S., Mitra, A., Joshi, V., 2007. Extrusion-A Novel Technology for Development of Value Added Fish Products. ResearchGate.
17. Pankina A.V. Development of Technology of Canned Fish from Moulded Products with Structure Regulating Compositions. Dis. Ph.D., - Vladivostok, 2007.
18. Popluga, D., Pilvere, I., Nipers, A. (2014). Main Development Trends of Grocery Retail Industry: Case Studies of Latvia, Lithuania and Estonia. Economic Science for Rural Development, 129-136.
19. Rohani, A., Salasiab, M., Ashbadi, Y., 2010. Effect of Cereal Fibre on the Physio-Chemical Quality and Sensory Acceptability of Instant Fish Crackers. Journal of Tropical Agriculture and Food Science, 38(1), 39-49.
20. Sharma, S., Basu, S., 2003. Preparation of an Extruded Fish Snack Using Twin Screw Extruder and the Storage Characteristics of the Product. Journal of the Indian Fisheries Association 30, 149-156.
21. Shaviklo, G., Olafsdottir, A., Sveinsdottir, K., Thorkelsson, G., Rafipour, F., 2011. Quality Characteristics and Consumer Acceptance of a High Fish Protein Puffed Corn-Fish Snack. Journal of Food Science and Technology, 48(6), 668-676.
22. Suknark, K., McWatters, K., Phillips, R., 1998. Acceptance by American and Asian Consumers of Extruded Fish and Peanut Snack Products. Journal of Food Science 63(4), 721-725.
23. Surasani, V., 2016. Application of Food Extrusion Process to Develop Fish Meat-Based Extruded Products. Food Engineering Reviews, 8(2), 448-456, Springer Link.
24. The World Bank, 2013. FISH TO 2030 Prospects for Fisheries and Aquaculture. Agriculture and Environmental Services Discussion Paper 03, World Bank Report No. 83177-GLB
25. Vanshin V.V. Extrusion Technologies in the Food Industry: Methodical Instructions for Laboratory Work on the Discipline "Extrusion Technologies in the Food Industry" (translated from Russian). Orenburg State University - Oregburg: OSU, 2011. - 31 p.
26. Wang, Feng & Zhang, Jian & Mu, Weisong & Fu, Zetian & Xiaoshuan, Zhang. (2009). Consumers' Perception Toward Quality and Safety of Fishery Products, Beijing, China. Food Control. 20. 918-922.
27. Wianecki, M. 2007. Evaluation of Fish and Squid Meat Applicability for Snack Food Manufacture by Indirect Extrusion Cooking. Acta Scientiarum Polonorum: Technologia Alimentaria, 6P.

## LAND CONSOLIDATION IN POLAND AS A TOOL FOR THE IMPROVEMENT OF FARMING CONDITIONS IN TERMS OF RURAL DEVELOPMENT- CASE STUDY

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**Abstract.** Improvement of farming conditions and increased profitability of farms in Poland are closely related to implementation of land consolidation works, which are performed insufficiently comparing to the demands. The paper aims to analyse the improvement of farming conditions resulting from land consolidation based on the selected research site – land consolidation object "Adrianki". The study concerned economic, environmental-and-landscape and legal-and-social aspects of the land consolidation effects. Results of the research proved that the farming conditions in the analysed agricultural holdings were improved based on the values of shape expense coefficient; it decreased comparing to its values before land consolidation. Environmental-and-landscape results remained neutral what means that environmental conditions were not improved, but, on the other hand, they were not worsened. However, satisfactory legal-and-social effects were obtained since the legal status of all real estates was settled and updated cadastral data was obtained. What refers to social effects, there can be indicated increased interest in land consolidation works within the areas neighbouring to the research site. The analysed results of land consolidation works stay in accordance with the Rural Development Programme and they allow to consider rural areas as places of work, living, rest and recreation.

**Key words:** land consolidation, farming conditions, development of rural areas.

**JEL code:** Q15

### Introduction

Within the Common Agricultural Policy (CAP) of the European Union, the Rural Development Programme (RDP) is performed. It is aimed at limitation of conventional forms of farming within rural areas (in particular, the agricultural production) and introduction of new functions of rural areas. The Rural Development Programme includes sustainable and multifunctional development of areas, where relations between the agriculture, the village and the natural environment remain in balance. This programme was also initiated in Poland. According to the provisions of the Agenda 2000, the agriculture - apart from conventional production functions - may play an important role in the area of the environment protection, among others, in the field of protection of soils, landscape and biodiversity of natural habitats. In the case of agriculture in Poland, it is extremely important to promote the idea of the multifunctional rural development, in particular, with respect to activities aiming at diversification of the agricultural production and improvement of the profitability of farming. In the long-term perspective, the multifunctional development of rural areas should be performed with consideration for economic, social and environmental aspects. The idea of the multifunctional development of rural areas in Poland should be implemented through inter alia:

- improvement of effectiveness and profitability of farms,
- maintaining environmental-and-landscape structures,
- improvement of conditions of the technical infrastructure in the Polish villages.

Taking into account the current conditions of farming in Poland, it is impossible to reach the balance in the above areas without implementation of land consolidation works. Literature and statistical data review proves that the high regional diversification of the area structure of parcels and farms still exists in Poland (Woch, 2006; Sobolewska-Mikulska, 2009). Therefore, improvement of spatial structure of farms performed in parallel with decreasing the number of farms and increasing their size is the required and priority task. The system of co-financing of

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activities performed in rural areas in Poland is also supported by the European structural funds. The first tranches of payments took place in the period 2007-2013 and they equalled to approximately 28.6 billion euros. Next subsidies, aiming at restructuring, modernisation and development in parallel with environmental protection and the agricultural landscape arrangement activities are currently being spent (2014- 2020); they equal to 32.1 billion euros (data from the Ministry of Agriculture and Rural Development, 2016). Beneficiaries of the discussed financial means are farmers who should modify their activities towards diversification of incomes and the multifunctional development (Roszkowska-Madra, 2009). The current agricultural policy assumes the increased profitability of farms and competitiveness of all forms of activities, promotion of innovative technologies in agricultural households through structural changes and wide implementation of surveying works - land consolidation operations.

Land consolidation is the conventional legal-and-technical solution which creates the possibility to improve conditions in the agriculture and forestry. As it was proved by performed analyses, high demands for such works exist in Poland. The land use structure in Poland is one of the worst in Europe. The analysis of data of the Agency for Restructuring and Modernisation of Agriculture (ARMA) of 2014 proves that urgent land consolidation works are required for about 7.1 million hectares, i.e. approximately 70 % of all arable lands in Poland. At present, land consolidation works in Poland are performed according to the act on land consolidation and exchange (Ustawa..., 1982). Land consolidation works include inter alia:

- delineation of new cadastral parcels of improved parameters (e.g. shape),
- reduction of small parcels,
- improvement of land tenure structure,
- improvement of shape expanse of lands in the agricultural holdings,
- implementation of post-consolidation investments (e.g. construction of new road infrastructure).

When referring to the multifunctional development, land consolidation effects may be divided into three main groups, including:

- 1) economic effects;
- 2) environmental-and-landscape effects;
- 3) legal-and-social effects.

Re: 1. Economic results directly illustrate the objectives of land consolidation works defined in the Act (Ustawa..., 1982). They directly refer to creation of more advantageous conditions in farming and forestry. Both, external and internal factors influence the correct use of lands for the agricultural production. Land consolidation allows to interfere with external factors and, at the same time, to support the increase of the effectiveness of the agricultural production. It is possible to reach such affects, among others, as a result of reduction of the number of parcels in a farm and the rational configuration of parcels in relation to a settlement area. Increased sizes of arable parcels are the additional effect. Besides, the rational configuration of parcels in a farm results in shortening of the transportation time and the distances between the settlement and the fields. Another important land consolidation effect is the correction of shapes of parcels, including the adaptation of their borders to the terrain relief, as well as to the transportation and hydrological networks and water melioration (reclamation) installations which divide arable lands into hardly accessible pieces. As a result, the number of small, ineffective parcels of irregular shapes is minimised. The design of functional agricultural road system is another crucial effect. Functional transportation routes ensure the possibility to apply more effective methods and machinery for the

agricultural production. Newly designed cadastral parcels have facilitated access to public roads as a result of construction of culverts and turnoffs. Another land consolidation effect concerns re-cultivation of areas useless for the agricultural production and elimination of unnecessary roads and balks.

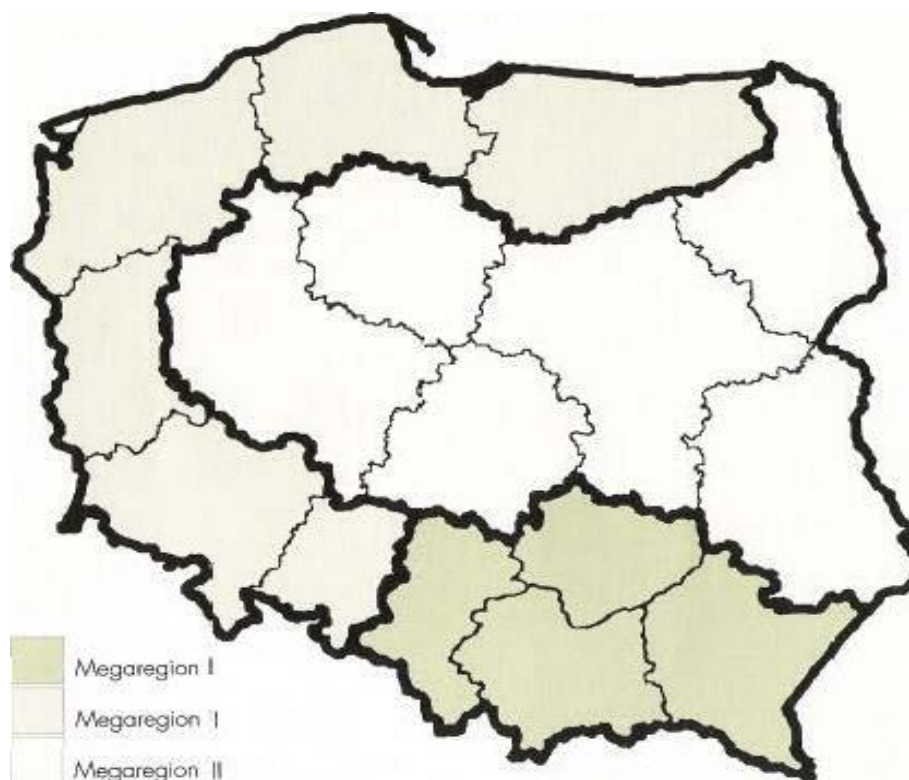
Implementation of the mentioned design solutions resulting in economic effects, aims at reduction of costs of the agricultural production and increase of profitability of farms.

Re: 2. Environmental-and-landscape results of land consolidation may be divided into effects related to protection of lands, vegetation and animals, and effects related to creation of landscape and improvement of environmental aspects. The first group of effects includes, first of all, actions against water and wind erosion and regulation of groundwater level in arable lands. Mentioned tasks may be performed by combination of both functions through arrangements of the rational agricultural-and-forest border. This allows for adaptation of land use to soil conditions and to selected directions of the agricultural production. Another important effect of land consolidation is the increase of forest cover in Poland. Introduction of afforestation considerably diversifies the agricultural landscape and results in the increased attractiveness of villages as places for recreation and rest; this, in turn, influences diversification of incomes and development of non-agricultural activities. Agro-tourism is often connected with ecological farming; interest in this type of farming has been constantly growing among rural and urban population.

Re: 3. According to the provisions of Act (Ustawa..., 1982) legal-and social effects of land consolidation works lead to updating and setting the legal status of real estates by achieving the consistency between property registers and data included in the real estate cadastre. The result is the updated legal documentation and the creation of cadastral databases according to currently required parameters. Parcel borders are permanently fixed in the field, according to provisions included in the documentation. The land consolidation process also allows to designate and secure land for construction of technical and social infrastructure.

The above possible effects contribute to the increase of economic activeness of farms what, in turn, influences the growth of social satisfaction from the transformation processes. It is a highly positive phenomenon.

Rural areas, defined in the European Charter for Rural Areas (1996) are inland or coastal countryside, including small towns and villages, where the main part of the area is used for agriculture, forestry, aquaculture and fisheries, economic and cultural activities of country-dwellers, non-urban recreation and leisure areas [or natural reserves], and other purposes, such as housing. Rural areas in Poland are highly diversified; when analysing the agrarian structure and economic conditions of individual farms are analysed, three megaregions of rural areas in Poland may be distinguished (Fig. 1).



**Source: The coherent structural policy of development of rural areas and the agriculture. The document approved by the Council of Ministers in 1999, Warszawa 1999 r.**

Fig. 1. **Boundaries of mega-regions of the agriculture and rural areas in Poland**

The megaregion I is characterised by the highest fragmentation of farms. The average size of a farm in the megaregion I equals to 2.5-4.0 ha.

Large farms are dominating in the megaregion II, which require fast arrangements of spatial structures remaining after the State Farms. This is a poor region characterized by high unemployment and low social activeness.

The megaregion III is relatively best balanced with respect to economic, ecological, demographic and social aspects. Two thirds of Polish farms are located within this megaregion; they are considered as farms which may be activated and multifunctionally developed when they gain financial support.

Since the accession of Poland to the European Union in the year 2004, positive changes in the structure of the Polish agriculture may be noticed. This concerns, first of all, the issue of concentration of farms. In order to adapt to the European Union standards, many farms have undergone the process of specialisation and modernisation. However, in Poland, many smallest and economically weakest farms terminated their agricultural production. Basing on the results of the National Agricultural Census 2010 (Powszechny..., 2010), the total number of farms had decreased by more than 22 % (from 2.9 million to 2.3 million) in the period 2002-2010; this reduction concerned 33.8 % farms with 1-2 ha of arable lands. Despite this, farms of the size between 1-5 ha of arable lands were still the highest percentage in the structure of farms - 37.8 %. Considerable increase in the number of farms could be noticed in size group above 30 ha of arable lands; in the case of farms between 30 and 50 hectares the percentage was equal to 12.5 % and the number of farms with more than 50 ha of arable lands increased by more than 40 % in the analysed period. Comparing to the results of the National Agricultural Census 2010 data acquired

in 2013 (GUS 2014), it is possible to indicate the continuous trend of the reduction in the number of farms and the increase of their average total size (from 11.26 ha to 11.54 ha and from 9.85 ha to 10.22 ha, respectively). Despite this, the average size of arable lands in one farm still remains much smaller comparing to countries of the similar assortment of production, which are the competitors for the Polish agriculture, such as the Czech Republic (152.4 ha), Germany (55.8 ha), France (53.9 ha) (Poczta, 2013).

Presented information allows to formulate the thesis that structural transformations of Polish agriculture are required and land consolidation works should be intensified.

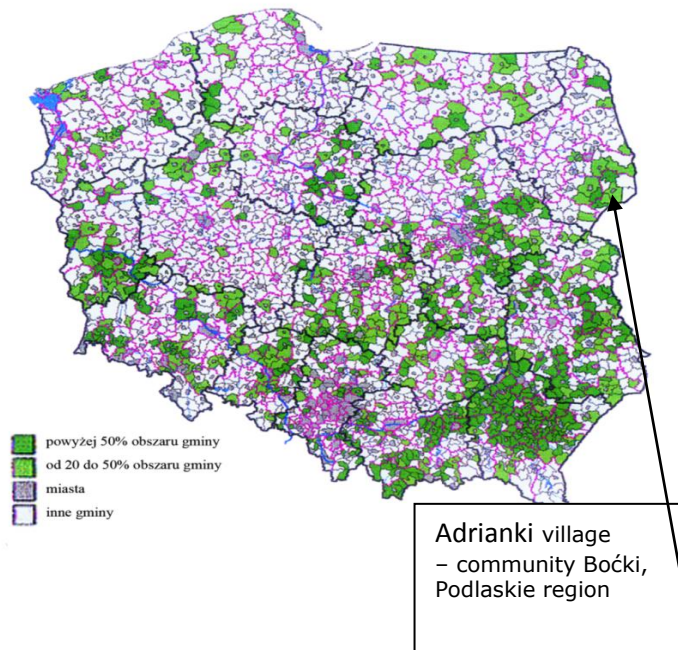
### **Research object and methods**

The **paper aims** to analyze the improvement of farming conditions resulting from land consolidation based on the scope of design solution implemented in the land consolidation project for the selected research site – land consolidation object "Adrianki". In order to reach the aim, the author set the following **research tasks** according to the scope of analysis:

- 1) The assessment of farming conditions, including:
  - analysis of fragmentation of land in individual farms,
  - analysis of shapes of agricultural parcels in farms,
  - analysis of shape expanse (configuration of lands) in farms,
  - analysis of changes in the agricultural roads system,
  - analysis of changes in the water melioration (reclamation) system.
- 2) The assessment of the impact of land consolidation on the landscape and the environment
- 3) The assessment of legal-and-social effects of land consolidation.

The research was based on the surveying documentation, including cadastre databases and cadastral maps presenting the state before and after land consolidation, as well as land consolidation documentation. The investigation of changes in the farming conditions included analysis of geometrical data of agricultural plots and their number and the analysis of the values of Moszczenski coefficient representing the shape expanse of lands in farms. The analysis of the road system was based on the analysis of cadastral maps and cadastral database. Studies on the impact of land consolidation on the landscape and the environment were carried out on the basis of an environmental study documentation and the Environmental Impact Assessment report. The investigation of legal effects of land consolidation was carried out on the basis of cadastral data, whereas the social effects were defined based on the interviews with farmers' representatives.

Comparative and analytical methods in the case study approach were applied as **research methods**. The **research object** - Adrianki village (1.484 hectares) is located in the Podlaskie Region (Fig. 2). The Lesna River flows through the village. The village is also crossed by the national road. Frequent melioration ditches, as well as historical and cultural places are characteristic features of this village (such as the Orthodox Church and the manor complex of the 19<sup>th</sup> century).



Source: The Ministry of Agriculture and Rural Development, according to Woch F. 2014

Fig. 2. The indicative location of research site on the map of the assessment of demands for land consolidation works by Polish municipalities, with specification of approximate locations of analysed areas

## Research results and discussion

The objective of land consolidation works of the Adrianki site was to create more advantageous conditions of farming and forestry. The initial lack of farmers' interests in the discussed activities was gradually changing into the growing involvement of the local society; it was the result of the growing involvement of the project team in discussions and presentations of possible project results. The presentation of expectations of land consolidation participants concerning changes and, in particular, corrections (such as straightening parcel lines) and changes of locations of fields was the result of land consolidation promotion activities. Other effects which improved farming conditions are presented below.

### 1. Economic effects

5 farms were analysed; the size of each farms exceeded 15 ha and the number of parcels in each farm exceeded 10. The total areas of analysed farms equalled to 116.88 ha, with 104 parcels of the average size of 1.26 ha. After the land consolidation works the size of farms was increased to 139.56 ha, the number of parcels was reduced by 33, and the average parcel size equalled to 1.82 ha. What is also important, sizes of all, newly designed farms were increased to more than 20 ha after the land consolidation works.

- The analysis of fragmentation of lands in individual farms

The land consolidation area equals to 1484.57 ha. Before land consolidation it included 1204 cadastral parcels. Individual farms covered the area of 1330.15 ha and 1107 parcels. The average parcel size before land consolidation in an individual farm equalled to 1.20 ha. After land consolidation the area of farms was changed and it equals to 1484.34 ha. The average parcel size was increased to 1.58 ha.

- The analysis of shapes of parcels in farms

The investigation of shapes of parcels was performed based on the analyses of proportions between the parcel lengths and widths. For geometrically irregular parcels such analyses were not performed. The analysed parcels were divided with respect to:

- the parcel width smaller than 10 m,
- the parcel width smaller than 20 m,
- proportion of parcel sides smaller or equal to 5:1,
- proportions of parcel sides greater than 5:1, but smaller or equal to 10:1,
- proportions of parcel sides greater than 10:1, but smaller or equal top 20:1,
- proportions of parcel sides greater than 20:1.

The results of performed analyses are presented in Table 1.

Table 1

**The analysis of shapes of agricultural parcels in farms, the Adrianki site**

	The total number of analysed parcels	The number of parcels of the width		The number of parcels with proportions of sides			
		Less than 10 m	Between 10.0 and 20.0 m	≤5:1	5:1÷10:1	10:1÷20:1	>20:1
<b>Data prior to land consolidation works</b>	27	174	289	261	214	223	382
<b>After land consolidation works</b>	13	32	132	283	211	194	152
<b>Difference</b>	14	142	157	-22	3	29	230

*Source: author's work based on the cadastral data for the Adrianki site*

Tests concerning the shapes of parcels proved that the increased parcel width does not always result in the improved proportion of the parcel sides.

- Analysis of configuration of lands in farms

In order to determine the configuration of lands in farms, the Moszczenski (1927) formula was applied:

$$\mu = \frac{K \times L}{1.53 \times P} \quad (1)$$

$\mu$  – shape expanse (land configuration) coefficient of a farm;

$K$  - the length of parcel circumference [m];

$L$  – the distance between parcels and the farm centre [m];

$P$  - the farm size [ha];

1.53 – the correcting coefficient.

Table 2 presents calculations of the shape expanse coefficient for 5 selected farms.

Table 2

**Shape expanse coefficients before ( $\mu_1$ ) and after ( $\mu_2$ ) land consolidation for the analysed farms in the Adrianki site.**

Number of farms	Prior to land consolidation (1)				After land consolidation (2)				Difference $\mu_1 - \mu_2$
	$P_1$	$K_1$	$L_1$	$\mu_1$	$P_2$	$K_2$	$L_2$	$\mu_2$	
1	16.82	944.5	13.50	495.0	24.29	903.4	1334.6	323.0	-172.0
2	20.42	885.8	2558.3	725.0	25.14	893.1	2158.3	501.0	-224.0
3	23.08	866.0	2990.0	733.0	26.04	785.3	2453.6	484.0	-249.0
4	25.81	955.8	2568.7	622.0	27.64	949.4	1833.3	412.0	-210.0
5	30.75	816.6	1515.8	263.0	36.45	835.1	1460.6	219.0	-44.0

Source: author's work based on the cadastre database for the Adrianki site

The analysed shape expanse coefficient for selected farms decreased by – 179.0 as an average; it is not the best result. However, the analysis of land consolidation documentation proved that it corresponded to social expectations for the project.

- The analysis of changes in the agricultural road system

Before land consolidation the road system included 47 municipal roads of the total length of 3.49 km. The average width of a pavement equalled to 6.5 m, and the area covered by all roads in the village was equal to 25.21 ha. High difficulties for farming which resulted in increased costs and longer access times were caused by the high number of parcels belonging to individual farms without the access to public roads. After land consolidation works all parcels have access to roads, which were widened to 12 m; this allowed for two-way traffic of agricultural machinery. In places where such solutions were not possible, special passing places were designed. As a result, the transportation system was optimally designed, maintaining the minimum area for roads. Besides, some roads were hardened with gravel or covered with asphalt. Research works proved that shortened distances between farm centres and arable parcels may result in reduction of costs between 10 % and 20 %.

- The analysis of changes in the water melioration (reclamation) system

Before land consolidation the total area of all water melioration (reclamation) installations equalled to 13.27 ha, including 6.63 ha of basic water melioration facilities and 6.64 ha of detailed water melioration facilities. All installations were generally in poor conditions. Locations of melioration ditches were corrected and their technical parameters (width and depth) were improved. Cadastral records were updated within this field.

## **2. The assessment of impacts of land consolidation on the landscape and the environment**

Environmental impact assessment of land consolidation works was performed according to the Act (Ustawa..., 2008) and it proved neutral impacts of land consolidation works on the natural environment in the case study. Protected areas did not occur in the analysed area. Some losses in the landscape were caused by grubbing-up trees and bushes close to water melioration ditches. Insufficient funds did not allow for planting additional trees. Regulation of melioration streams allowed to limit the occurrence of flooded areas.

### 3. The assessment of legal-and-social effects

As a result of the land consolidation process, the new legal state of designed parcels was legitimised and recorded in the property registers. Cadastral data was also updated for the entire area. From the perspective of social effects, improvements in farming conditions resulted in the increased social satisfaction which affected inhabitants of neighbouring villages and led to their growing interest in land consolidation works.

### Conclusions, proposals, recommendations

Results of land consolidation works are noticeable by farmers mainly in the economic sphere, but environmental-and-landscape or legal-and-social effects may not be neglected. However, in Poland the economic factor related with the reduction of agricultural production costs and the maintenance of the increased incomes is the most important and at the same time it seems to be the most difficult factor for implementation. The research results indicate that activities aiming at the increase of production profitability require efficient co-operation at the level of the public administration, contractors and participants of the land consolidation process.

Economic effects were satisfactory for the analysed area; however, they were not very high. The measurable economic effects include: (i) the reduction of the number of plots by 35 %, (ii) the improvement of the geometric proportions of plots, (iii) the reduction of the values of the shape expanse coefficient for the analysed farms by an average of 180 %, (iv) the reduction of production costs due to shortening the distance between the plots by an average of 15 %, (v) reduction of the area of land used as the agricultural roads.

The most effective method which encourages to perform land consolidation works includes the dialogue and social consultations. In this area, land consolidation works performed in the village of Adrianki achieved positive results, since they resulted in the increased interest in land consolidation works among inhabitants of neighbouring villages. But land consolidation did not improve environmental-and-landscape aspects in analysed areas; it remained neutral. Research results indicate that it is required in Poland to constantly promote the idea of multifunctional rural development performed within the process of land consolidation.

### Bibliography

1. *Agenda 2000 (The Agenda 2000)* (2000). Retrieved:uniaieuropejska.org/agenda-2000/ Access: 02.02.2018.
2. *Europejska Karta Obszarow Wiejskich (The European Charter of Rural Areas)* (1996). Wies i Rolnictwo, No 2-3, Warszawa.
3. Moszczenski, S. (1927). *Nowy sposob ujmowania rozlogu ziemi (The New Approach to Configuration of Lands)*. Biblioteka Pulawska, Warszawa.
4. Poczta, W. (ed.) (2013). *Gospodarstwa rolne w Polsce na tle gospodarstw Unii Europejskiej – wplyw WPR (Farms in Poland versus farms in the European Union - impacts of the CAP)*. Główny Urząd Statystyczny, Warszawa.
5. *Powszechny Spis Rolny 2010 (The National Agricultural Census) (2010)*. Główny Urząd Statystyczny, Warszawa.
6. Roszkowska-Madra, B.(2009). *Koncepcje rozwoju europejskiego rolnictwa i obszarow wiejskich (Concepts of development for the European agriculture and rural areas)*. *Gospodarka narodowa*. No. 10, p. 83-102.
7. Sobolewska–Mikulska, K. (2009). *Kierunki modernizacji struktury przestrzennej obszarow wiejskich po wstapieniu Polski do Unii Europejskiej (Directions of modernisation of the spatial structure of rural areas after the Polish accession to the European Union)*. *Przegląd Geodezyjny*. No. 10, p. 11-14.



8. *Spojna polityka strukturalna rozwoju obszarow wiejskich i rolnictwa. Dokument przyjetý przez Rade Ministrow w 1999 r. (Coherent structural policy of development of rural areas and agriculture, the document approved by the Council of Ministers in 1999)* (1999). Przegląd Rzadowy, No 9, pp. 65-100, Warszawa.
9. *Ustawa o scaleniu i wymianie gruntow z dnia 26 marca 1982 r. (The act on land consolidation and exchange of March 26, 1982)* (1982). Journal of Law 1982 No 10 pos. 55.
26. *Ustawa o udostepnianiu informacji o srodowisku i jego ochronie, udziale spoleczenstwa w ochronie srodowiska oraz o ocenach oddziaływania na srodowisko z dnia 3 października 2008 r. (The act on distribution of information on the environment and its protection, on participation of the society in the natural environment protection and on the environmental impact assessment of October 3, 2008)* (2008). Journal of Laws 2008 No 199 pos. 1227.
10. Woch, F. (2006) Perspektywy zmian strukturalnych na obszarach wiejskich, Kompleksowe scalenia gruntow rolnych i lesnych oraz jego wplyw na srodowisko (Perspectives of structural changes in rural areas, Complex consolidation of agricultural and forest lands and its environmental impacts). *Materialy szkoleniowe IUNG – PIB Pulawy*, No 93, pp. 5-22.
11. Woch, F. (2014). *Ocena rozlogu gruntow Polsce oraz potrzeb ich scalania (The assessment of configuration of lands in Poland and demands for land consolidation works)*. Materialy konferencyjne, IUNG –PIB, Pulawy.

## MAIN DIRECTIONS IN THE EU MEMBER STATES RURAL DEVELOPMENT POLICIES: SIMILARITIES AND DISSIMILARITIES

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**Abstract.** The paper presents the comparison of key challenges addressed as the most significant to face within the rural development programmes 2014-2020 (RDP 2014-2020) in different Member States of the European Union. The paper aims to indicate main similarities and dissimilarities in the needs of the country's territories and priority targets of their rural development policies. The study presents the data on the amount of funding allocated to particular priority within the RDP 2014-2020 in each Member State. The study was based on the European Commission's data (factsheets on Rural Development Programmes 2014-2020 for each country).

The study results in the prioritization of distinguished challenges (priorities), where the level of importance to each challenge was assigned based on the amount of budget allocated to each priority. The research indicates that the issue of restoring, preserving and enhancing ecosystems in agriculture and forestry gains the greatest interest in the countries of European Union (the objective was given the highest priority rank in 24 out of 28 EU Member States), whereas the issue of resource efficiency and shift to low carbon and climate resilient economy in agriculture, food and forestry sectors (the priority coefficient assessed on the level of 7.4 %) and the issue of food chain organisation, animal welfare and risk management (the priority coefficient assessed on the level of 8.9 %) play the least significant role.

**Key words:** rural development, Rural Development Programme 2014-2020, EU rural development policy.

**JEL code:** Q18

### Introduction

Common Agricultural Policy (CAP) is one of the most important policies of the European Union (EU); it occupies the major share of the region's budget and has profound economic, social, political, environmental and cultural effects on agricultural development in the rural areas of EU Member States (Papadopoulos, 2015). Rural Development Programmes (RDPs) constitute the second pillar of the CAP. They are partly funded by the EU budget (the European Agricultural Fund for Rural Development - EAFRD) and partly co-financed by national and/or regional authorities. Current programming period 2014-2020 offers a total of 19 different RDP measures from which Member States/Regions may choose, designing sub-measures and operations suitable to their local needs.

European rural areas face several challenges. Over the last 60 years the unprecedented increase in food production has come at considerable cost to the natural environment and farmland biodiversity (Javadzadeh et al., 2014). Therefore, Europe places emphasis on programs that sponsor environmental services targeting at reducing negative externalities (e.g. nutrient run-off, soil erosion) and increasing positive externalities (e.g. preserving a farming heritage) and aims to support environmentally beneficial farming practices, including organic farming and the maintenance of existing low-intensity systems (Baylis et al., 2008; Ilbery and Bowler, 1998; Mullarkey et al., 2001; Pradziadowicz, 2017). Apart from environmental protection and preservation of biodiversity in rural areas, increasing attention should be drawn to climate change adaptation and resource efficiency (Ellen et al., 2011; Olesen and Bindi, 2002). Another crucial issue is promoting social inclusion and poverty reduction. According to EUROSTAT, (2017), rural citizens of EU are more at risk of poverty or social exclusion than urban inhabitants (25.5 % compared with 42.0 % in the year 2015). What is more, attention should be diverted towards eliminating restraints on trade and distortions of competition in agricultural sector, unlocking local

potential for economic diversification and going beyond agricultural restructuring (Gallent et al., 2015). Consideration should be given to the issue of promoting alternative food supply chains, as they can constitute a contribution to transitions concerning the shift from a productivist to a 'post-productivist' food regime and the public consumer pressure for a larger variety of distinctive 'quality' food products (Renting et al., 2003). Mentioned objectives need the open innovation type of approach (e.g. innovative farm technologies) and require knowledge transfer.

Accordingly, rural development programmes 2014-2020 for Member States or their regions should address at least four of the following challenges (six priorities):

- Priority 1 – Fostering knowledge transfer and innovation in agriculture, forestry and rural areas;
- Priority 2 – Enhancing the viability and competitiveness of all types of agriculture, and promoting innovative farm technologies and sustainable forest management;
- Priority 3 – Promoting food chain organisation, animal welfare and risk management in agriculture;
- Priority 4 – Restoring, preserving and enhancing ecosystems related to agriculture and forestry;
- Priority 5 – Promoting resource efficiency and supporting the shift toward a low-carbon and climate-resilient economy in the agriculture, food and forestry sectors;
- Priority 6 – Promoting social inclusion, poverty reduction and economic development in rural areas (European Commission, 2016).

Although the EU cohesion policy is aimed at the reduction of regional and social disparities in the EU territory (Hooghe, 1996), a strong level of rural areas' diversification within the EU Member States has to be outlined. There can be noticed differences and discrepancies between the countries or even their regions in relation to inter alia: (i) economic conditions such as the pace of economic development, agricultural labour input, agricultural prices, agricultural trade and farmers' incomes (Czyzewski and Kryszak, 2017; Kryszak and Staniszewski, 2017), (ii) level of living (Sompolska-Rzechula, 2017), (iii) rural population and social development (Vashchyk and Siudek, 2015; Siudek and Vashchyk, 2014), (iv) farm structure and land fragmentation (Van Dijk, 2003), (v) ecological development and environmental parameters and conditions (Kingston, 2011; Miklos and Spinerova, 2009), (vi) institutional mechanisms (Nowak et al., 2016; Ramniceanu and Ackrill, 2007). According to Ciutacu C. et al. (2014), the conditions of agricultural production are varying widely especially between the East and the West of the continent, due to completely different policies and principles which have been followed after 1945 – Eastern agricultural production was structured on the principles of collective ownership, whereas the capitalist Western sector was based on the respect for private property and gaining profit with the backup of government intervention and unionist militancy for progress (Ciutacu et al., 2008; Ciutacu et al., 2009). Taking all the discrepancies into account, the national policies should both implement the Common Agricultural Policy and be tailored to the most crucial needs and challenges of the particular territory of a country or a region, so that they uphold existing differences in Member States.

## Research object and methods

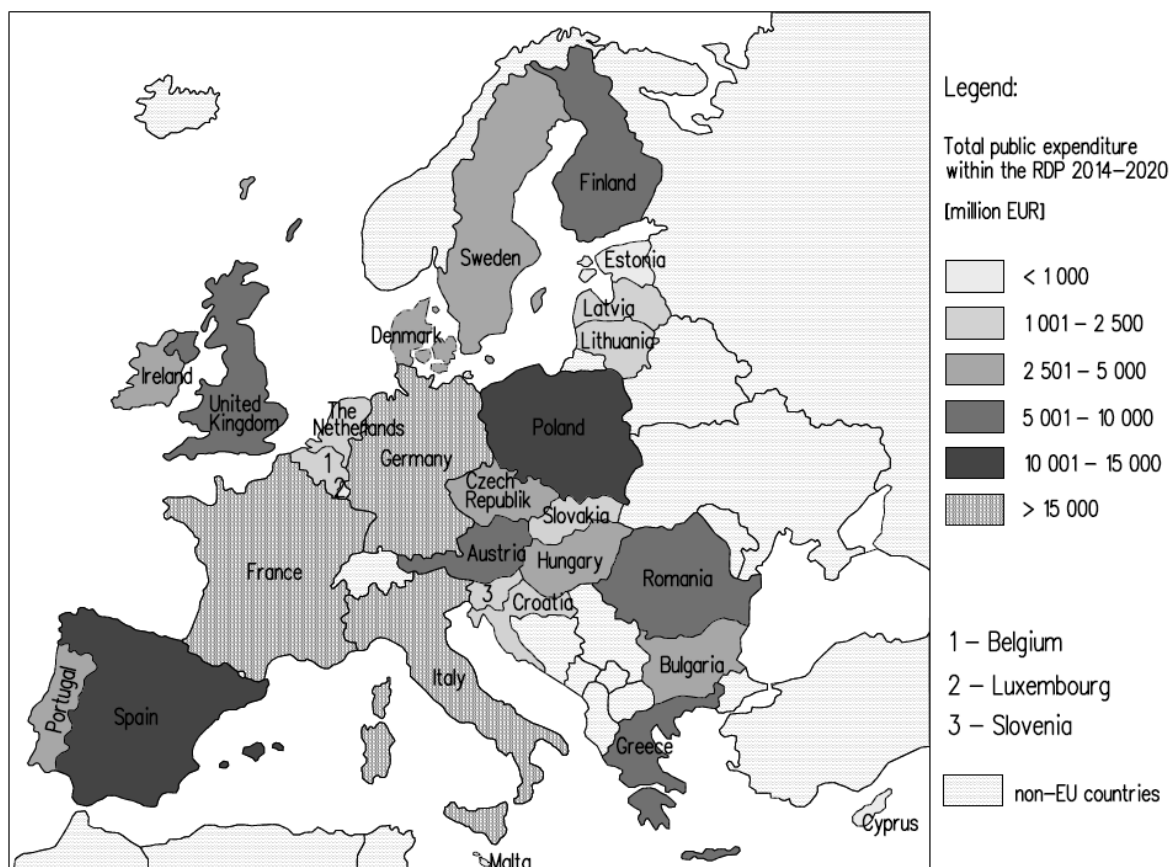
**The research aims** to investigate main similarities and dissimilarities in the priority targets of EU Member States rural development policies. In order to achieve the research goal, **the method** of interstate comparative analyses was applied. The paper presents the comparison of key challenges addressed as the most significant to face within the rural development programmes 2014-2020 (RDP 2014-2020) in different Member States of the European Union. The research was

based on the data on the amount of funding allocated to particular priority within the RDP 2014-2020 in each Member State. **The data** was obtained from the European Commission's factsheets on Rural Development Programmes 2014-2020 for each country (European Commission, 2017). In order to reach the aim, the author set following **research tasks**: (1) provision of summary statistics data on the public budget allocated to each distinguished challenge (priority P2, P3, P4, P5, P6) in 28 EU Member States within the RDPs 2014-2020, (2) prioritization of distinguished challenges, where the level of importance to each challenge was assigned based on the amount of budget allocated to each priority (elaboration of priority-ranked list of challenges in the agricultural policy of each Member State), (3) analysis of main disparities and similarities in funds allocation across Member States.

## Research results and discussion

### 1. Total public expenditure within the RDP 2014-2020 in each Member State

According to the research results, the public funding allocated within the 118 Rural Development Programmes 2014-2020 adopted for different EU Member States equals to 156 699 508 196 EUR in total (author's calculations based on the European Commission's data included in the factsheets on public support allocated to each measure within the Rural Development Programmes 2014-2020 in each country). As share of total EU funding for RDP 2014-2020, the largest public budget allocations were noticed in Italy (12.0 %), Germany (10.8 %) and in France (10.5 %) (Figure 1).



Source: author's study based on the European Commission's data

Fig. 1. Total public expenditure within the Rural Development Programmes for the years 2014-2020 in each European Union Member State

## 2. Share of funds per priority in the Rural Development Programmes 2014-2020

The share of funds per priority (P2, P3, P4, P5) in the Rural Development Programmes for the years 2014-2020 in each EU Member State was investigated. The results of the study are presented in tabular form (Table 1). Some EU Member States adopted more than one RDP 2014-2020. In total, there were adopted 118 RDPs 2014-2020 in the EU. The study concerned the total amount of funds allocated to the whole country, without specification on the share of allocations in particular regions. No financial allocation for Priority 1 (P1) was shown in Table 1 in a separate column, as the expenditure is distributed across other five focus areas (P2, P3, P4, P5, P6). The table also does not include the data on public allocations dedicated to Technical Assistance and Discontinued Measure 113 (Transitional expenditure, Early retirement, etc.), which was taken into account in the research while investigating the total public expenditure within the RDP 2014-2020 for each country. Based on the obtained values the prioritization of challenges within the Rural Development Programmes 2014-2020 of each EU Member State was provided (See sub-part 3).

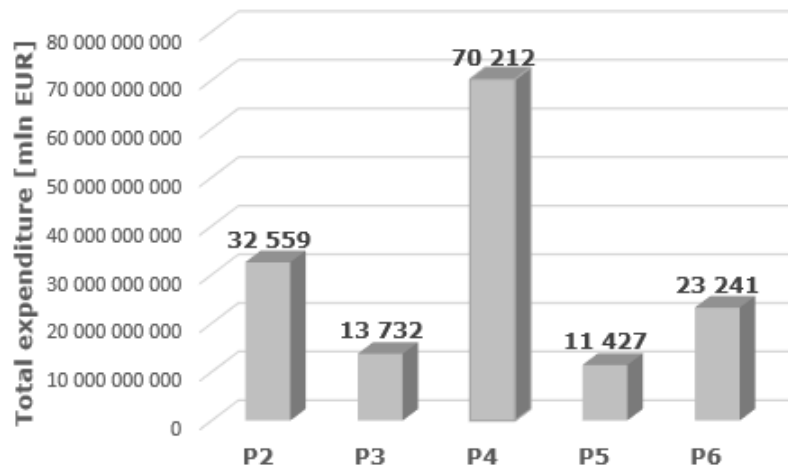
When analysing the share of funds per priority in the total public allocations for the Rural Development Programmes 2014-2020 in the EU (Figure 2), the largest amount of funding (45.3 %) was allocated to the Priority 4 (Restoring, preserving and enhancing ecosystems related to agriculture and forestry), which is related to actions aimed at having agricultural land under contract to stimulate biodiversity, agricultural land to improve water management and agricultural land to improve soil management, as well as conversion or maintaining organic farming. This may suggest that rural policies of EU Member States exhibit strong consideration for the preservation of biodiversity in rural areas. Next, 21 % of total public budget was designated to the Priority 2 (Enhancing the viability and competitiveness of all types of agriculture, and promoting innovative farm technologies and sustainable forest management), which is being followed by Priority 6 - Promoting social inclusion, poverty reduction and economic development in rural areas (15.0 %). The lowest amount of funds was allocated to Priority 3 - Promoting food chain organisation, animal welfare and risk management in agriculture (8.9 %) and Priority 5 - Promoting resource efficiency and supporting the shift toward a low-carbon and climate-resilient economy in the agriculture, food and forestry sectors (7.4 %). For the last two mentioned priorities some Member States did not allocate funds at all (Denmark and Luxembourg in case of Priority 3; Slovenia and the Netherlands in case of Priority 5). Therefore, actions such as promoting alternative food supply chains, resource efficiency and climate adaptation are not treated as the highest-priority challenge in EU Member States' rural policies.

Table 1

**Share of funds per priority (P2, P3, P4, P5) in the Rural Development Programmes for years 2014-2020 in each European Union Member State**

Country	Allocated budget [EUR] per priority				
	P2	P3	P4	P5	P6
<b>Austria</b>	869 370 000	481 887 500	5 156 484 523	244 962 352	827 895 625
<b>Belgium</b>	560 896 517	40 442 949	578 897 258	240 425 830	135 085 602
<b>Bulgaria</b>	371 932 203	272 904 039	983 098 024	430 648 778	815 155 429
<b>Croatia</b>	711 003 205	278 956 380	650 748 724	200 597 894	468 241 752
<b>Cyprus</b>	33 950 000	14 850 000	112 100 992	25 299 008	42 500 000
<b>Czech Republic</b>	552 103 114	239 979 731	1 976 669 627	24 212 095	231 267 428
<b>Denmark</b>	140 228 816	0	768 758 131	134 444 926	77 922 074
<b>Estonia</b>	283 500 000	105 000 000	365 600 000	23 800 000	176 000 000
<b>Finland</b>	1 024 400 000	559 000 000	5 699 531 757	150 400 000	762 000 000
<b>France</b>	3 387 284 373	797 183 291	9 090 606 419	1 015 282 544	1 874 220 813
<b>Germany</b>	2 699 062 381	1 509 926 822	7 510 128 854	740 808 469	4 120 138 147
<b>Greece</b>	860 456 151	406 879 731	2 335 082 475	1 161 973 779	676 989 595
<b>Hungary</b>	715 960 741	771 978 936	1 203 443 811	629 185 295	753 193 553
<b>Ireland</b>	299 800 000	158 300 000	2 842 755 630	456 500 000	250 000 000
<b>Italy</b>	5 234 578 218	2 554 287 651	6 865 930 185	1 265 567 399	2 434 812 362
<b>Latvia</b>	510 324 909	93 431 601	574 644 817	75 078 545	236 255 704
<b>Lithuania</b>	608 644 452	163 519 068	578 117 172	178 900 557	290 789 481
<b>Luxembourg</b>	113 400 000	0	236 023 327	4 000 000	11 141 000
<b>Malta</b>	17 710 263	15 880 919	52 455 545	25 251 941	13 279 762
<b>Poland</b>	4 474 840 477	1 659 610 914	4 160 623 209	300 997 069	2 148 939 940
<b>Portugal</b>	1 720 983 734	119 299 782	1 347 896 061	959 589 621	469 054 765
<b>Romania</b>	1 864 161 812	995 367 204	2 813 740 122	1 025 842 022	2 563 692 738
<b>Slovakia</b>	374 294 740	400 390 000	896 538 000	19 223 650	310 093 019
<b>Slovenia</b>	223 621 867	101 898 083	575 211 499	0	167 991 552
<b>Spain</b>	3 209 940 623	1 481 416 106	4 547 384 189	1 642 091 360	1 575 760 246
<b>Sweden</b>	358 569 218	189 229 285	2 624 336 911	76 803 898	895 284 713
<b>The Netherlands</b>	500 750 000	54000000	917 770 000	0	110 480 000
<b>United Kingdom</b>	837 286 623	266 347 403	4 747 256 500	375 405 321	802 662 767
<b>TOTAL:</b>	<b>32 559 mln</b>	<b>13 732 mln</b>	<b>70 212 mln</b>	<b>11 427 mln</b>	<b>23 241 mln</b>

Source: author's study based on the European Commission's data



Source: author's calculations based on the European Commission's data

Fig. 2. Share of funds per priority (P2, P3, P4, P5) in the total public allocations for the Rural Development Programmes 2014-2020

### 3. Prioritization of challenges within the Rural Development Programmes 2014-2020

For each EU Member State, the level of importance to each challenge was assigned basing on the *priority coefficient* ( $H_{C_{P_i}}$ ) calculated as the percentage share of budget allocated for particular priority (challenge) in the total public expenditure within the RDP 2014-2020:

$$H_{C_{P_i}} = \frac{E_{P_i}}{TE} \times 100\% \quad (1)$$

Where:

$H_{C_{P_i}}$  – priority coefficient for  $i^{th}$  challenge  $P_i$ , where  $i=2, 3, 4, 5, 6$ ;

$E_{P_i}$  – budget allocated for  $i^{th}$  challenge (priority)  $P_i$ , where  $i=2, 3, 4, 5, 6$ ;

$TE$  – total public expenditure within the RDP 2014-2020 (including public allocations dedicated to Technical Assistance and Discontinued Measure: transitional expenditure, early retirement).

The study results in the prioritization of distinguished challenges (P2, P3, P4, P5, P6) in each EU Member State (ranking), where the order of significance of each challenge was assigned based on the values of calculated priority coefficient  $H_{C_{P_i}}$  (Table 2).

According to the study results, for the majority of EU Member States the distribution of funds per priority in RDPs is similar to the one for the whole European Union in terms of the priorities to which was allocated the largest and the lowest amount of money (Fig. 2). 24 out of 28 Member States allocated the largest amount of funding to Priority 4 (of which 8 countries allocated between 64 % and 71 % of total budget). The remaining 4 countries (Croatia, Lithuania, Poland, Portugal) allocated roughly the same amount of money (between 27 % to 36 % of total public expenditure) to both Priority 2 and 4. Apart from Sweden and Ireland, none of the countries allocated less than 10 % of total budget to challenge P2.

Table 2

**The prioritization of challenges (P1, P2, P3, P4, P5)  
 within the rural development programmes 2014-2020 in each EU Member  
 State**

Country	P2		P3		P4		P5		P6	
	Rank*	HcP2 [%]	Rank*	HcP3 [%]	Rank*	HcP4 [%]	Rank*	HcP5 [%]	Rank*	HcP6 [%]
Austria	2	11.1	4	6.2	1	66.0	5	3.1	3	10.6
Belgium	2	35.5	5	2.6	1	36.7	3	15.2	4	8.6
Bulgaria	4	12.7	5	9.4	1	33.7	3	14.8	2	27.9
Croatia	1	29.8	4	11.7	2	27.3	5	8.4	3	19.6
Cyprus	3	14.0	5	6.1	1	46.1	4	10.4	2	17.5
Czech Republic	2	18.0	3	7.8	1	64.3	5	0.8	4	7.5
Denmark	2	11.8	5	0.0	1	64.6	3	11.3	4	6.5
Estonia	2	28.6	4	10.6	1	36.8	5	2.4	3	17.7
Finland	2	12.4	4	6.8	1	69.0	5	1.8	3	9.2
France	2	20.7	5	4.9	1	55.4	4	6.2	3	11.4
Germany	3	16.0	4	8.9	1	44.4	5	4.4	2	24.4
Greece	3	15.3	5	7.2	1	41.4	2	20.6	4	12.0
Hungary	4	17.2	2	18.5	1	28.8	5	15.1	3	18.0
Ireland	3	7.4	5	3.9	1	70.6	2	11.3	4	6.2
Italy	2	27.9	3	13.6	1	36.6	5	6.8	4	13.0
Latvia	2	32.4	4	5.9	1	36.4	5	4.8	3	15.0
Lithuania	1	30.8	5	8.3	2	29.2	4	9.0	3	14.7
Luxembourg	2	30.8	5	0.0	1	64.1	4	1.1	3	3.0
Malta	3	13.6	4	12.2	1	40.4	2	19.5	5	10.2
Poland	1	33.1	4	12.3	2	30.8	5	2.2	3	15.9
Portugal	1	36.5	5	2.5	2	28.6	3	20.3	4	9.9
Romania	3	19.7	5	10.5	1	29.7	4	10.8	2	27.1
Slovakia	3	18.0	2	19.3	1	43.1	5	0.9	4	14.9
Slovenia	2	20.2	4	9.2	1	51.9	5	0.0	3	15.2
Spain	2	25.3	5	11.7	1	35.8	3	12.9	4	12.4
Sweden	3	8.3	4	4.4	1	61.0	5	1.8	2	20.8
The Netherlands	2	30.8	4	3.3	1	56.4	5	0.0	3	6.8
United Kingdom	2	11.6	5	3.7	1	65.9	4	5.2	3	11.1
<b>TOTAL:</b>	<b>2</b>	<b>21.0</b>	<b>4</b>	<b>8.9</b>	<b>1</b>	<b>45.3</b>	<b>5</b>	<b>7.4</b>	<b>3</b>	<b>15.0</b>

**Key:** Rank – final ranking of challenges (P2, P3, P4, P5, P6) in each EU Member State;

**HcP<sub>i</sub>** – priority coefficient of <sup>i</sup>th challenge (P2, P3, P4, P5, P6) for each EU Member State.

**Source:** author's study based on the European Commission's data

In case of 16 countries, challenges P3 and P5 were located on two last places on the priority ranking list. The majority of the countries allocated to Priority 3 less than or equal to 12 % of their total public budget. The rare exceptions were Hungary (18.5 %), Italy (13.6 %) and Slovakia (19.3 %). Regarding Priority 5, none of the countries allocated more than 15 % of their total budget apart from Greece (20.6 %), Malta (19.5 %) and Portugal (20.3 %). 13 countries allocated to priority P5 less than or equal to 5 % of their total public allocations. This may suggest that those countries focus on different measures which can contribute to environmental and climate objectives



(e.g. measures within priorities P2 and P4). However, measures possible to implement under priority P5 are crucial and should not be neglected. When analysing the budget reserved to priorities P4 and P5 in total, only 4 countries allocated less than 40 % of their total budget: Poland (33.0 %), Croatia (35.9 %), Lithuania (38.3 %) and Estonia (39.3 %). On the contrary, the largest public expenditure to P4 and P5 in total was noticed in Ireland (82 %), Denmark (76 %), Finland (71 %) and United Kingdom (71 %).

No clear distinction can be drawn between the distribution of funds in the 'old' and 'new' (the 13 countries which have joined the EU since 2004) Member States. However, 11 out of 13 'new' Member States allocated more than or equal to 15 % of their total public budget to measures related to priority P6 (Social inclusion, poverty reduction, economic development), whereas the support allocated to P6 did not reach the level of 15 % of total public budget among 'old' Member States (with exception of Germany (24 %) and Sweden (21 %)).

Based on the research calculations there can be distinguished some similar patterns of funds distribution in EU Member States (Table 3).

Table 3

**Distinguished patterns in the distribution of funds per priority (P2, P3, P4, P5) in the Rural Development Programmes for years 2014-2020 in EU Member State**

Distinguished Pattern	Share of funds per priority in the total public budget in EU Member States - HcPi				
	P2	P3	P4	P5	P6
<b>Pattern 1a</b> For countries:	11-18 %	4-8 %	64-66 %	1-5 % <sup>A</sup>	8-11 %
	<b>Austria, Czech Republic, Denmark, Finland, United Kingdom</b>				
<b>Pattern 1b</b> For countries:	31 %	0-3 %	56-64 %	0-1 %	3-7 %
	<b>Luxembourg, The Netherlands</b>				
<b>Pattern 2a</b> For countries:	28-33 %	6-14 %	27-37 %	3-9 %	13-20 %
	<b>Croatia, Estonia, Italy, Latvia, Lithuania, Poland</b>				
<b>Pattern 2b</b> For countries:	36 %	3 %	29-37 %	15-20 %	9-10 %
	<b>Belgium, Portugal</b>				
<b>Pattern 3a</b> For countries:	14-25 %	6-18 %	36-46 %	10-21 %	12-18 %
	<b>Cyprus, Greece, Hungary, Spain</b>				
<b>Pattern 3b</b> For countries:	13-20 %	9-12 %	30-44 %	11-19 % <sup>B</sup>	24-28 % <sup>C</sup>
	<b>Bulgaria, Germany, Malta, Romania</b>				
<b>Pattern 3c</b> For countries:	18-20 %	9-20 %	43-52 %	0-1 %	15 %
	<b>Slovakia, Slovenia</b>				
<b>Countries not fitting the distinguished patterns: France, Ireland, Sweden</b>					

**Key:** <sup>A)</sup> Exception for Denmark  $H_{CP5} = 11.3 \%$

<sup>B)</sup> Exception for Germany  $H_{CP5} = 4.4 \%$

<sup>C)</sup> Exception for Malta  $H_{CP6} = 10.2 \%$

*The highest-priority challenge (P<sub>i</sub>) in each pattern underlined.*

**Source: author's study based on the European Commission's data**

**Conclusions, proposals, recommendations**

1) Despite the strong level of diversification in the rural areas in EU Member States, there can be noticed some similarities in the hierarchy of the priorities adopted in the RDPs 2014-2020. The majority of Member States (24 out of 28 countries) allocated the largest amount of funding to Priority 4, which may suggest that EU countries pay a great deal of attention to the issues of preservation of ecosystems and biodiversity in rural areas. Challenge P4 was in most cases

being followed by P2 (actions related to enhancing farm viability competitiveness and sustainable forest management) in the priority ranking list.

- 2) There can be distinguished some similar patterns of funds distribution in EU Member States (countries not fitting the distinguished patterns are France, Ireland, Sweden). The RDPs for each country focus mainly on one or two priorities: P2, P2 and P4 or P4 and P6 (more than 25 % of total budget allocated per priority).
- 3) Actions related to promoting alternative food supply chains, resource efficiency and climate adaptation are not treated as the highest-priority challenge in the RDPs of the majority of the EU Member States (challenges P3 and P5 were ranked as priorities of the lowest significance in general). In case of 16 countries, challenges P3 and P5 were located on two last places on the priority ranking list. Denmark and Luxembourg did not allocate funds at all in case of Priority 3 and Slovenia and the Netherlands in case of Priority 5. High significance assigned to Priority 3 can be noticed only in a few Member States (Hungary, Italy, Slovakia). Regarding Priority 5, none of the countries allocated more than 15 % of their total budget apart from Greece, Malta and Portugal.
- 4) 13 countries allocated less than or equal to 5 % of their total public expenditure to priority P5 (Resource-efficient, Climate-resilient Economy). However, when analysing the budget reserved to priorities P4 and P5 in total, only 4 countries allocated less than 40 % of their total budget: Poland (33.0 %), Croatia (35.7 %), Lithuania (38.3 %) and Estonia (39.3 %). The author's research leads to the conclusion that it is very important to conduct information and education campaigns on agri-environmental issues in the mentioned countries. In the upcoming programming period, a further attempt to address the environmental, climate adaptation and resource efficiency issues in the RDPs should be made and a larger amount of funding should be allocated to these objectives.
- 5) No clear distinction can be drawn between the distribution of fund in the 'old' and 'new' Member States. However, most of the 'new' Member States tend to allocate more funding to Priority 6 (Social inclusion, poverty reduction, economic development) than the 'old' Member States.

## Bibliography

1. Baylis, K., Peplow, S., Rausser, G., Simon, L., (2008). Agri-environmental Policies in the EU and United States: A comparison. *Ecological Economics* 65 (2008), pp. 753-764.
2. Ciutacu, C., Chivu, L., Andrei, J.V., (2014). Similarities and Dissimilarities between the EU Agricultural and Rural Development Model and Romanian Agriculture. Challenges and perspectives. *Land Use Policy* 44 (2015), pp. 169-176.
3. Ciutacu, C., Chivu, L., Mark, C., (2008). E'tude comparative dans le secteur del'agriculture de L'union Européenne. *Rom. J. Econ.* 27/2 (36), pp. 40-56.
4. Ciutacu, C., Chivu, L., Raluca, I.I., (2009). The Global Financial Crisis: Management of Deficits and Debts. *Amfiteatru Econ. J.* 11 (Number Special 3), pp. 735-750.
5. Czyzewski, A., Kryszak, L., (2017). Agricultural Income and Process. The Interdependence of Selected Phenomena in Poland Compared to EU-15 Member States. *Managerial Economics* 2017, vol. 18, no. 1, pp. 47-62
6. Ellen, G.J., Hommes, S., Kalweit, A.M., Lamoen, F.v., Melisie, E.J., Maring, L., Paalman, M., Peerdeman, K., Rooij, S.A.M.v., Steingrover, E.G., (2011). Multifunctioneel landgebruik als adaptatiestrategie: puzzelen met ondernemers en beleidsmakers. Kennis voor Klimaat rapport KvK/036/2011. Kennis voor Klimaat, Utrecht, the Netherlands, 89 pp.
7. European Commission, (2017). *Rural Development 2014-2020: Country Files*. Retrieved: [https://ec.europa.eu/agriculture/rural-development-2014-2020/country-files\\_en](https://ec.europa.eu/agriculture/rural-development-2014-2020/country-files_en). Access: 29.01.2018.
8. European Commission, (2016). *Rural Development 2014-2020*. Retrieved: [https://ec.europa.eu/agriculture/rural-development-2014-2020\\_en](https://ec.europa.eu/agriculture/rural-development-2014-2020_en). Access: 02.02.2018.

9. EUROSTAT, (2017). *Europe 2020 Indicators – Poverty and Social Exclusion*. Retrieved: [http://ec.europa.eu/eurostat/statistics-explained/index.php/Europe\\_2020\\_indicators\\_-\\_poverty\\_and\\_social\\_exclusion](http://ec.europa.eu/eurostat/statistics-explained/index.php/Europe_2020_indicators_-_poverty_and_social_exclusion). Access: 02.02.2018.
10. Gallent, N., Hamiduddin, I., Juntti, M., Kidd, S., Shaw, D., (2015). *Introduction to Rural Planning. Economies, Communities and Landscapes*. 2<sup>nd</sup> Edition. The Natural and Built Environment Series. Routledge, Taylor and Francis Group, New York and London, 366 pp.
11. Hooghe, L., (1996). Introduction: Reconciling EU-Wide Policy and National Diversity. In: L. Hooghe (Ed.), *Cohesion Policy and European Integration: Building Multi-Level Governance*. Oxford University Press Inc., New York, pp. 1–26.
12. Ilbery, B., Bowler, I., (1998). From Agricultural Productivism to Post-productivism. In: B. Ilbery (Ed.), *The Geography of Rural Change*. Longman, London, pp. 57–84.
13. Javadzadeh, S.M., Mehraban, A., Ebrahimi, A., Javadi, H. (2014). Agri-Environmental: A Review. *Adv. Agric. Biol.* 2 (2), 2014, pp. 93-104.
14. Kingston, S. (2011). *Greening EU Competition Law and Policy*. Cambridge University Press, Cambridge, 474 pp.
15. Kryszak, L., Staniszewski, J., (2017). The Elasticity of Agricultural Income in the EU Member States under Different Cost Structures. *Scientific Journal Warsaw University of Life Sciences – SGGW Problems of World Agriculture* volume 17 (XXXII), number 4, 2017, pp. 182–192.
16. Miklos, L., Spinerova, A., (2009). The Environmental Conditions in Carpathian Basin and the Environmental Policy of European Union. *Acta Universitatis Sapientiae Agriculture and Environment* 1 (2009), pp. 83-92.
17. Mullarkey, D., Cooper, J., Skully, D., (2001). Multifunctionality of Agriculture: Do Mixed Goals Distort Trade. *Choices*, First Quarter 2001, pp. 31-34.
18. Nowak, A., Janulewicz, P., Krukowski, A., Bujanowicz-Haras, B., (2016). Diversification of the Level of Agricultural Development in the Member States of the European Union. *Cah. Agric.* 2016, 25: 55004, pp. 1-7.
19. Olesen, J.E., Bindi, M., (2002). Consequences of Climate Change for European Agricultural Productivity, Land Use and Policy. *European Journal of Agronomy* 16, pp. 239-262.
20. Papadopoulos, A.G., (2015). The Impact of the CAP on Agriculture and Rural Areas of EU Member States. *Agrarian South: Journal of Political Economy: A tri-annual Journal of CARES* Vol. 4 (1), pp. 22-53.
21. Pradziadowicz, M., (2017). Realization of Agri-environmental Program in Western Pomerania in the Years 2007-2013. Proceedings of the 2017 International Conference "ECONOMIC SCIENCE FOR RURAL DEVELOPMENT" No 44, Jelgava, LLU ESAF, 27-28 April 2017, pp. 161-165
22. Ramniceanu, I., Ackrill, R., (2007). EU Rural Development Policy in the New Member States: Promoting Multifunctionality? *Journal of Rural Studies* Vol. 23 (4), pp. 416-429.
23. Renting, H., Marsden, T., Banks, J., (2003). Understanding Alternative Food Networks: Exploring the Role of Short Food Supply Chains in Rural Development. *Environment and Planning* Vol. 35 (2003), pp. 393-411.
24. Siudek, T., Vashchik, M., (2014). Economic Development of Rural Areas in European Union Member States in 2000-2012. *Oeconomia* 13 (3) 2014, pp. 95-104.
25. Sompolska-Rzechula, A. (2017). Diversification of Rural Areas in Poland in Terms of Level of Living. Proceedings of the 2017 International Conference "ECONOMIC SCIENCE FOR RURAL DEVELOPMENT" No 44, Jelgava, LLU ESAF, 27-28 April 2017, pp. 182-189
26. Van Dijk, T., (2003). Scenarios of Central European Land Fragmentation. *Land Use Policy* 20 (2), pp. 149-158.
27. Vashchik, M., Siudek, T. (2015). Social Development of Rural Areas in the European Union Member States in 2000-2012. *Roczniki Naukowe Ekonomii Rolnictwa i Rozwoju Obszarow Wiejskich*, T. 102, z. 1, 2015, pp. 7-17.

## FACTORS OF PSYCHOLOGICAL INFLUENCE AFFECTING EMPLOYEES IN RIGA ESTATE MANAGEMENT COMPANY N083

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**Abstract.** The aim of the study is to assess and improve the safety and health of workers at work. In order to achieve this goal, the labour protection system was analyzed at a management company (Zemgale Division). The authors used the risk assessment methods often applied in Latvia, survey of employees and have developed recommendations for improving the labour protection system.

Ergonomic risk assessment methods and psychoemotional factors have been analyzed. Based on the analysis of the obtained results, proposals were developed for improvement of the labour protection system, which may be suitable also for other companies.

**Key words:** stress, occupational diseases, psychological climate.

**JEL code:** H51, J150

### Introduction

People spend a lot of their life at work. During the process of work an employee is exposed to factors endangering the health and even life: physical (noise, vibration, radiation), chemical (hazardous substances and products), biological (bacteria, mushrooms, allergens etc.), psychoemotional (stress, disagreements at work, inadequate work); as well as to combinations of various factors.

The safe working conditions of an employee are regulated by the Labour Protection Law, the Cabinet of Ministers Regulations, ILO Regulations, as well as the European Union Framework Directives, which must be fulfilled by both the employer and the employee (Berger.A.A., 2011, Chapanis A., 1996, The Labour Protection law, 2002).

During the work process, a worker can develop illnesses, so-called occupational diseases, associated with representatives of a particular profession.

There is more talk about stress, psychoemotional overload, tension at work, lack of time, overload, work at night, overtime, conflicts, threats, poor relations with the employer and colleagues.

Creating a healthy psychological climate in a team is one of the key challenges for managers of all levels. A healthy climate is when all conflict situations are discussed and resolved. Therefore, it is important to more deeply evaluate the psychosocial risk in any organization in order to objectively assess the situation and to determine whether the psychoemotional state of the staff does not affect the quality and reputation of the organization's activities (The Labour Law, 2002, The Labour Environment internace ..., 2007, Riga Stradins University..., 2011).

Since restoration of independence of the Republic of Latvia, a number of residential housing management companies have been established, which provided housing management and administration services for residential building owned by local governments. For customers' convenience, such companies were established in each microdistrict of Riga.

By the end of 2010, 15 municipal capital companies were operating in the administrative territory of Riga. Taking into account that 15 different companies managing dwelling houses owned by the local government had not implemented and realized uniform principles of operation and management, a decision was made to establish LLC "X" management company.

The chosen management company was established on 29 December 2010. Zemgale Division is one of few divisions of the management company, which over time has preserved the historically

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developed territorial area - both in the Soviet era and since restoration of independence of the Republic of Latvia it managed and administrated residential houses in Pardaugava, Zemgale Suburb of Riga.

Zemgale Division of the management company has established a labour protection system and provided its functioning and control; internal supervision of the work environment is carried out on a regular and qualitative basis at all stages of the work, preventive measures are implemented in the company, the employees are cooperating with the employer, are aware of the risks evaluation and participate in the implementation of labour protection measures. The study determined psychological factors in Estate management company that will help to improve afterwards workers' conditions of labour and interrelationship between employees and employers and consumers.

The aim of these papers is to analyse psychological factors effecting employees of Estate management company and to develop recommendations on how to improve the work conditions.

The Labour Protection Law states that the state policy in the field of labour protection is to arrange the working environment so as to avoid unsafe working conditions (Ozoliņa-Ozola, I., 2011, Riga Stradins University..., 2011).

Compliance with laws and regulations guarantees that employees subordinated to the employer will be able-bodied (Berger A.A., 2011, Chapanis A., 1996).

## Material and methods

*In their study, the authors used the following methods:*

- abstract-logical method for separating the essential features of the studied object from least significant ones and for analyzing different alternative solutions;
- graphical method - for a visual illustration of data and for the presentation of the analysis data. Data so formatted is easily comparable;
- constructive method of calculations;
- monographic method - to collect and summarize information as well as to conduct a detailed study based on extensive literature review. Divisions of the management company implement the company's policy as well as realizes the vision of the company and its capital shareholder. The divisions provide high-quality services of management of residential apartment houses, implement an efficient use of financial resources for the maintenance and improvement of the housing stock.

The mission of the management company's Zemgale Division is to fulfill the mission of the company: to carry out a high-quality and uninterrupted management of residential buildings, promoting to improve technical condition of these houses.

*Strategic objectives of the management company are structured in three groups:*

- 1) objectives associated with the implementation of the functions of the local government, which are related to the fulfillment of duties specified in agreements on management of residential houses: provision of mandatory management activities and guidelines specified in the policy planning documents;
- 2) objectives associated with commercial activity, which are not directly related to the but are related to the improvement of the company's internal functioning, capacity growth, improvement of management processes, introduction of quality management system, attraction of new clients etc.;
- 3) financial objectives, which include the forecasts for indicators of net turnover, investments, personnel costs, number of employees, profit or loss etc.

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*From the company's standpoint, the vision and mission shall mean:*

- **Vision:** The management company is the largest and most professional housing manager in Riga with highly qualified staff who provide a high-quality and fast service for inhabitants of residential apartment houses, as well as innovative management methods, involving the inhabitants in the process of improving their services.
- **Mission:** Provide the services of management of residential houses (technical maintenance of buildings, sanitary care of attached land plots etc.), of which quality satisfies the inhabitants of residential apartment houses and other clients (Berger A.A., 2011).

*The company provides the following residential house management activities (The Labour Law, 2002):*

- Sanitary maintenance of residential houses;
- Heating, water supply and sewerage, domestic waste disposal services;
- Provision of electric power supply for the co-owned part of residential buildings;
- Inspection, maintenance and routine repair of residential houses and their communications.

*Activities of the division can be split into four groups (Unpublished materials of ... ):*

- 4) Providing a continuous and high-quality management of residential apartment houses (management of home appliances and communications; management and sanitation of houses and their attached territories; visual inspection of houses; provision of other management services);
- 5) Providing the technical improvement of managed buildings and implementation of energy efficiency measures (technical improvement of houses; implementation of home energy efficiency measures; technical improvement of house-related areas);
- 6) Customer service quality improvement (direct customer service; organization of educational and informative events for customer; development of IT solutions for improvement of customer service; public relations);
- 7) Providing the competitiveness of the company (application of modern management principles; improvement of staff professionalism and experience; improvement of the division work organization; improvement of the material and technical base and infrastructure).

The tasks of Zemgale Division activity are in line with the goals and objectives of the management company and the Law on Residential Housing Management.

The psychoemotional climate in a company like a management enterprise is very important because people with very different background and age working there and often they are not able to communicate with each other during the working day, which causes many problems in the team.

### **Description of create scales**

In order to assess the psychological situation in the management company's Zemgale Division, the author of the work has chosen three groups of employees, and members of each group were asked to complete several tests, one of them being the *Psychological Climate Scale* (see Table 1).

Creating a healthy psychological climate in the team is one of the main tasks of the managers of all levels. A healthy climate means that all conflict situations are discussed and solved. In order to assess the psychological climate of the work group, the author used the expert assessment methods and conducted an anonymous survey of employees of groups of certain professions (Kalnina, L., 2012, Ozoliņa-Ozola, I., 2011).

*The study was participated by three groups of employees (Unpublished materials of ...):*

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- 1) Yardkeepers - cleaners;
- 2) Office workers;
- 3) Working group (engineers, roofers, electricians, plumbers, auxiliary workers etc.)

Table 1

**Psychological climate assessment scale  
 (modified by the author from Kalķis, 2008, 194)**

Features of healthy psychological climate	Scale 5 to 1	Features of unhealthy psychological climate
<b>1. In the workday beginning, the colleagues have a good mood, they take inspiration and vigour.</b>		1. Most of employees appear at work in everyday "routine" mood, they do not feel joy.
<b>2. Most of us are happy about the possibility of contacting each other.</b>		2. The teammates are indifferent to mutual contact.
<b>3. Success of each team member really brings joy to the others.</b>		3. Anybody's success makes the others displeased, envious.
<b>4. A newcomers to our work team will be treated with grace.</b>		4. Our newcomers will feel like a stranger for a long time.
<b>5. In case of trouble we are trying to find out the circumstances.</b>		5. In case of trouble in our team everyone will try to blame the other or find "the guilty".
<b>6. Presence of a superior activates our ease and liberty.</b>		6. In the presence of a superior many feel tense and confused.
<b>7. We usually discuss with each other our family joys and sorrows.</b>		7. Many of us do not want to discuss our problems with others.
<b>8. Sudden invitation to a superior does not cause negative emotions in most employees.</b>		8. Sudden invitation to a superior causes negative emotions in many of us.
<b>9. Violator of labour discipline r affects the other teammates.</b>		9. Violator of labour discipline reports only to the superior.
<b>10. When making critical remarks, most of us do it delicately.</b>		10. Critical notes sound openly or secretly offensive.
<b>11. Appearance of a superior brings positive emotions to us.</b>		11. Appearance of a superior arises dislike in many of us.
<b>12. "Transparency" is the norm in the team.</b>		12. "Transparency" is still very far away.
<b>13. Favourable and trustful atmosphere rules in relations with clients.</b>		13. Communication with clients creates obvious or masked nervousness.
<b>14. We are pleased to provide information and services in the framework of our duties.</b>		14. When it comes to fulfilling own work tasks, I experience stress each time contacting with the clients.
<b>15. Sudden invitation to or appearance of a client does not cause negative emotions.</b>		15. Sudden invitation to or appearance of a client causes negative emotions.
<b>16. Appearance of clients gives us positive emotions.</b>		16. Appearance of clients is a source of dislike for many.
<b>17. It seems to me that the clients appreciate my work and I feel their positive attitude.</b>		17. It seems to me that the clients do not appreciate my work and I feel their negative and humiliating attitude.

The survey involved of a total of 150 employees of average age 26 to 50. The assessment should be done by a 5-point system, entering the value of the points depending on the employee's situation assessment according to the put questions. The total score is within the range 85 to 17 points (85-68 acquired points - healthy atmosphere; 67-35 - medium atmosphere; 34-17 - unhealthy work atmosphere is ruling in the team). Summarizing the answers of the respondents, it is possible to judge not only the general psychological climate in the collective but also in what direction some changes should be made in order to improve the psychological atmosphere. For example, whether there are disagreements with the management, colleagues or clients. The author

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used the psychological climate scale and adapted it to the specifics of the organization's activity, included questions 13 to 17 on contact with the clients (see Table 1).

The following results were obtained by evaluating and summarizing the data obtained (see Table 2). In Table 1 the received points are grouped by jobs.

### Research results and discussion

The first part discusses the psychoemotional climate in a company like management enterprise with vary background and age working there.

The second part presents the main results of study, following by conclusion some recommendations suggested by authors.

Table 2

#### Results of psychological climate assessment (created by the author, 2017)

Job groups	Number of employees who received 17 – 34 points	Number of employees who received 35 – 67 points	Number of employees who received 68 – 85 points
Office workers	-	47	3
Yardkeepers - cleaners	-	38	12
Working group	-	43	7

Summarizing the acquired data, the above results were obtained and presented in Table 2 where the employees are grouped by their jobs and the points received are shown for each group. The summarized points of for all job groups is generally between 35 and 67, which corresponds to the average psychological climate, but there were also respondents in each group who scored between 68 and 85 evidencing a healthy psychological climate.

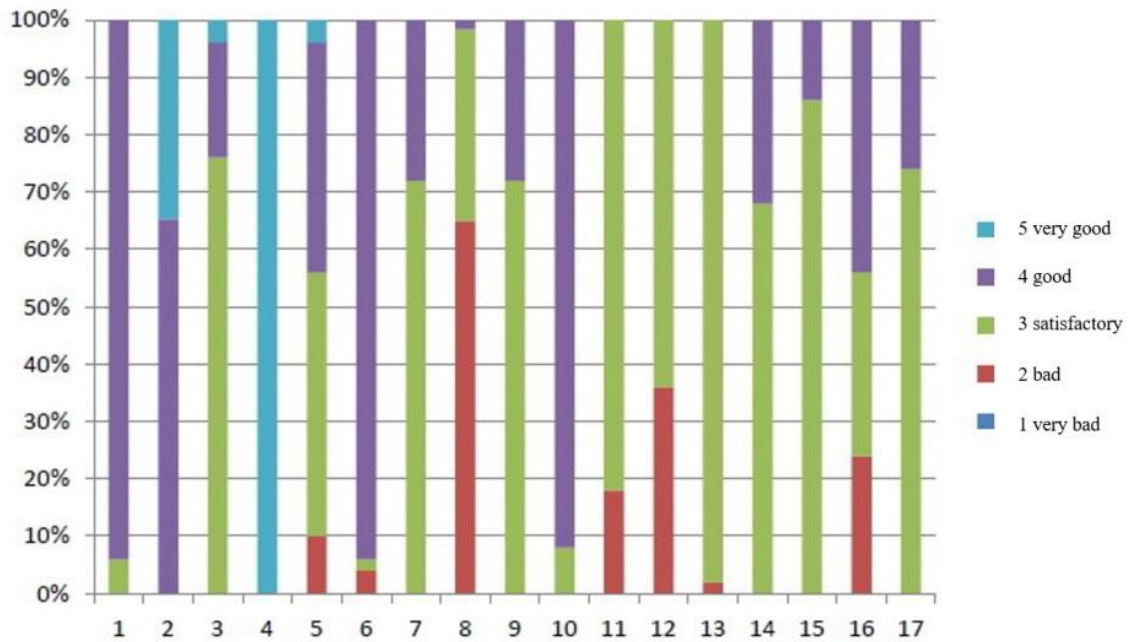
In continuation of the work, the author carried out a psychoemotional assessment analysis for each job group separately (see Figure 1, Figure 2, Figure 3), identifying for each group the most problematic sphere, which would require certain improvements and solutions.

Psychoemotional risk assessment by the psychological climate scale for the *Working Group* in Figure 1 demonstrates that the respondents very low evaluated the following features:

- In case of trouble in our team everyone will try to blame the other or find "the guilty" - 1 employee,
- In the presence of a superior many feel tense and confused - 5 employees;
- Many of us do not want to discuss our problems with others - 36 employees;
- Sudden invitation to a superior causes negative emotions in many of us - 36 employees feel moderately;
- Appearance of a superior arises dislike in many of us - 9 employees;
- Appearance of clients is a source of dislike for many - 43 employees have noted *moderately*,
- It seems to me that the clients do not appreciate my work and I feel their negative and humiliating attitude: in each 12 - bad and 37 – moderately, as noted by the respondents.
- Psychoemotional risk assessment based on the psychological climate scale for the *Yardkeepers - Cleaners* in Figure 2 shows that employees of this group are more negative than positive in contacting the clients as well as have evident problems with the management (see Figure 2).

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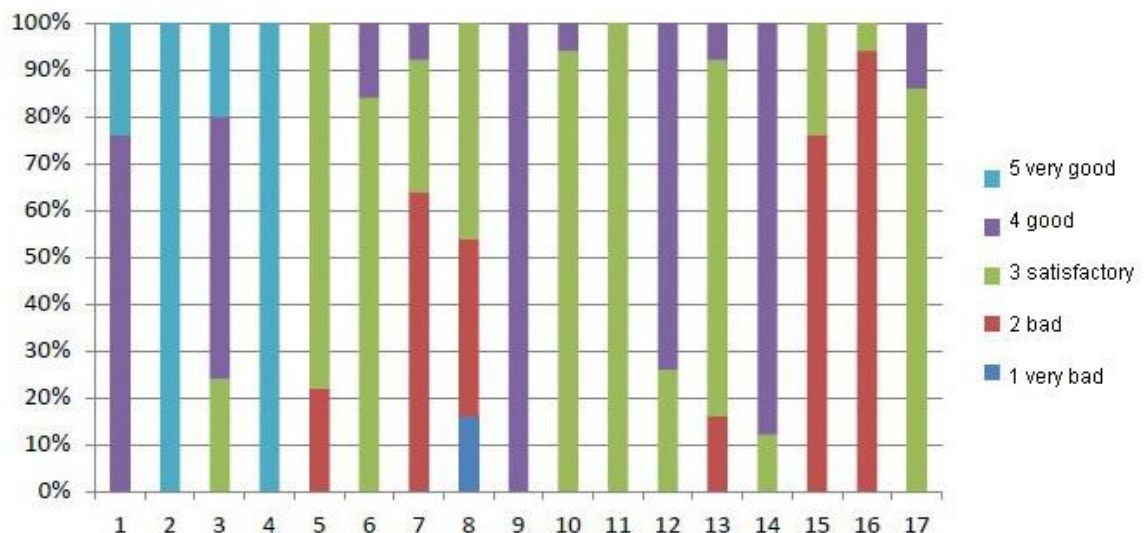


Source: author's calculations based on questionnaires.

Fig. 1. Psychoemotional risk assessment based on the psychological climate scale for the Working Group, % (created by the work author, 2017).

Psychoemotional risk assessment based on the psychological climate scale for the Yardkeepers - Cleaners in Figure 2 demonstrates that the respondents very low evaluated the following features:

- In case of trouble the colleagues blamed each other - 11 employees;
- Many employees do not want to discuss their problems with others - 32 employees;
- Invitation to a superior causes negative emotions - 19 employees;
- Communication with customers creates nervousness - 8 employees;
- Sudden invitation to or appearance of the client causes negative emotions - 38 employees;
- Appearance of clients creates dislike - 47 employees.



Source: author's calculations based on questionnaires.

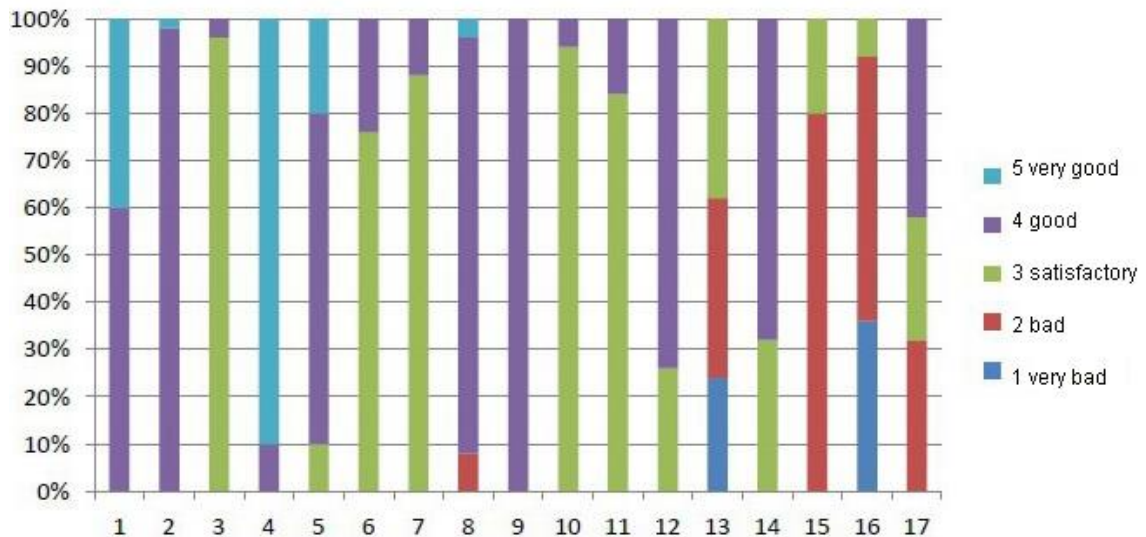
Fig. 2. Psychoemotional risk assessment based on the psychological climate scale for the Yardkeepers - Cleaners, % (created by the work author, 2017).

It can be seen on Figure 3 that employees of this group have most negatively marked just the contact with clients because in their everyday work just the office staff most of all are working with the residents - apartment owners, both at reception time and by telephone (see Fig. 3).

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Source: author's calculations based on questionnaires.

Fig. 3. **Psychoemotional risk assessment based on the psychological climate scale for the Office Staff, % (created by the work author, 2017).**

Psychoemotional risk assessment based on the psychological climate for the *Office staff* is shown in Figure 3 where it can be seen that the respondents very low evaluated the following features:

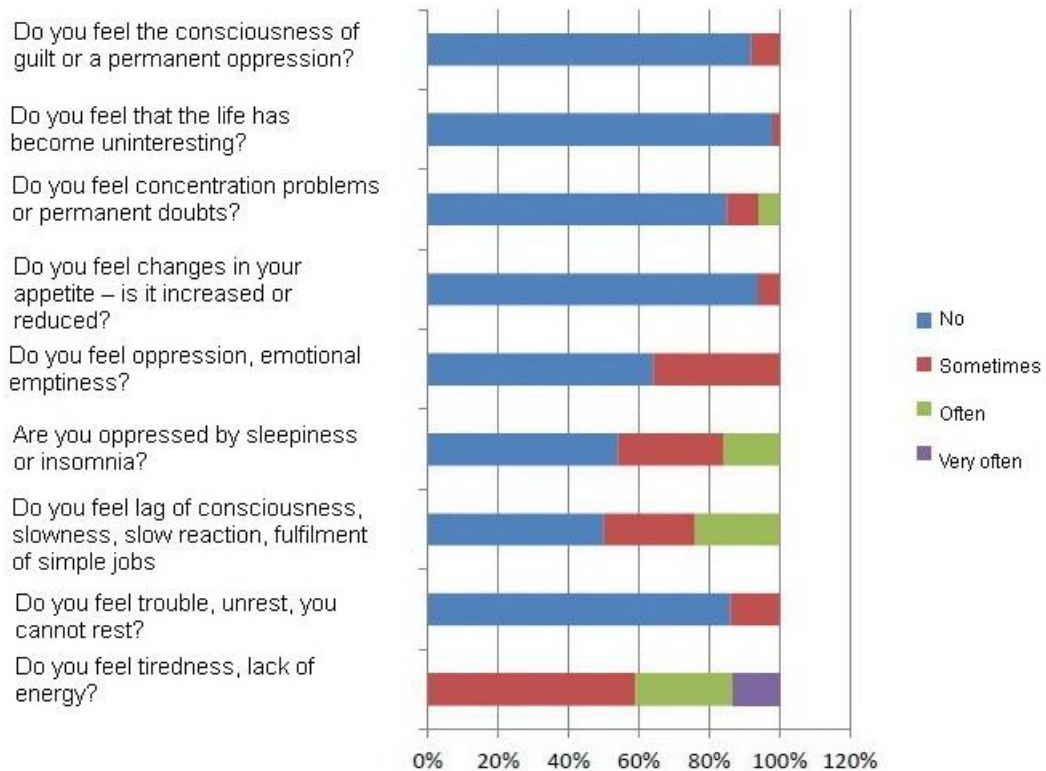
- Sudden invitation to a superior - 8 employees;
- Contact with clients causes obvious or masked nervousness or dislike - 25 employees;
- Sudden invitation to or appearance of a client arises negative emotions - 40 employees;
- Appearance of clients arises dislike in many - 46 employees;
- We think that the clients do not appreciate this work - 16 employees.

In addition to the psychoemotional climate assessment, the authors gave the same employees a test that identified the signs of depression.

Depression test results can be viewed on Figure 4 and demonstrate that no one needs consultation by a specialist but some have signs of moderate depression – total 52 employees out of 150 being surveyed (see Appendix No. 4 for the questionnaire).

The survey involved a total of 150 employees of average age 26 to 50. There is a common idea that the work in such kind of companies is not stressed, safe. However, our study has proved the opposite.

Summarizing the results of the depression test for the employees, the author concludes that in general the participants of the Office Staff group feel worst of all psychoemotionally, that is those who are most often in contact with the clients. The author explains it by a large amount of work and the number of apartment owners as each house manager administers 50 to 100 residential buildings; respectively, there is also a very large number of apartment owners, of which every third one one wants to visit the management company and express their wishes, raise voice, sometimes threaten etc., so often the situation in the working environment causes a depressing mood.



Source: author's calculations based on questionnaires.

Fig. 4. Results of workers' depression test (created by the author, 2017).

## Conclusions

Summarizing the data on psychoemotional risks, the obtained results show that the summarized score for groups of job is mainly within 35 and 67, which corresponds to the average psychological climate, as well as there were respondents in each group of job who scored points 68-85, which evidences the healthy psychological climate.

The psychoemotional risk assessment according to the psychological climate scale is similar for all groups. The answers given indicate that employees have more negative than positive in contacts with the clients as well as the problems with managements are evident in the answers given.

Depression test results demonstrate that no one needs consultation by a specialist but some have signs of moderate depression – total 52 employees out of 150 being surveyed.

In general the participants of the Office Staff group feel worst of all psychoemotionally, that is those who are most often in contact with the clients, which is explained by a large volume of work and visits of negatively disposed apartment owners, so often the situation in the work environment causes a depressive mood.

This study allows to ray attention to conditions to work effectively for Estimate management companies both in Riga and all Republic cities.

The division manager should make changes in own style of work, paying more attention to the wellbeing of workers. It is desirable to find time for negotiations and problem solving, arrange weekly meetings to discuss work to be done, make decisions collectively rather than deciding and criticizing at sole discretion, provide employees with information on solutions reduction of working load, which will improve the employees' work process and quality.

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In order to ensure good relationships between the office workers and the clients, the division manager should organize restrictions on the customer reception times, regulate a uniform distribution of work, employ the trainees, appoint the office workers to attend the motivation courses, establish additional payments or pay bonuses for positive work results.

As the received data of the study are not published, the authors are going to supply this information both the Head of the enterprise where the investigation took place, and Riga city authority. The authors hope that this will help to accept strategic important solutions on development and personnel's, occupied in this sphere, motivation.

## Bibliography

1. Belcikovs, J., & Praude, V., (2001) *Management*. Riga: Vaidelote Publishing.
2. Berger A.A (2011). *Media and Communication Research Methods: An Introduction to Qualitative and Quantitative Approaches*. Second Edition. London: Sage Publications Ltd.p.205
3. Chapanis A (1996). *Human factors in systems engineering*. New York; Wiley 332p.
4. The Labour Protection Law (2002) [online] LR Law ,Riga 2002. 20 Juny, Latvian Journal. Internet site Law.lv [ viewed 2017.4.May] . Available:<https://likumi.lv/doc.php>
5. The Labour and risks in Latvia 2012-2013, (2016).[online] Latvian Labour employer Confederation [viewed 2017 4 May]. Available: <http://www.iddk.lv/wp-content>
6. The Labour Law.(2002) [online]LR law, Riga 2001. 20 Juny, Latvian Journal, Internet site, Law Lv [viewed 2017 4 May], Available: <https://likumi.lv/doc.php>
7. The Process of Internal Monitoring of Working Environment (2007) [online] LR Cabinet Regulation 660.Riga 2007 5 October, Latvian Journal, Internet site Likumi.lv [viewed 2017 4 May], Available: <https://likumi.lv/doc.php>
8. Eglīte, M (2012) *The Labour Medicina*.Riga: Riga Stradins University.834 p.
9. Kalnina, L. (2012) *Modernize the labour relations*. Riga: Latvian Free Trade Union Confederation Publishing.
10. Kalkis, V. (2008) *The labour Environment Risk Assessment Methods, Guidelines, Risk Matrices, Examples, Advices and Softwares*. Riga: Latvian Education Fund. 242 p.
11. Keil, M., Amershi, B., Holmes, S., Jablonski, H., Luthi, E., Matoba, K., Plett, A., Unruh, K. (2007) *Diversity Management Training Handbook*. EU: International Society for Diversity Management.
12. Ministry of Welfare (2010). *Psychosocial environment*. Riga: Latvian Free Trade Union.
13. Ministry of Welfare (2016, March 14) *Psihoemocionālie riska faktori [Psycho-emotional risk factors]*. Retrieved from: [http://www.lm.gov.lv/upload/aktualitates/null/psihoemocionalie\\_raksts1.pdf](http://www.lm.gov.lv/upload/aktualitates/null/psihoemocionalie_raksts1.pdf)
14. Ozoliņa – Ozola, I. (2011) *Issues of Human Resource Management Effectiveness Measurement*. Economics and Business, 21, 67-75.
15. Riga Stradins University (2011) *Stress at work or psycho-emotional risk factors*. Riga: Riga Stradins University, Occupational Safety and Environmental Health Institute, 24.
16. Unpublished materials of the management company.
17. Wilson, J.R., Haines, H.M. (2001) *Participatory Ergonomics*. International Encyclopedia of Ergonomics and Human Factors. Publisher: Karwowski, pp 1282 -1286.

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## HIGH HAZARD OBJECTS EXPLOITATION IN RURAL REGIONS AND IDENTIFIED RISK MANAGEMENT PROBLEMS IN LATVIA

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**Abstract.** The deployment of potentially dangerous objects often results in criticism from urban dwellers around the world. Often these objects are not only in urban areas but also in rural areas. Accidents at such objects often lead to deteriorating living conditions, as well as to impossibility to use land and water resources, and uncontrollable environmental pollution. There are many different studies across the world in this area, but the situation in Latvia related to the management and prevention of technogenic risks has not been studied. The article considers particular qualities of high hazard objects' exploitation particular qualities in rural areas of Latvia. Management of technogenic risks is studied and assessed as an independent management system and its role is specified in the development of Latvian rural regions as well as the management risks are identified and possible harmful consequences for the inhabitants and environment. The present article reviews a situation how high hazard objects are exploited in Latvia, what management drawbacks are established and what are the possible solutions. The aim of the study is to show the link between the operational factors and environmental impacts of increased hazard sites, as well as to examine the management system, the prevention of existing hazards and to identify risks. The study results in the demonstration of identified situation and shortcomings in technogenic risk management system and their impact on the rural environment.

**Key words:** high hazard objects, environment protection, civil defence, disasters.

**JEL code:** R19, L89

### Introduction

The deployment of potentially dangerous objects often results in criticism from urban dwellers around the world. Often these objects are not only in urban areas but also in rural areas. Many of the consequences of the accidents, carried by many technogenic objects and, potential danger zones have long exceeded certain small regions; and accidents in Bhopale, Fukusima, Seveso have become synonymous for fear around the world. Accidents at such companies often lead to deteriorating living conditions, as well as to impossibility to use land and water resources, and uncontrollable environmental pollution. There are many different studies across the world in this area, but the situation in Latvia related to the management and prevention of technogenic risks has not been studied.

69 objects are located in the territory of Latvia where operations with hazardous chemicals are carried out in such a volume that these facilities fall within the European Parliament and Council Directive 2012/18/ES (04.07.2012.) on the management of high risks of accidents associated with hazardous substances. The industrial accident objects include 39 lower risk level objects and 30 higher risk level objects. All abovementioned objects are potentially dangerous and, upon coincidence of certain circumstances, an accident can occur at them threatening the neighbouring people, technologies and environment.

The aim of the study is to show the link between the operational factors and environmental impacts of increased hazard sites, as well as to examine the management system, the prevention of existing hazards and to identify risks. The study results in the demonstration of identified situation and shortcomings in technogenic risk management system and their impact on the rural environment.

The objectives are to examine existing data on the management of technogenic risks in the field of industrial security in Latvia and the EU; explore regulatory enactments governing industrial security from the point of view of the Latvian civil protection system; draw conclusions on the

shortcomings of the industrial security system and its effects on the rural environment in Latvia. Methods applied in the study are deduction and comparison methods. Through the deduction method, the authors will examine all the components of the legislation on industrial safety related to the management of emergency prevention in Latvia. The method of comparison will be used as proof of the existence of problems in managing risks and for comparison with the optimal situation

### **General**

Disaster risk reduction is a broad term which encompasses many human actions that either prevent or limit the devastating human, infrastructure, and financial impacts of disasters (Organisation..., 2011). In order to achieve the development and stability of agriculture, also in relation to a possible effect of disasters, in 2013 the Ministry of Agriculture of the Republic of Latvia and LLKC "Latvian Rural Advisory and Training Centre" have developed an important document for the development of the entire Latvian agriculture titled "Activities for the rural space long-term strategy, description of agricultural situation and analysis of the industry needs for the development of the Latvian Rural Development Plan 2014-2020". In accordance with this document, it has been identified that the agriculture is an important sector of Latvian national economy as well as provides the urban inhabitants with food supply and is the main maintainer and guardian of the environment quality (Activities, 2013). In this context, it is important to preserve Latvian agricultural lands against the technogenic threat and not deteriorate the environmental conditions, thus providing a possibility to preserve the quality of life and land resources for the next generations. In Latvia, the high hazard facilities (hereinafter referred to as HHF) that are engaged in storage, transportation or manufacture of hazardous and harmful substances are located not only in towns but also in rural regions, as well as the railway and motor-road infrastructure crosses all regions of Latvia.

The risk of possible accidents at HHFs, which could lead to a technogenic disaster and adverse consequences, can be not only in the vicinity of HHF but also at considerable distances, thus creating the environmental and social risk among the inhabitants who very often are not aware of potential threat and are not prepared to overcome the possible consequences with their own resources; Latvian farmers often lack money reserves and in case of pollution will not be able to eliminate the harmful consequences with own resources. Threat unawareness about the harmful consequences and possible scope thereof exists also on the level of governmental organizations that are responsible for the control of industrial risks and assessment of documents. The world practice gives evidences that preventing a threat is more efficient than coping with the consequences. Restoration is generally a costly undertaking, partly because it is often begun only after environmental degradation is well developed and is expensive to avert, but also because it is often labour and resource intensive. Furthermore, restoration often requires large investments upfront and has long lags before generating benefits (Crookes, 2013). Thus, at the national and local government level in Latvia, it is necessary to timely plan the protection measures and identify the possible risks in order to reach a stable development and growth of Latvian rural regions without spending great money resources for liquidation of consequences, which also is a time-consuming process. The technogenic risk management is an urgent problem all over the world and Latvia is not an exception. Efforts in the field of disaster and emergency management have shifted towards a focus on disaster risk reduction with the overall goal of increasing capacities in both rural and urban contexts (Cole, 2014). Imbalance in social awareness of ecological and technogenic

risks, which is currently evident in Latvia and already for a long time being the reason for doubts and nonunderstanding among people who are responsible for the management of such risks, has led to the studies of the risk perception.

Previous studies on the relation between real and perceived risks were analysed by the challenge response model. It was hypothesized that people are concerned about environmental hazards because they need to cope with "out there" yet objectively identifiable problems (Inglehart, 1995). In Latvia in 2015, the Ministry of Environment and Regional Development carried out the study "Assessment of disaster possibility and effect risks in environment" that demonstrated well that considerable problems exist in the country with the risk assessment and action algorithms, which creates disagreements in risk management between the state institutions, local governments and enterprises. Also the time went by since the assessment and necessary amendments were made in some regulatory enactments, the lasting entropy and large stock of issued regulations have resulted in fact that all necessary measures are taken, which is explained also by the failure to develop a unified risk assessment methodology that would allow to work out a unique approach to the branch risk assessment. Risk analysis methods, along with post-construction standards currently being developed, are evolving tools aimed at helping companies maintain plants better and save money (Degaspariy, 2002).

According to previous studies in Europe, the industrial risk management is based on the identification of possible threats. The objective is the restriction, guard and safety with technical, human and financial resources of the organization. Enterprises where a high risk of accidents exists are subject to the administrative duty to carry out own labour risk assessment for any hazardous material used, manufactured or stored; however, there is no unified methodology in Latvia for risk evaluation and thus the enterprises themselves can decide what risk assessment system will be used and what results will be required. Legal regulation of these systems in Latvia is generally controlled by the State Environmental Supervision Bureau, the State Environmental Service and the State Fire and Rescue Service as a part of the civil defence system (hereinafter referred to as CD). In order to understand how this system is functioning, in the next section the authors will analyse in detail the general industrial safety mechanism in Latvia and will identify the drawbacks in the risk management. Studies carried out within more than thirty years provide few strategies for the management of environmental threats. Various authors identify contradictory risk management concepts, realistic ones that explain the risk as a physical reality existing regardless of our knowledge about it, and those explaining the risk as a social structure with an emphasis on the contrast risk assessment and social quality (Vandermoere, 2008).

### **Safety of industrial facilities as part of civil defence**

Industrial safety is a state of protection of vital interests of the society and the lives of employees against accidents and their consequences in hazardous production facilities. In turn, labour protection, electrical safety, and fire safety are part of the industrial safety.

In each company, one of the main tasks is to identify potential hazards, sources of risks (internal ones that may occur in the company itself and external ones that exist irrespective of the operation of the facility), plan and take measures to prevent or minimize risks to employees, damage to property and the environment. It is important for the people of each facility and surrounding areas to be aware of the danger they are exposed to. They need to understand where there is a danger that can be detrimental to them, what is the real state of affairs, how to protect

themselves against the effects of harmful and dangerous environments. A threat according the European Commission Staff Working Paper is a dangerous phenomenon, substance, human activity or circumstance that can lead to loss of life, injury or other damage to health, damage to property, loss of livelihood and services, social and economic destabilization, or damage to the environment (Riska..., 2010).

In order to better manage the State of Exception (hereinafter referred to as SE) in any company, it is necessary to develop the ES management plans, including the maximum possible number of threats and the operational algorithms.

One of the main tasks in any company is to provide a safe working environment for its employees, but along with normal situations at work dangerous situations can be created threatening all employees of the facility or, in some cases, the inhabitants outside the facility. Dangerous condition of a facility is a state that does not turn into breakdowns or into an extremely dangerous condition provided the servicing personnel is acting in a modern and proper manner (Smidre, 2008).

In accordance with laws and requirements of the CM regulations, each high hazard facility (hereinafter referred to as the HHF) shall develop the CD Plan of the facility, the Safety Review (hereinafter referred to as the SR) or the Accident Risk Prevention Programme (hereinafter referred to as the ARPP), depending on the amount of hazardous substances in the facility. In accordance with Article 15 of the CAKPL, local governments shall publish on their Internet homepage the HHF CD Plan and shall ensure that it is actual. The SFRS shall develop the HHF – Out-of-facility CD plans where measures and resources are provided for, which are necessary to overcome possible breakdown or accident of which consequences can spread beyond the territory of the Facility. For each HHF existing in Riga, the SFRS has developed the CD plans of the facility, which are a component part of Riga CD Plan. There in total 18 HHFs of regional and national level in Riga, which have developed the CD plans, SR or ARPP in accordance with the CM Regulation No. 131 of 01.03.2016. "Industrial accidents risk assessment procedure and risk reduction measures" (hereinafter referred to as the CM 131), this regulation providing also for the systematic control of the facilities and requirements necessary for execution by management of the Facilities in order not to allow the emergency situation as well as to mitigate possible adverse consequences.

According to explanation given in the book "Labour Safety", the SE is divided into: threat of SE, partial SE, general SE, evacuation. Threat of SE: such situation can be neutralized by means that are provided for firefighting and with help of personnel present at the place of accident. Partial SE: it cannot be liquidated as easy as the previous one since personnel present at the place of accident will need help of a qualified team that is better prepared and has at its disposal more means to cope with fire and emergency circumstances. General SE: its size exceeds the possibilities of human resources and materials at their disposal in coping with fire and emergency circumstances. It disturbs the everyday working rhythm of the enterprise and it is necessary to call for help from outside. Evacuation: SE when it is necessary to partly or fully remove the personnel from the enterprise premises or territory, consistently and under control (Darba..., 2010).

In order to reduce the occurrence of SE at the facility, the Labour Protection (hereinafter referred to as LP) Law establishes the responsibilities for the employers to care of their employees, forming the rapid response teams, including therein the trained employees, upon threat of emergency or occurrence of the SE. Article 12 "First aid and other emergency measures" of the LS Law establishes as follows:



(1) The Employer at the enterprise shall provide measures necessary for rendering first aid, confinement or liquidation of dangerous consequences of equipment breakdown, firefighting, evacuation of employees and other persons.

(2) The Employer:

- 1) shall ensure the communication with external services, particularly with service providing emergency medical aid and carries out firefighting and rescue works;
- 2) shall appoint employees trained in first aid, performance of firefighting and personnel evacuation measures, and shall ensure that these employees are in a sufficient number, respectively instructed and provided with necessary equipment (Darba..., 2001).

In accordance with the above, the employer, regardless of whether the enterprise is or is not referred to the HHF, shall be liable to meet the requirements of the LS Law and appoint the personnel, purchase the respective equipment as well as to carry out training of the personnel in case of the SE. If threat of the SE at work is not eliminated in full, then the employer shall be barred from demanding the employees to resume work if all measures have not been taken to prevent the threat and ensure safe work.

When developing the SE action plans, the HHF management has all possibilities to reduce the possible risk at workplaces and damages to the enterprise, which are caused by adverse consequences. These adverse consequences for the enterprise can be both economic and public when information is spread in media, which causes a wide response in the society. But in general, all adverse consequences will result in the reduced volume of manufactured products, which can lead to a bankruptcy.

Thus, carrying out the SE probability analysis, the HHF management can timely develop all necessary instructions, acquaint with them the personnel, appoint employees for performance of actions to cope with the accident, thus reducing the risk and probability of occurrence of adverse consequences. It is worldwide recognized that in combat with the SE the best device is the performance of preventive measures at the enterprise, which minimize all kinds of damages.

In order to reduce the probability of the SE occurrence, a job instruction with description of employee's responsibilities and main tasks should be developed for each position in which the employees work. Thus the job description will help the employee to understand the general situation and the complexity of the contracted work, and so to evaluate whether (s)he will be able to carry out the responsibilities.

The most widespread SE that can occur at the enterprise is fire. In order to prevent fire break-out, various safety measures should be taken.

With the objective to reduce the fire threat to the enterprise and employees, the CM Regulation No. 238 of 19.04.2016 "Fire safety regulations" is issued establishing the liability to develop a fire safety instruction including the information on actions in case of fire. Article 175 of the fire safety regulation specifies that the responsible person shall ensure the development of the fire safety instruction for an economic activity facility or a public facility (except undeveloped territory and territory where construction is not carried out). The fire safety instruction is a complex of fire safety requirements meeting the designated use of the economic activity facility or the public facility. The enterprise shall be required to develop the instruction if the facility meets article 192 of the fire safety regulation, which provides for the economic activity facility or the public facility where more than 50 people can be present at the same time. Responsible person of a critical infrastructure facility not rarer than once a year shall arrange practical studies in accordance with

the fire safety instruction section "Actions in case of fire". In addition to the abovementioned, the employer shall be liable to develop also the evacuation plans and place them in the enterprise premises. The evacuation plan means visually executed unambiguous instructions how a natural person should act in case of fire, breakdown or dangerous situation and how possibly faster get to a safe location (Ministru..., 2016).

Based on the abovementioned, it shall be concluded that 100 % of enterprise should have the fire safety instructions while the evacuation plans shall only be developed in cases when the enterprise meets criteria specified in article 192 of the fire safety regulation.

With the objective not to allow the fire break-out at the enterprise and reduce the possibilities of injuries to the employees, the CM Regulation No. 209 of 12.04.2016 were adopted: "Equipment electrical safety regulations" providing and establishing the essential requirements for electrical equipment and the mechanism for supervision of their observance as well as the procedure of marker supervision. Observance of this regulation can considerably reduce the possible risks for the enterprise and employees.

If the enterprise is a HHF, then it shall develop the ARPP as well as the CD plan, which also make up the biggest part of materials proving the expediency of the industrial safety measures at the enterprise.

Currently, at all enterprises that are not the HHF, in order to anticipate the possible threats, identify the risk sources and coordinate actions in case of breakdown or disaster as well as to plan and take other preventive, preparatory, response and consequence liquidation measures, the CD plan should be worked out in accordance with the CM Regulation No. 658 of 7 November 2017 "Regulations on the structure of civil defence plans and information to be therein included". CAKPL, being in force since 1 October 2016, provides to ease the administrative burden on the entrepreneurs and specifies that the CD plan shall only be developed by the HHFs. In this situation, the fuel filling stations (hereinafter referred to as the FFS) and gas filling stations (hereinafter referred to as the GFS), which are important facilities of national economy, lose their significance within the framework of the CD system since in case of threat the owner does not provide a special action algorithm as well as the general NS system safety, see Figure 1.

The CD plan should necessarily have therewith enclosed the annex "Plan of action in case a substance or object of unknown origin is found". This plan provides for action by employees if a substance of unknown origin is found, or suspicious or explosive object is found, suspicious postal item is received (unopened, damaged, partly opened), which arouses reasonable suspicions of presence therein of unknown origin substance, suspicious or explosive objects, known fact pointing to the threat of explosion or terrorism, information is received about possible release of hazardous substance.

In addition to the abovementioned documents, the enterprise management shall have the right to conclude cooperation agreements on mutual assistance and overcoming the SE with other enterprises, thus reducing the adverse consequences, for example, in cases of sanitation.

Within the CD plan, DR and ARPP, the employees should be provided with the possibility to receive all information necessary to prepare for overcoming any SE at the enterprise by respective efforts and resources.

The safety assurance system includes also systems specially established with the objective not to allow the SE occurrence or to minimize adverse consequences, which could be automatic fire-extinguishing systems, collective protection means. The collective protection means include: fire-

extinguishing systems, alarm and warning systems, damaged process shutdown systems, monitoring systems.

The firefighting system today is a combination of complex engineering measures that can ensure the fire safety of a building and industrial facility and technical equipment combined into systems for rapid detection and eradication of fire. Such fire safety assurance means include fire alarm systems, smoke prevention systems and fire extinguishing systems. The fire-fighting system helps to ensure fire safety of the facility and eliminate the possibility of uncontrolled fire occurrence. Automatic fire extinguishing systems detect fire in a timely manner and eliminate the fire in its early stages of development. They work automatically upon receiving a signal of fire in the protected area. There is a wide range of fire detection systems that employers can choose themselves depending on the characteristics and security class of the enterprise.

Alarm and warning systems are important when an enterprise faces a dangerous situation and it is necessary to notify its employees and visitors, therefore the importance of this system is extremely high. The warning system is mostly used jointly with the fire detection and alarm system because it is possible to efficiently evacuate people through voice announcements.

Damaged process shutdown systems are important at enterprises where production processes take place, the system follows the ongoing processes and, if necessary, automatically shuts them down thus preventing the occurrence of the SE.

Monitoring systems allow the operator to follow the situation, remotely and if necessary to shut down the work processes. It can be done by video surveillance cameras, detectors etc.

In the present study, the authors have examined the CD plans of 19 Riga HHFs and have found out that the approach to the industrial safety measures depended on position of the facility management and available financing. Educational level and responsibility factors differ as well, depending on the following aspects: preparation of documents and actual situation at the facility. Often the facility administration's position in relation to the safety system management and quality of documents is formal. And namely, information that is reviewed in the CD plan does not coincide with information delivered in the SR or ARPP since persons responsible for the safety measures interpret the CM regulations in a different way, as a result of which it leads to a chaotic organization of the industrial safety at the facility. Each document itself may be developed in full volume and in accordance with the effective legislation; however, analysing the common parallels and comparing the safety measures at the facility, it was established that the production facilities are often featured by a chaotic approach and lack of communication between structural units. One of entropy formation factors is also enterprises providing services on contractual basis only within a narrow specificity, for example, on LP or only on firefighting, thus situations occur when the facility documents have been developed by several competent institutions but there is no common connection between the documentation and fulfilment of measures at the facility. Checking each component of the system individually, members of the State Environment Service inspection commission formed at a HHF only look at their sphere, for example, labour protection or fire safety.

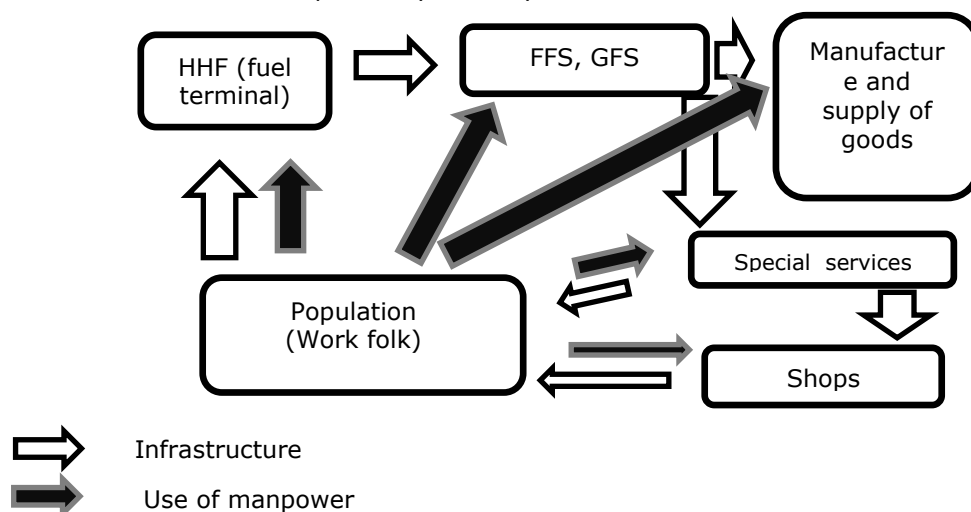
The inspecting institutions have possibility to make sure of the complex of measures only from the CD plan, SR or ARPP, which are voluminous documents and serve as a summary of all HHF safety documents. It can be stated that the State Environment Supervision Bureau (hereinafter referred to as VPVB), examining the SR or the ARPP or HHFs, establishes very many deficiencies in the safety system, which should be eliminated by the HHFs, thus evidencing a situation when the facility management has no responsibility for the correctness of submitted documents and for the

possibility to fulfill the complex of safety measures. VPVB serves as a school teacher who checks the work of a bad pupil who is not responsible for correctness and accuracy of own work. The problem situation is also deteriorated since VPVB, assessing the SR or ARPP of enterprises, prescribes a period of several years for elimination of drawbacks while HHFs take advantage of this situation and do not eliminate the drawbacks as long as possible but postpone until the last moment.

Importance of the HHF CD plan in the context of documents is minimal and it briefly repeats information available in the SR or ARPP, this situation became possible since the CD plan is developed based on the CM Regulation No. 131 issued in accordance with the Chemicals Law, which is not an efficient measure of the facility protection in the context of the ML, ASIS and NS law. Protective content of the CD is fully ignored while it is an efficient complex of measures protecting the facility against external hazard sources. Usually the section "external threats" is developed formally and does not provide for whatever complex of actual measures in activity of the facility in order to efficiently reduce the threat to the facility infrastructure and not allow the occurrence of emergency situation (such as masking measures). At present time, the HHFs limit themselves to the closing measures, which from the standpoint of the CD system is not a correct way out of the possible risk threat situation and provision of national economy with raw materials. Closing large oil storage HHFs means a chain reaction in activity of all nation economy sectors, for example, fuel supply is an important function in population evacuation, food supply and operation of special services.

HHF safety and action algorithm development from the standpoint of the CD system measures efficiency is an integral part of the NS system, but at present time this issue of the CD system is developed very poorly and the planned closing measures are inefficient, which means unassured stability of national economy.

Regularities of the CD systems from the standpoint of the SE probability and the system stability are shown on Figure 1. The illustrated situation at minimal level demonstrates the importance of mutual functional dependency of many structures.



Source: author's work

Fig. 1. Minimal national stability (within CD system)

Within the system stability, it is important to retain each involved element but the most important function is with the basic enterprises, on which the existence of other institutions and inhabitants depends, therefore the most part of HHFs working in order to provide local market with

source materials are important objects of national economy, which must be preserved and functioning of which must be ensured in cases of threat. National CD system should be provided with a complex approach on the part of the entire society since liquidation of one element causes problems in other ones.

## Conclusions

- 1) The management system, regulatory enactments regarding the safety of the functioning of dangerous industrial enterprises in Latvia, system of control from the supervisory institutions and shortcomings contained in the risk management system have been examined.
- 2) Latvian agriculture development and environment preservation are closely connected with the HHF safety system and measures carried out to reduce the possible accident risk.
- 3) In general, HHF stability depends on both the quality of regulatory enactments issued by the governmental institutions and the approach of the enterprises to the safety solutions. Development of Latvian agriculture is closely associated with the HHF safety measures and realizable risk identification policy.
- 4) More institutions are established in Latvia, which carry out complex HHF inspections, but each institution only reviews the safety measures within its competence, which results in an observable situation with empty sectors when a general picture of the safety system and adequate risk assessment are not developed.
- 5) HHF safety is closely associated with the functioning of Latvian civil defence system that ensures the protection of inhabitants in case of accident or disaster.
- 6) Environmental impacts may be catastrophic in the event of an accident; thus, the management of high-risk companies is obliged to comply with the requirements of national supervisory authorities, which not always occurs.
- 7) The correlation between the quality of the documents to be developed and the safety of an increased hazard company directly affects the company's ability to prevent and identify harmful environmental consequences. There is a possibility of reducing potential technological risks and potential impacts on the rural environment, which often depends on the quality of the inspections carried out by the supervisory authorities and the necessary measures taken by the managers of high-risk enterprises.

## Bibliography

1. Aktivitates lauku telpas ilgtermiņa stratēģijai Lauksaimniecības situācijas apraksts un nozares vajadzību analīze Latvijas Lauku attīstības plāna 2014.-2020. gadam izstrādei. (*Activities for the long-term strategy for the rural area of agriculture and analysis of the needs of the industry for the development of the Latvian Rural Development Plan 2014-2020*) (2013). pp. 4.
2. Cole, J.M., Murphy, B.L. (2014). Rural Hazard Risk Communication and Public Education: Strategic and Tactical Best Practices. *International Journal of Disaster Risk Reduction*. Volume 10, Part A. pp. 292-304.
3. Crookes D.J., Blignaut, J.N., M.P. de Wit, Eslerd, K.J., Le Maitre, D.C., Milton, S.J., Mitchell, S.A., Cloete, J., De Abreu., P, Fourie (nee Vlok), H., Gull, K., Marx, D., Mugido, W., Ndhlovu, T., Nowell, M., Pauw M., Rebelo, A. (2013). *Journal of Environmental Management*, Volume 120, pp. 138-147.
4. Darba aizsardzības likums. (Labour Protection Law) (2001)// "Latvijas Vestnesis", 105 (2492).
5. Darba drošība. (Occupational Safety) (2010). Rīga: LR Labklājības ministrijas izdevums. pp. 271.
6. Degaspary, J. (2002). Risky Business: Practitioners Say That the Techniques for Managing Industrial Risk Also Protect the Bottom Line. (Feature Focus: Plant Safety) *Mechanical Engineering-CIM*. Volume 124(7), pp. 42-43
7. Inglehart, R. (1995). Public Support for Environmental Protection: Objective Problems and Subjective Values in 43 Societies. *Political Science and Politics*, 28(1), pp. 57-72.
8. Ministru kabineta noteikumi Nr. 238 "Ugunsdrošības noteikumi" (Ministry Cabinet Regulations Nr.238 "Fire Safety Regulations") (2016). // "Latvijas Vestnesis", 78 (5650).

9. Organisation for Economic Co-Operation and Development, Risk Awareness, Capital Markets and Catastrophic Risk. (2011) Policy Brief Policy Issues in Insurance No. 14. Retrieved from (<http://dx.doi.org/resursi.rtu.lv/10.1787/9789264046603-en>) . Access: 20.10.2016.
10. Riska novertesanas vadlinijas katastrofu parvaldībai. (*Risk assessment guidelines for disaster management*) (2010). Brisele: *Komisijas dienestu darba dokumenti*. pp. 8.
11. Smidre, P., Jemeljanovs, A., Ievins, J., (2008). *Vides aizsardzība no tehnogēno avariju un katastrofu ģenerētajiem piesārņojumiem. (Environmental protection from technology-generated pollution and disaster-generated pollution)* pp. 42.
12. Vandermoere, F. (2008). Hazard Perception, Risk Perception and Need for Decontamination by Resident Exposed to Soil Pollution: The Role of Sustainability and the Limits of Expert Knowledge. *Risk Analysis*. Volume 28(2), pp. 387-398.

## SMALL AGRICULTURAL FARMS IN LATVIA AND BALTIC SEA COUNTRIES AND THEIR POSSIBILITIES

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**Abstract.** The study was conducted with a purpose to find out importance, development and its opportunities of the small agricultural farms in Latvia, taking into account the situation also in other countries of the Baltic Sea. Topicality of the paper is related to a large share of the small agricultural farms in the structure of the agricultural farms, and their very significant impact on the socio-economic situation in the rural areas. The economic activity of the small agricultural farms at the same time in general is low, and their potential (land, workforce, manufacturing resources) is not sufficiently used. Many small farms discontinue their operation, and only a relatively small portion of them become larger.

The paper contains a scientific discussion regarding a socio-economic importance of the small agricultural farms in the rural community, especially in the facilitation of its sustainability. Also it includes results of some surveys conducted in Latvian small farms and analyse of farm structural data. It shows that the small agricultural farms exist also in the EU-15 Member States, and they can operate along with the large farms. The study results show that it is not correct to assess only the economic aspects of these farms separately from the social and environmental aspects. Several niches exist where such farms can successfully operate. These are not the mass products, but rather the products with high value added. For the small farms to be able to create competitive manufacturing, a purposeful investment support suitable for these farms is extremely necessary.

**Key words:** agriculture, small farms, structure, development.

**JEL code:** O13, Q18

### Introduction

A proportion of the small agricultural farms in Latvia is one of the largest in the EU with a very significant impact on the socio-economic situation in the rural areas, especially on the territories far from the development centres. The economic activity of these agricultural farms in general is, however, low, and their potential (land, workforce, manufacturing resources) are not being sufficiently used. Changes in the structure of the agricultural farms of Latvia take place slowly, and they are mostly related to termination of operation of the small agricultural farms but significantly less to their development. This thematic study is therefore conducted with a purpose to reveal the current situation of the small agricultural farms (hereinafter - the small farms or SF) and their development possibilities in Latvia. The situation of SF in other Baltic Sea countries also is analysed. The hypothesis set for this study is that the operation of the small farms under certain conditions can be successful and sustainable.

The following tasks were therefore established for the study:

- general characteristics of the small farms and their role in ensuring sustainable operation;
- study the structure and development trends of the small farms in Latvia and selected EU Member States;
- assessment of the prospective directions of development of these farms.

The following materials were used in the study: scientific literature, including the study results, various level (international, EU and Latvian) strategic and programmatic documents; Eurostat and Farm accountancy data network (FADN) database data; survey data conducted in Latvian small farms at 2017. Since the farm structural survey is conducted once in 3 years, the latest available data regarding the structure of the farms in the EU Member States is for the year 2013. They, however, sufficiently reveal the trends, therefore may be used in this study.

Qualitative and quantitative economic research methods: analysis and synthesis; comparative analysis, logically and abstractly constructive methods were used in the study, performing analysis of various scientific publications, laws and regulations, documents, programmes and information sources. Also survey method is used in the study, using results of two surveys where Latvian small farms are surveyed. One of these surveys was carried out by Institute of Agrarian resources and Economics to assess changes in economic data of farms between 2014 and 2016 (340 valid responses in SF sector), and second was carried out by Latvian Rural Advisory and Training Centre to reveal main problems and development possibilities of small farms (134 responses in SF sector). To compare Latvian data with another countries, seven countries around the Baltic sea are chosen (Lithuania, Poland, Germany, Denmark, Sweden, Finland and Estonia).

Novelty of the paper is linking of the context of economic and rural development (sustainability) of the small farms and recommendations which are taking into account both economic and socio-environmental aspects of small farms. The matters discussed due to limited size of the paper are analysed to the extent permitted by the size of the publication; only the main indications are therefore discussed in the paper.

The structure of the farms is being analysed, using division of the farms based on their economic size, where the criterion applied is a standard output (SO) used in the database of the Eurostat EU Member State surveys on the structure of agricultural farms. Taking into account the purpose of the paper and the actual structure of the farms in Latvia, the farms with SO value up to EUR 25.000 are considered as small for the purpose of this study.

## **Research results and discussion**

### **1. Small farms - different functions**

A role of the small farms (SF) in the agricultural and rural development contexts has not been fully assessed. The understanding of effectiveness and produce value dominating for decades in the economy did not take into account an impact of sustainability of the rural activity and multi-functionality. Agricultural manufacturing - business - was separated from the cultural context of the rural development, place and communities. The current research and political approaches allow assuming that the role of the SF changes (What is ..., 2011; Davidova & Thomson, 2013; De Castro et al., 2014 etc.)

Quantitative assessment methods have not yet been designed, unified and broadly accepted to precisely establish a contribution of the SF in creation of public benefit, provision of environmental services and rural development. A new definition for the small farms which would incorporate not only the regulatory approach but also the components of public benefit is currently being searched for (Gioia, 2017).

Studies and political documents accept the decisive SF role in the context of further rural development (Kern, 2015; Agricultural and Rural Convention, 2010; ESPON & MCRIT, 2014; FAO, 2014; Ishii-Eiteman, 2009). The main contexts in which the role of SF is being assessed are concepts of sustainability and multi-functionality (Meike, 2017; Tisenkopfs et al, 2015; OECD, 2015; Ambrosio-Albala, M., Bastiaensen, J, 2010; Molders, 2014; Novikova, 2014), which are manifesting as a reduction of poverty and facilitation of employment, creation of attractive rural landscape, as well as density of rural population and development of communities/places (European Parliament, 2013; OECD, 2017).



Sustainable rural economic activity includes a satisfaction of need for food, raw materials and fuel, by improving quality of environment and resource base, ensuring economic viability of agriculture, life quality of the rural population (Toward..., 2010), which are the most important points of the road map of agriculture in the 21st century.

The dominating philosophy in the world is the industrial one, where agriculture is just another type of business, and the opposite to it - the agrarian philosophy (multi-functional) where the agriculture has social functions and has perceived as a part of the rural community (Thompson, 2010). This is reflected in various policies -the State-supported agriculture or the protectionism approach; the agriculture based on competition following the market liberation, and the EU dominating multi-functional agriculture combing the manufacturing of tradable goods and creation of non-tradable goods. The EU CAP is characterized by conglomerate of various agricultural understandings, which makes it more difficult to implement the policy (Molders, 2014).

Sustainability may be achieved by various forms of farming, but the studies recognize that small farms (compared to the large farms) are more beneficial for reaching the social goals of the community (Meike, 2017). It is determined by both the politics, dominating farming forms and also by the knowledge. A significant factor stimulating change of attitude toward traditional and environmentally-friendly manufacturing methods is a change of the buyers' habits where the ethical side of the manufacturing becomes important (Pollan, 2006).

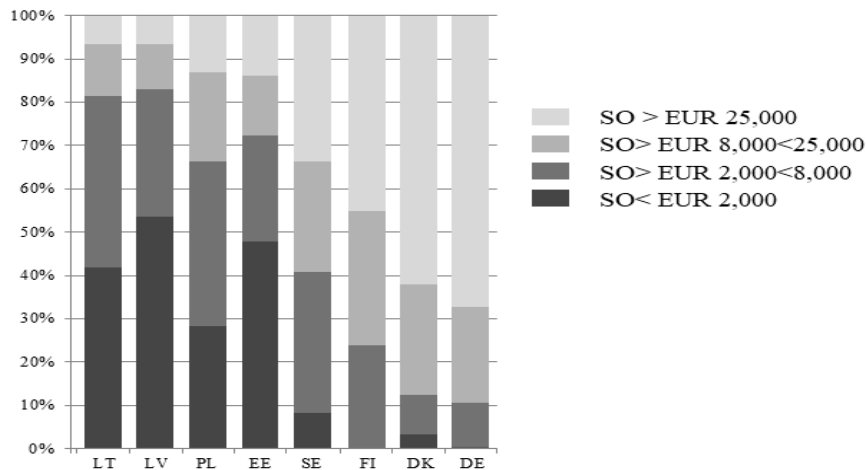
SF play own different role as a part of rural development in contexts of multi-functionality, externalities, local community preserving uniqueness and potential of place- based innovate development. This part includes: text, tables, figures, formulae with references, data source references, evaluation of validity for calculations. This part may be divided in balanced sub-parts.

## **2. Farm structure and tendencies**

Taking into consideration heterogeneity of the agricultural systems, historical heritage, as well as demographic situation and geographic conditions in various countries, idea of a small farm is different. It is affected by the criteria selected for the definition, as well as the goals of various institutions forming the definition, assigning to it a political meaning. The small farmers are not homogeneous; they have different experience and interests, as they contain the farmers well integrated in the market, as well as the poor farmers (Davidova & Thomson, 2014; Gioia, 2017).

Talking about the small farms, various terms are used, for example, family farm, agro-ecological farm, natural farm and agricultural farm. Each of these definitions places an emphasis on various aspects of this agricultural system, namely, physical (area) or economic value (SO) - small farm; its main source of workforce - family farm; - main manufacturing method - traditional, organic or agro-ecological; involvement degree in the market - self-consumption, partially natural or involvement in the market (manufacturing of goods) (Gioia, 2017).

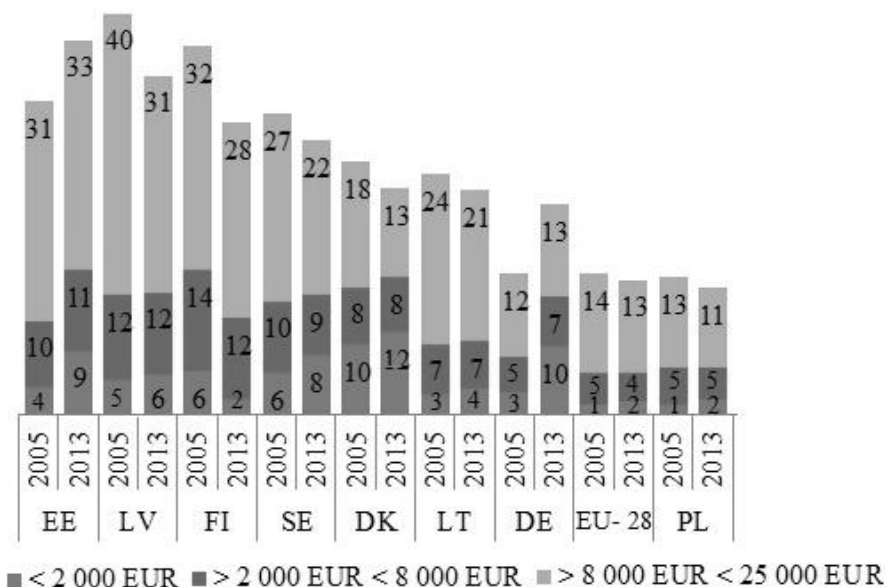
A total of 10.8 million farms are recorded in the EU-27 (not including Croatia). A number of these farms relatively rapidly reduced in the entire EU: since 2005 the reduction speed is by 3.7 % per year. Reduction of the farms in Latvia (by 5.5 % per year) is more rapid than in average in the EU. The structure of the farm size in various member states is significantly different (Figure 1). Latvia and Lithuania have the largest share of small farms among Baltic Sea countries. Among all EU Member States, Latvia has the fourth largest proportion of such farms (83 %).



Source: author's calculations based on Eurostat data

Fig. 1. Distribution of farms in the standard output (SO) groups in the selected EU Member States in 2013 (% of total)

Approximately one third of the Member States in general has a balanced structure of farms - a large proportion in them is formed by the large, medium and small farms, but it has an insignificant number of very small farms (less than 2 thou EUR of SO). Among Baltic Sea countries, these are Sweden and Finland. From the point of view of the well-balanced development, such structure could be considered as optimum one, as it includes both highly productive farms producing goods for the market, and also the lifestyle farms also manufacturing and earning income even though in a smaller amount. The farms where the production is insignificant or does not take place at all almost do not exist in these countries.



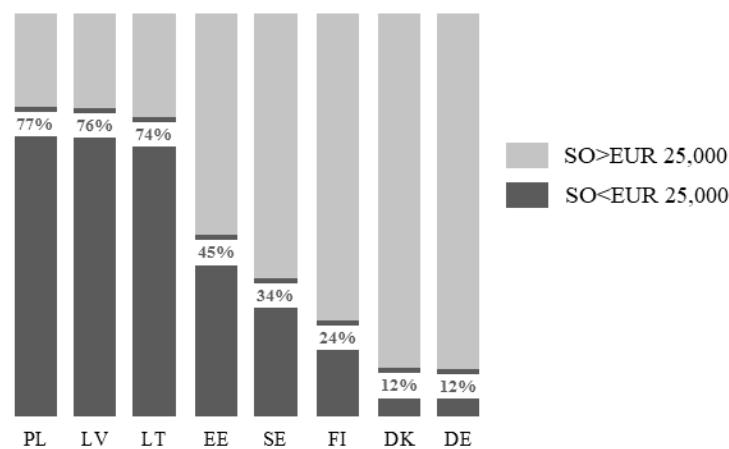
Source: author's calculations based on Eurostat data

Fig. 2. Average UAA in SF groups in Latvia and other Baltic Sea States, ha

The economically large farms not always mean that they are large in area. Average Usable Agricultural Areas (UAA) in each of the viewed farm size groups in Latvia and other EU Member States are summarized in Figure 2. The figure shows that the land areas managed by SF in Latvia are among the largest in the EU Member States. In the group of Latvian farms with SO less than 2 thou EUR, they in average manage 6 ha of UAA, which is the fourth largest indicator among the

analysed EU Member States. The largest average UAA area is in Denmark, Germany, Estonia and Sweden. In the group of farms with SO between 2 and 8 thou EUR, they in average manage 12 ha of UAA, which is a shared highest indicator with Finland. In all other countries, the relevant areas are smaller. The farms with SO between 8 and 25 thou EUR in Latvia, on the other hand, have the second largest average UAA area after Estonia (31 ha). Average UAA area per one farm affects the potential development opportunities and directions.

SF plays the greatest role in the employment context (Figure 3). In this sense, countries expressly divide into two groups - one contains the majority of the new member states, where the proportion of these farms in the agricultural employment is above 70 % in terms of Annual Work Units (AWU). It includes also Latvia with 76 % which is similar to a range of other EU countries (among Baltic Sea countries these are Lithuania and Poland).



Source: author's calculations based on Eurostat data

Fig. 3. Share of the employment in small farms (SO < EUR 25.000) in the total agricultural employment in the selected countries (in AWU, 2013)

The general description of the respondent farms obtained from the survey data is as follows: the agricultural farms are maintained because the operation in them is either a lifestyle or the main source of income. Maintaining or increase of the manufacturing volume is planned within the next three years. The implementation of these plans is mostly limited by uncertainties about future in general, as well as lack of the manufacturing and financial resources.

Analysis of the survey results allows distinguishing a range of priorities to become a growing agricultural farm in the respondents' opinion: the payments for the existing area must be maintained, long-term investments must be supported, funds must be granted for acquisition, expansion of land, tax discounts and loans must be granted.

Even though current support to the small agricultural farms, especially in terms of investments, is considered as insufficient (Veveris & Sapolaite, 2017), the EU policy documents, however, increasingly appreciate importance of the small agricultural farms and express a need to provide a special support to these farms. The Resolution of the European Parliament 2013/2096 (INI) regarding the future of small agricultural farms adopted at the beginning of 2014 is the first document of such importance attesting to directing of the support policy toward facilitation of solutions and development models appropriate for the needs of small and family agricultural farms. It invites the Member States and the European Commission to take appropriate measures in the scope of the new Common Agricultural Policy (2014-2020), as well as prepare the guidelines for the period after 2020, by additionally attracting also other EU policy directions to resolving the

problems of the small agricultural farms, considering also additional State support. Attention is paid also to the fact that an effective way needs to be found to ensure support also to the small manufacturers of agricultural products, the operation and the products manufactured of what are not related to the title to the agricultural land and/or the use of this land (European Parliament, 2013).

### **3. Prospective directions of development**

The results of the performed study show that even though the small farms in their operation face many difficulties, and their number reduces, their importance is still significantly great. Moreover, a contribution of the small farms in maintaining environmentally-friendly, local community-oriented manufacturing and preserving of local traditions on the EU scale is being increasingly appreciated. It allows concluding that the small and large farms are not interchangeable - they to a great extent have their own different niche. Well-balanced structure of farms where the farms of various size, specialization and market orientation are operating may be rated as one of the preconditions for the full-fledged rural development.

SF output, as well as created value added per one person employed in Latvia is one of the lowest in the entire EU (according to FADN data). It means that these farms have an opportunity to increase income, not only becoming larger in terms of manufacturing volume, but also by operating in the existing volume, but by increasing economic activity.

The analysis performed during the preparation of the paper allows concluding that the main reason for the insignificant income of the small farms in Latvia is the low value of the obtained output. It means that the following principal directions are necessary to increase income:

- to produce more in physical sense;
- to produce with higher value added;
- to reduce use of resources' per produced unit.

All these directions have a significant potential in the conditions of Latvia. This is evidenced by the survey results regarding the provisional impact of the Latvian Rural Development Programme 2014-2020. It shows that the economic activity in the agricultural farms which have received investment support has significantly improved compared to the agricultural farms not receiving any support. In the context of increase, the greatest impact is on the changes to the total value of the produce (increase of 51 % from the support recipients, and only 20 % from the non-recipients), value of the long-term investments (51 % and 21 %, respectfully), proportion of the products sold to the products produced (31 % to 15 %), to the number of the groups of produced agricultural products (30 % to 11 %).

A direction focused on creation of additional value added to the already existing products is considered as prospective. It includes both direct supply chains and processing of goods, thus even more increasing its sales price. At this stage, cooperation plays a major role, when the raw materials to the relevant farm (artisans) engaged in the processing are supplied by various farms.

Saving of the application of resources is usually related to the latest technologies. Significant investments in the small farms were not made during the previous period of Latvian Rural Development Programme. It means that investments in new technologies are required for raising efficiency. Lack of fixed assets during this time has become even more pronounced and significantly delays the operation of the farm. Since the resources of the farms in majority of cases are very limited, the investment support available to SF is very important in this regard.

## Conclusions, proposals, recommendations

- 1) A change of paradigm is taking place in the studies and on the policy level of Europe, recognizing that the importance of SMF in the formation of the rural space is broader than considered so far on the basis of narrow economic criteria. It is therefore important in the formation of further policy to take into consideration also a contribution of these farms in such areas as sustainable farming, reduction of poverty and facilitation of employment, formation of attractive rural landscape, as well as density of population of the rural areas and development of communities/ areas.
- 3) A proportion of the small farms in Latvia is one of the largest in the EU, and they play a great role in employment and formation of socio economic environment in the rural areas. They therefore need a special policy with a purpose to stimulate their development and conservation.
- 4) In order to increase income of the small farms, it is important to activate in them a production process, especially facilitating production of products with a high value added. Targeted investments are necessary for this purpose.
- 5) Since the area payments currently play the most important role in ensuring the income of the small farms, transfer to the more target-oriented investment support measures in case of SF must be well-considered and gradual, taking into account also the public benefit provided by small farms.

## Bibliography

1. Agricultural and Rural Convention. (2010). A Communication from Civil Society to the European Union Institutions on the future Agricultural and Rural Policy. ARC-2020.
2. Ambrosio-Albala, M., Bastiaensen, J. (2010). The New Territorial Paradigm of Rural Development: Theoretical foundations from systems and institutional theories. Discussion Paper 02. Institute of Development Policy and Management. University of Antwerp.
3. Davidova, S., & Thomson, K. (2013). Family Farming: a Europe and Central Asia Perspective. Background Report for Regional Dialogue on Family Farming: Working Towards a Strategic Approach to Promote Food Security and Nutrition.
4. De Castro, P., Adinolfi, F., & Capitanio, F. (2014). Family Farming. Issues and Challenges in the Reformed Common Agriculture Policy. *Economía Agraria y Recursos Naturales-Agricultural and Resource Economics*, 14(1), pp. 169-176.
5. ESPON & MCRIT LTD, (2014). Territorial Scenarios and Visions for Europe Final Report | 30/06/2014
6. European Parliament (2013). Report on the Future of Small Agricultural Holdings (2013/2096(INI)) Commission Committee on Agriculture and Rural Development.
7. Eurostat, (2013). Retrieved: <http://ec.europa.eu/eurostat/data/database>. Access: 12.11.2017.
8. FAO, (2014). The State of Food and Agriculture Innovation in family farming.
9. Gioia, A. (2017). Small Farms in Europe: Time for a Re-Definition. *Ecoruralis*
10. Ishii-Eiteman, M. Feeding the World, Greening the Planet. (2009). Summary of Findings of the International Assessment of Agriculture Knowledge, Science and Technology for Development. IAASTD Fact sheet. (IAASTD)  
[https://www.globalonenessproject.org/sites/default/files/downloads/IAASTD %20Fact %20Sheet.pdf](https://www.globalonenessproject.org/sites/default/files/downloads/IAASTD_%20Fact_%20Sheet.pdf)
11. Kern, M. (2015). Vision: Do More with Less, Better in Time! Sustainable Value Creation in Agriculture by Implementing Digital Technologies. In *Computer Application Towards Agri-Biology and Engineering Streams*. Eds: R.Hbehl et al. Agrobios Publishers, in press.
12. Meike, F. (2017). Small Farms in Europe: Viable but Underestimated. *EcoRuralis*, 9 p.
13. Molders, T. (2014). Multifunctional Agricultural Policies: Pathways towards Sustainable Rural Development? *Int. J. of Soc. of Agr. & Food*, Vol. 21, No. 1, pp. 97-114.
14. Novikova, A. (2014). Valuation of Agricultural Externalities: Analysis of Alternative Methods. *Research for Rural Development*, Volume 2.
15. OECD, (2017). Summary Record Of The Nineteenth Meeting Of The OECD Network On Farm Level Analysis. Paris, 22-23 May, 1st session, (12).
16. Pollan, M. (2006). *The Omnivore's Dilemma: A Natural History of Four Meals*. Newrk: Penguin Books.
17. Thompson, p. (2010). *The Agrarian Vision: Sustainability and Environmental Ethics*. Lexington: University Press of Kentucky.

18. Tisenkopfs, T., Sumane, S., Kunda, I., Pilvere, I., Zeverte-Rivza, S., Stokmane, I. (2015). Latvijas mazo saimniecību dzīvotspēja (Viability of Latvian Small Farms). Baltijas Studiju Centrs un Latvijas Lauksaimniecības universitāte (Centre of Baltic Studies and Latvian Agricultural University).
19. Toward Sustainable Agricultural Systems in the 21st Century (2010). National Academy of Sciences. The National Academies Press. Washington.
20. Veveris, A., Sapolaite, V. (2017). Accessibility of Rural Development Programme Support for Small Rural Farms in Latvia. Economic Science for Rural Development No.44, Jelgava, pp. 345-352.
21. What is a small farm? (2011). European Commission. Agriculture and Rural development. EU Agricultural Economics Briefs. No2 – July 2011, pp. 11.

## INDICATIONS OF GENTLE FOREST LAND GRABBING IN LATVIA

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**Abstract.** The term land grabbing in scientific literature has been used since approximately 2007 - 2008 to describe a trend of large scale land transactions (deals, acquisitions etc.) in rural areas made mostly by foreign companies or multinational corporations as well as governments. In many places worldwide, such transactions have reached large-scale proportions. There are several similar characteristics that explain what exactly is 'land grabbing', its causes and its consequences. The purpose of this research is to identify the trend of land grabbing in general and then to determine whether land grabbing characteristics are found in Latvia. Specifically, this research is focused on the data analysis of forest land owned by foreigners who own a minimum 500 hectares in at least one region of Latvia.

**Key words:** land grabbing, large-scale land transactions, international real estate transactions, land foreignization.

**JEL code:** Q15, R3, R15

### Introduction

The term 'land grabbing' started being used worldwide around 2007 - 2008 as food prices increased significantly to describe large scale land deals through either purchase, long-term lease or concessions ([www.landmatrix.org](http://www.landmatrix.org)) primarily to develop food and biofuels production as well as mining, urbanisation (Zoomers et al., 2017) and other projects in developing nations such as: Africa, Southeast Asia, Latin America and the Caribbean (Borras et al., 2012), post-Soviet Eurasia (Visser and Spoor, 2011), Europe (Petrescu-Mag et al., 2017; Van der Ploeg et al., 2015; Borras et al., 2013) particularly (but not exclusively) in Eastern European countries (Guffens et al., 2012; Cotula and Vermeulen, 2009). The 'land grabbing' nowadays would be more applicable in the broader sense of the term because these dynamics do not only affect land (agricultural lands, forests, rangelands, and coastal lands) but also natural resources in general (**FIAN, 2017**) for example, 'water grabbing', 'green grabbing'.

The aim of this research is to find out whether large-scale land transactions in rural regions of Latvia can be designated as land grabbing. The research assigns the following tasks: 1) to study scientific literature about the history and the characteristics of land grabbing; 2) to identify the major landowners in rural regions of Latvia (specifically, this research is focused on the data analysis of forest land owned by foreigners who own a minimum 500 hectares in at least one region of Latvia); 3) to identify their nationality; 4) to determine whether any of the following land grabbing characteristics can be observed in international land transaction in Latvia: transactions are made on a large scale, violation of the human rights of local people, low land purchase price, low transaction transparency, land ownership concentration, expulsion of native population from the land, buyer is in a dominant position in negotiation and in land transaction, ecological pollution as a result of large size land transactions, changes of the lifestyle of local people.

### Methodology

First, scientific literature was explored to identify the history and the characteristics of land grabbing in the world and in particular in Europe. Then data were collected on about 400 companies in Latvia, each of which owns at least 500 hectares of agricultural or forest land located in one regional territory (all of the entire 500 ha must be located in one region) and in which the owners of the majority or all of the shares are foreigners. Data were obtained from the State Land Service and the Latvian Register of Enterprises. All 400 companies were analysed to determine

ownership of shares. Then the area of agricultural and forest land owned by foreigners in each of these regions of Latvia was determined. During the period from 15 to 16 January 2018, visits to 8 Latgale municipalities (Karsavas county, Ciblas county, Ludzas county, Zilupes county, Rezeknes county, Dagdas county, Aglonas county, and Kraslavas county) were made and meetings were held with ten local government representatives: seven mayors, two municipality deputies and one qualified specialist, in order to find out the opinion of municipalities regarding the possible international land grabbing occurring in their municipalities (results of questionnaire are revealed in Table 1).

Table 1

**Results of questionnaire conducted with 10 representatives of local governments about land grabbing characteristics in these selected regions of Latgale: Karsavas, Ciblas, Ludzas, Zilupes, Rezeknes, Dagdas, Aglonas and Kraslavas visiting Latgale between January 15 and 16, 2018**

No	Characteristics of the land grabbing	Yes	No	Partly
1	Transactions are made on a large scale	9	0	1
2	Violates the human rights of local people	1	9	0
3	Low land purchase price	8	1	1
4	Low transaction transparency	0	8	2
5	Land ownership concentration takes place	10	0	0
6	Expulsion of local people from the land	0	2	8
7	Buyer is in a dominant position in negotiation and in land transaction	5	4	1
8	Environmental pollution	0	10	0
9	Changing the lifestyle of local people	1	9	0

Source: author's calculations based on questionnaire

**History and the characteristics of land grabbing**

The most significant research institutions for land grabbing today are: Land Matrix project (<http://www.landmatrix.org>, Bracco et al., 2015; Carroccio et al., 2016); Monitoring of land deals by GRAIN, based on media reports (<https://www.grain.org>); Reports by the International Institute for Environment and Development (<https://www.iied.org>, Cotula et al. 2009); The International Food Policy Research Institute (<http://www.ifpri.org>, Von Braun and Meinzen-Dick, 2009); Oxfam (<https://www.oxfam.org>); The Oakland Institute (<https://www.oaklandinstitute.org>, Daniel and Mittal, 2009); European Coordination Via Campesina (<http://www.eurovia.org/>); European Coordination Via Campesina and The Transnational Institute (<https://www.tni.org/>, Van der Ploeg et al., 2015); The International Land Coalition (<http://www.landcoalition.org>); The World Bank (Deininger and Byerlee, 2011).

The primary characteristic that identifies land grabbing deals is the size of area of land controlled by powerful transnational and national economic actors (Friis and Reenberg, 2010), and investment companies and holdings (Bracco et al., 2015). However, there is not only one single characteristic that makes a transaction a land grabbing. For example, land grabbing can also be determined by the amount of capital involved (Hunsberger et al., 2014). Examples of land grabbing include instances when the size of land acquired is relatively vast tracts of land (Borras et al., 2012) or also when the land acquired by foreign entity is disproportionately larger in size in comparison to the average locally owned land holding in the region (FIAN, 2010).

Other determining characteristics that qualify a land transaction as a land grabbing are as follow.



- 1) Land grabbing is indeed a global trend that can be observed not only in the Global South, but it also occurs in the North (Van der Ploeg et al., 2015). It is recognized that land grabbing is not a completely new trend. History contains many episodes and countless examples of land grabbing, such as: the seizure of the land of indigenous people in North America, European enclosures in the North, 'agricultural outsourcing' since the 1990s (Vandergeten et al., 2016) or several circles of land grabbing in Central America since the late 19th century (Edelman and Leon, 2013).
- 2) Low price of resources (Zoomers, 2013; Petrescu-Mag et al., 2017) or acquisition of land below the real estate market values (Carroccio et al., 2016). Foreign investors are not always paying the cheapest price for land resources compared to local speculators, such as arendatori in Bulgaria or native speculators in other Eastern European countries (Borras, 2013). Speculative transactions were also done with agricultural and forest land in Latvia.
- 3) Occurrence of human rights abuse – influencing the right to food and food security (Franco et al., 2015; Golay and Biglino, 2013; De Schutter, 2009) as well as the right to housing, the right to water, the right to an adequate standard of living, the right to take part in cultural life, the right to work, the right to self-determination and the rights of women (FIAN, 2017).
- 4) Low transparency in transactions. Strong evidence shows that increased transparency does not prevent land grabbing. Several existing cases show that transparency simply led to more "transparent" land grabs (FIAN, 2013).
- 5) Land concentration - agricultural as well as forest land concentration is dominant all across the world as well as in Europe (Borras, 2013) and it can be observed together with land grabbing. Both trends are equally significant (Van der Ploeg et al., 2015; Borras, 2012).
- 6) Expulsion of native people from the land (Borras et al., 2011).
- 7) Transactions for the most part are not made on equal terms between the investors and local landowners. The bargaining power in negotiating these agreements is on the side of the foreign firm (Von Braun and Meinzen-Dick, 2009).
- 8) Change in the livelihood of rural communities based on drastic re-ordering of land use (Van der Ploeg et al., 2015).
- 9) Threat to traditional rural livelihood (White et al., 2012; Zoomers et al., 2017) and environmental sustainability (Vandergeten et al., 2016).
- 10) Foreignization of land (Borras et al., 2012; Van der Ploeg et al., 2015). Usually land grabbing should be understood as foreignization of the land, but not necessarily always because there is also domestic land grabbing (Borras et al., 2012).
- 11) Causal relation between land grabbing and events of organized violence (Balestri and Maggioni, 2016).

The main causes of the land grabbing in scientific literature are mentioned:

- 1) the expected continuation of human growth in the world (Friis and Reenberg, 2010);
- 2) limited land resources in the world (Friis and Reenberg, 2010);
- 3) to secure food supplies for land (and water) scarce countries (Edelman et al., 2013; Jagerskog et al., 2012);
- 4) renewable energy policies in European Union and the subsequent investments from the EU to produce biofuels production (Cotula et al., 2008; Antonelli et al., 2015; Bracco et al., 2015);
- 5) speculation on future increase in the price of agricultural land (De Schutter, 2009);
- 6) expectations of higher agricultural commodity prices (Cotula, 2012);
- 7) the sharp rise in extractive mining, tourism and urbanization (FIAN, 2016).

Many authors and organizations have a different approach and methodology to determine what land grabbing deals are. This is why the extension, scale, purpose and novelty of land grabbing are estimated differently (Cotula et al., 2014; Garcia, 2017) as well as precise and reliable information in terms of the amount and location of land transactions is very limited and elusive (Friis and Reenberg, 2010). Also, different terms are used to describe a similar process: 'land grab', 'large-scale land acquisitions (deals, transactions)', 'land rush', 'rush for farmland', 'large-scale land acquisitions' etc. The most complicated and debated issue in global land grabbing today is how to determine land deals and measure them (Edelman et al., 2013). It must also be taken into account that not all land transactions with land are transparent or publicly available, rather land deals are typically shrouded in secrecy (White et al., 2012).

### **Foreign-owned agricultural and forest land ownership and gentle land grabbing in Latvia**

According to the "Global map of investments" from LANDMATRIX ([www.landmatrix.org](http://www.landmatrix.org)), there are no land grabbing transactions in Latvia (data from LANDMATRIX can be used critically for a variety of reasons (Borras, 2016)); and according to the information from GRAIN ([www.grain.org](http://www.grain.org)), there was only one large transaction with farmland for the size of 1895 ha made in 2015 by the Ingleby Company from Denmark. Is there any ground for asserting that there is no land grabbing in Latvia?

To determine if land grabbing has occurred in Latvia, it must first of all be ascertained whether foreigners have captured a control of extended tracts of land (Borras, 2013) in Latvia. The purpose of this research was to answer the question whether or not land grabbing can be observed in Latvia – by exploring more thoroughly (Borras, 2016) agricultural and forest land acquired during the last 10 to 15 years by foreign-owned companies registered in Latvia as well as by examining other characteristics of land transactions. On January 1, 2017 results reveal that disproportionately large tracts of forest land are controlled by foreign-owned companies in one region of Latvia - Latgale (Table 2).

Table 2

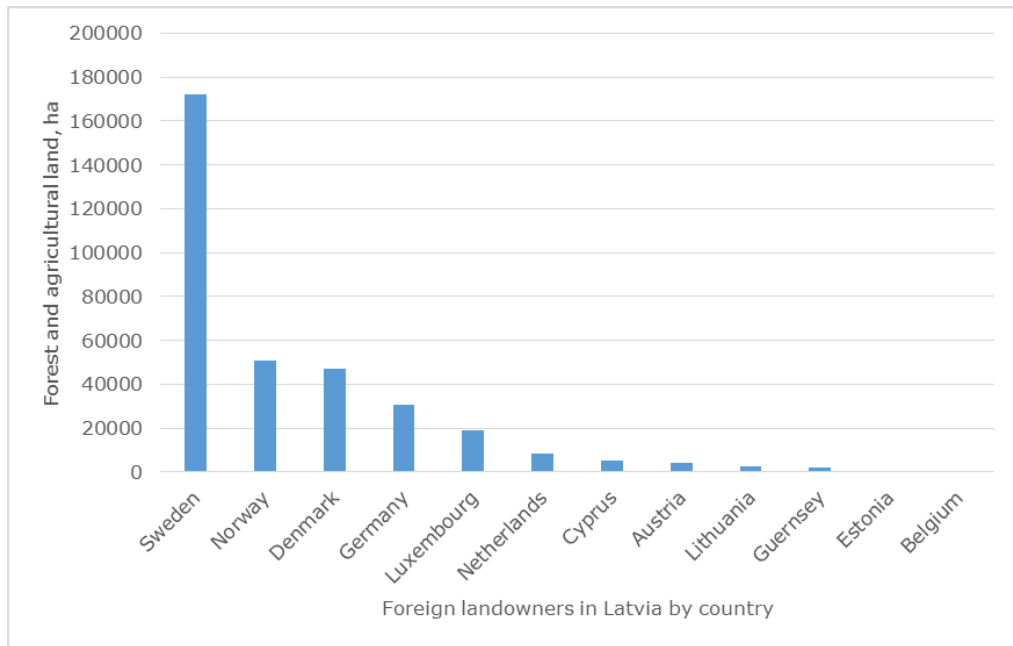
**The highest percentage of foreign-owned forest and agricultural land  
 in 10 counties in each of the four main regions of Latvia  
 (Kurzeme, Zemgale, Vidzeme and Latgale)**

Latgale		Vidzeme		Zemgale		Kurzeme	
County	Forest land, %	County	Forest land, %	County	Forest land, %	County	Forest land, %
Zilupes	52,39	Limbažu	11,29	Krustpils	9,71	Dundagas	6,02
Ludzas	40,37	Alūksnes	11,21	Kokneses	4,51	Kuldīgas	5,45
Dagdas	20,39	Amatas	10,81	Viesītes	3,26	Pāvilostas	5,31
Rugāju	16,64	Madonas	10,71	Neretas	3,13	Talsu	5,15
Kārsavas	15,74	Burtnieku	9,82	Pļaviņu	3,04	Skrundas	4,78
Balvu	13,96	Alojas	9,17	Jaunjelgavas	2,64	Saldus	3,90
Cīblas	13,26	Vecpiebalgas	9,12	Auces	2,35	Aizputes	2,84
Aglonas	12,70	Mazsalacas	9,00	Tukuma	2,19	Ventspils	2,67
Rēzeknes	12,34	Ogres	7,00	Ozolnieku	2,15	Priekules	0,51
Krāslavas	11,83	Smiltenes	6,96	Jaunpils	1,14	Vaiņodes	0,43
Latgale		Vidzeme		Zemgale		Kurzeme	
County	Agricultural land, %	County	Agricultural land, %	County	Agricultural land, %	County	Agricultural land, %
Zilupes	27,50	Madonas	10,59	Auces	24,41	Skrundas	12,57
Ludzas	24,54	Alūksnes	9,24	Skriveru	20,13	Dundagas	9,69
Dagdas	12,11	Burtnieku	7,44	Tukuma	11,00	Aizputes	9,51
Kārsavas	12,12	Amatas	6,85	Ozolnieku	10,74	Ventspils	7,50
Rēzeknes	6,88	Ērgļu	6,23	Dobeles	10,05	Vaiņodes	6,34
Rugāju	6,83	Priekuļu	4,63	Kandavas	8,39	Talsu	6,00
Aglonas	6,03	Mazsalacas	4,30	Krustpils	7,67	Priekules	5,77
Balvu	5,75	Gulbenes	3,17	Pļaviņu	6,67	Kuldīgas	4,25
Cīblas	5,66	Alojas	3,10	Jaunpils	5,43	Durbes	4,19
Vijānu	5,26	Ogres	3,10	Viesītes	3,93	Saldus	3,89

**Source: authors' construction based on the data from the State Land Service and the Latvian Register of Enterprises**

Transactions with agricultural and forest land in rural areas of Latvia are regulated by the Law "On Land Privatization in Rural Areas". On May 1, 2004, a 7-year restriction was imposed after Latvia's inclusion into the European Union, which prevented land transactions by natural and legal persons from the European Union (as well as other countries) in rural areas of Latvia. The restriction was later extended until April 30, 2014. Such restrictions motivated foreigners to get around this limitation by establishing companies in Latvia through which to legally buy property. Since May 1, 2014, legal and natural persons from the European Union Member State or states of the European Economic Area, or the Swiss Confederation have the same opportunity to obtain land according to the same terms as local ones. However, even after the liberalization of the land market in 2014, foreigners continue to use a legal entities for land purchasing. As a result, only 0.5 % of the total area of private land in rural territories of Latvia belongs to foreign natural persons.

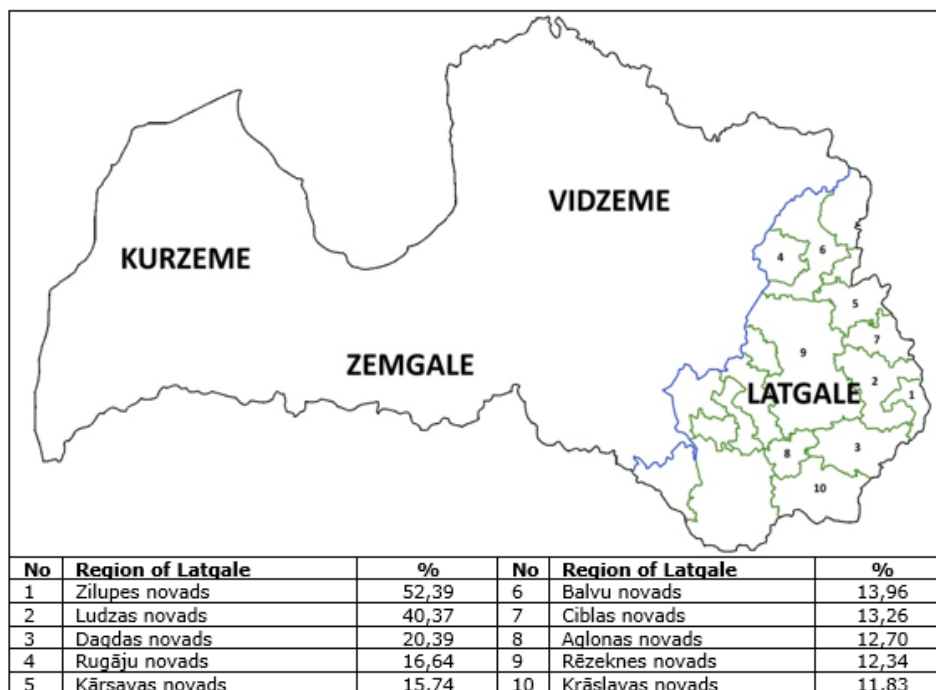
Almost ten years ago major foreign companies from Sweden, Norway, Denmark, Germany, Luxembourg, the Netherlands, Cyprus, Austria, Lithuania, Guernsey, Estonia and Belgium (Figure 1) arrived in Latvia with the purpose of acquiring agricultural and forest land. Foreign-owned companies currently own approximately 8 % of the total area of agricultural and forest land in Latvia or 340 344 ha.



Source: authors' construction based on the data from the State Land Service and the Latvian Register of Enterprises

Fig. 1. Foreign agricultural and forest landowners by country in Latvia on 1 January 2017

It can be concluded that in the part of Latvia – Latgale, foreign forest land ownership is disproportionately large. Therefore, the question whether or not land grabbing exists in Latvia was more thoroughly researched by analyzing the forest land ownership in the municipalities of Latgale (Figure 2, Table 1). The land concentration in Latgale is evidenced by the fact that the average forest owner owns an area of 10.5 hectares in Latvia (in total 144 000 private forest owners in Latvia own 1 516 164 hectares), but the average area of land owned by one company in 10 municipalities of Latgale is 1237 hectares. Moreover, many of these companies have a related owners.



Source: authors' construction based on the data from the State Land Service and the Latvian Register of Enterprises

Fig. 2. Percentage of foreign-owned forest land in 10 regions of Latgale on 1 January 2017

Representatives of local municipalities in interviews emphasized that foreign-owned land is managed well or even better than among local landowners. Among foreign landowners in Latvia, the largest landowner with more than 100 000 hectares is the Swedish company "Bergvik Skog" Ltd. "Bergvik skog" is a nature-friendly forestry company approved by the Forest Stewardship Council (FSC). "Bergvik Skog" Ltd forest management has been certified according to FSC principles (<https://ic.fsc.org/en>) since 2013. This indicates the good quality of forest management. In general, it can be concluded that the business activities of the foreign forestry companies are characterised by 1) high land management culture, 2) afforestation of agricultural and unforested land which have low agricultural value and 3) well organised afforestation of cutovers.

Many authors emphasise native population's displacement as the main consequence of land grabbing. In Latvia, a decrease in the local population can be observed in the regions where highest number of international land deals are carried out. The average amount of population decrease during the period from 1 January 2010 to July 2016 in Latvia was 7.33 %, but in regions of Latgale it was significantly higher (Aglonas county 15.29 %, Dagdas county 14.31 %, Kraslavas county 14.09 %, Zilupes county 14.05 %, Karsavas county 13.53 %, Ciblas county 13.43 %, Ludzas county 12.79 %, Balvu county 12.79 %, Rugaju county 12.66 %, Rezeknes county 9.65 %). However, the reason for decrease in population is a complex mix of socio-political factors, not land grabbing by foreigners. This was also verified by interviews conducted with representatives of local governments (Table 1).

Based on this research, it can be concluded that foreign-owned forest land in Latgale can be identified as land grabbing, because transactions as a whole are characterized by their large scale, low price received by landowners, land concentration and foreignization of land. However, the nature of this land grabbing is untypical, because foreign-owned land management is distinguished by good forest management. Therefore, in such cases it would be necessary to introduce this new term "gentle land grabbing".

### **Conclusions, proposals, recommendations**

- 1) It can be concluded that there is no uniform land grabbing definition. Its exact definition is determined by the methodology of each study.
- 2) Upon analysing foreign land ownership in the regions of Latvia, the main land grabbing evidence was found in relation to forest lands in the Latgale, i.e. disproportionately large tracts of forest land are controlled by foreign-owned companies mostly from Sweden. Other characteristics which can be observed in Latgale are land concentration and the low price of resources, but this does not always mean a low price was paid by foreign investors because of speculative activities.
- 3) In light of the good practice of forest management by foreign landowners in Latvia, it must be acknowledged that in this case land grabbing has a specific nature. It can be said, based on several parameters, that there has been land grabbing, however, this type should be considered as "gentle land grabbing".
- 4) In order to maintain a healthy proportionality of land ownership between local people and foreigners, the limit of foreigners owned land should be 10 % (let's call it "red line"). This would make it possible to maintain the local population's access to resources. A similar 10 % recommendation has been made in the studies of other authors (Petrescu-Mag et al., 2017) adding that during the market liberalization it is a utopian recommendation and it would be contrary to the principle of the free movement of capital of the EU. It should be the responsibility of foreign

business entities themselves to choose socially responsible business and do not cross the "red line".

## Bibliography

1. Antonelli, M., Siciliano, G., Turvani M. E., Rulli, M. C. (2015). Global Investments in Agricultural Land and the Role of the EU: Drivers, scope and potential impacts. *Land Use Policy*, 47, pp. 98–111. <https://doi.org/10.1016/j.landusepol.2015.04.007>
2. Balestri, S., Maggioni, M.A. (2016). This Land is My Land! Large-Scale Land Acquisitions and Conflict Events in Sub-Saharan Africa. CSCC Working Paper 1/2016, Milan, pp. 1-23. Retrieved: <http://hdl.handle.net/10807/97868>. Access: 15.10.2017.
3. Borras Jr., S. M., Franco, J. C., Gomez, S., Kay, C., Spoor, M. (2012). Land Grabbing in Latin America and the Caribbean. *The Journal of Peasant Studies*, 39(3–4), pp. 845–872. <https://doi.org/10.1080/03066150.2012.679931>
4. Borras Jr., S.M., Franco, J., Van der Ploeg, J. (2013). Land Concentration, Land Grabbing and People's Struggles in Europe: Introduction to the Collection of Studies. Transnational Institute. *The Hands off the Land Project*, 2013. pp. 6-29. Retrieved: <https://www.tni.org/en/publication/land-concentration-land-grabbing-and-peoples-struggles-in-europe-0>. Access: 28.12.2017.
5. Bracco Jr., S., Antonelli, M., Turvani, M.E. (2015). Foreign Investment in Land and Corporate Social Responsibility: An Investigation for Africa. African Centre for Technology Studies. *Responsible Natural Resource Economy*. Nairobi, Kenya: Acts Press, 2015. ISBN 9966-41-171-2
6. Borras Jr., S.M., Seufert, P., Backes, S., Fyfe, D., Herre, R., Michele, L., Mills, E. (2016). Land Grabbing and Human Rights: The involvement of European Corporate and Financial Entities in Land Grabbing Outside the European Union. Directorate-General for External policies. Policy Department. <https://doi.org/10.13140/RG.2.2.13719.16800>
7. Carroccio, A., Crescimanno, M., Galati, A., Tulone, A. (2016). The Land Grabbing in the International Scenario: the Role of the EU in Land Grabbing. *Agricultural and Food Economics* (2016) 4:12. <https://doi.org/10.1186/s40100-016-0056-7>
8. Cotula, L., Dyer, N., Vermeulen, S. (2008). *Fuelling Exclusion? The Biofuels Boom and Poor People's Access to Land*. IIED, London. ISBN: 978-1-84369-702-2
9. Cotula, L., Vermeulen, S. (2009). 'Land Grabs' in Africa: Can the Deals Work for Development? EED Briefing. Retrieved: <http://pubs.iied.org/17069IIED/>. Access: 15.10.2017
10. Cotula, L. (2012). The International Political Economy of the Global Land Rush: A Critical Appraisal of Trends, Scale, Geography and Drivers. *The Journal of Peasant Studies*, Volume 39, 2012 - Issue 3-4, pp. 649-680. <https://doi.org/10.1080/03066150.2012.674940>
11. Cotula, L., Oya, C., Codjoe, E.A., Eid, A., Kakraba-Ampeh, M., Keeley, J., Kidewa, A.L., Makwarimba, M., Seide, W.M., Nasha, W.O., Asare, R.O., Rizzo, M. (2014). Testing Claims about Large Land Deals in Africa: Findings from a Multi-Country Study, *The Journal of Development Studies*, 50:7, pp. 903-925, <https://doi.org/10.1080/00220388.2014.901501>
12. De Schutter, O. (2009). Large-scale Land Acquisitions and Leases: A Set of Core Principles and Measures to Address the Human Rights Challenge. Special Rapporteur on the Right to Food. Geneva: UN Office of the High Commissioner for Human Rights, 11 June 2009. Retrieved: <https://www.oecd.org/site/swacmali2010/44031283.pdf>. Access: 1.10.2017.
13. Deininger, K. and D. Byerlee. 2011. Rising Global Interest in Farmland: Can it Yield Sustainable and Equitable Benefits? The World Bank. Washington, DC USA. 214 p. Retrieved: <http://documents.worldbank.org/curated/en/998581468184149953/Rising-global-interest-in-farmland-can-it-yield-sustainable-and-equitable-benefits>. Access: 5.01.2018
14. Edelman, M., Leon, A. (2013). Cycles of Land Grabbing in Central America: an Argument for History and a Case Study in the Bajo Aguan, Honduras. *Third World Quarterly*, Volume 34, 2013, Issue 9, pp. 1697-1722. <https://doi.org/10.1080/01436597.2013.843848>
15. Edelman, M., Oya, C., Borras Jr., S.M. (2013). Global Land Grabs: Historical Processes, Theoretical and Methodological Implications and Current Trajectories. *Third World Quarterly*, 34(9), pp. 1517–1531. <https://doi.org/10.1080/01436597.2013.850190>
16. FIAN (2010). *Land Grabbing in Kenya and Mozambique: A Report on Two Research Missions – and a Human Rights Analysis of Land Grabbing*. Heidelberg: FIAN International, 2010, p. 8.
17. FIAN (2013). International Statement. G8 Should Implement the CFS Tenure Guidelines Rather than Launch a New Initiative Aimed at Increased Transparency in Land Transactions. 15 May 2013. Retrieved: [http://www.fian.org/fileadmin/media/publications\\_2015/Statement\\_G8\\_Land\\_Transparency\\_Initiative\\_Final\\_EN.pdf](http://www.fian.org/fileadmin/media/publications_2015/Statement_G8_Land_Transparency_Initiative_Final_EN.pdf). Access: 12.10.2017.
18. FIAN (2017). *Land Grabbing and Human Rights: The Role of EU Actors Abroad*. Prepared by Elyse Mills. Heidelberg: FIAN International, 2017, pp. 1-39.
19. Franco, J.C., Monsalve, S., Borras, Jr., S.M. (2015). Democratic Land Control and Human Rights. Current Opinion in Environmental Sustainability 2015, 15, pp. 66–71. <http://doi.org/10.1016/j.cosust.2015.08.010>
20. Friis, C., Reenberg, A. (2010). Land Grab in Africa: Emerging Land System Drivers in a Teleconnected World. GLP Report No. 1. GLP-IPO, Copenhagen. Retrieved: [http://www.ihdp.unu.edu/docs/Publications/GLP/GLP\\_report\\_01.pdf](http://www.ihdp.unu.edu/docs/Publications/GLP/GLP_report_01.pdf). Access: 15.12.2017

21. Golay, C., Biglino, I. (2013). Human Rights Responses to Land Grabbing: a Right to Food Perspective. *Third World Quarterly*, Volume 34, Issue 9, pp. 1630-1650. <https://doi.org/10.1080/01436597.2013.843853>
22. Guffens, C., Kroff, F., Seufert, p. (2012). Transnational Institute. Retrieved: [https://www.tni.org/files/download/15.\\_tenure\\_guidelines.pdf](https://www.tni.org/files/download/15._tenure_guidelines.pdf). Access: 12.10.2017
23. Hunsberger, C.A., Borrás, C.A. Jr., Franco, J.C., Chunyu, W. (2014). Large-Scale Land Transactions: Actors, Agency, Interactions. From "Rethinking Global Land Use in an Urban Era," edited by Karen C. Seto and Anette Reenberg. 2014. Strungmann Forum Reports, vol. 14, pp. 201-215. <http://dx.doi.org/10.7551/mitpress/9780262026901.003.0011>
24. Jagerskog, A., Casco, A., Harsmar, M., Kim, K. (2012). Land Acquisitions: How will they Impact Transboundary Waters? Report Nr 30. SIWI, Stockholm. Retrieved: <http://www.siwi.org/publications/land-acquisitions-how-will-they-impact-transboundary-waters/>. Access: 12.10.2017
25. Lambin, E.F., Geist, H.J., Lepers, E. (2003). Dynamics of Land-use and Land-cover Change in Tropical Regions. *Annual Review of Environment and Resources*, 28, pp. 205-241. <https://doi:10.1146/annurev.energy.28.050302.105459>
26. Petrescu-Mag, R.M., Petrescu, D.C., Petrescu-Mag, I.V. (2017). Where to Land Fragmentation-Land Grabbing in Romania? The Place of Negotiation in Reaching Win-win Community-based Solutions. *Land Use Policy*. 64 (2017), pp. 174-185. <https://doi.org/10.1016/j.landusepol.2017.01.049>
27. The 10 FSC Principles. Retrieved: <https://ic.fsc.org/en/what-is-fsc-certification/principles-criteria/fscs-10-principles>
28. Van der Ploeg, J.D., Franco, J.C., Borrás Jr. S.M. (2015). Land Concentration and Land Grabbing in Europe: A Preliminary Analysis. *Canadian Journal of Development Studies*, 36:2, pp. 147-162. <http://dx.doi.org/10.1080/02255189.2015.1027673>
29. Vandergeten, E., Azadi, H., Teklemariam, D., Nyssen, J., Witlox, F., Vanhaute, E. (2016). Agricultural Outsourcing or Land Grabbing: a Meta-analysis. *Landscape Ecology*, March 2016. <http://doi.org/10.1007/s10980-016-0365-y>
30. Visser, O., Spoor, M. (2011). Land Grabbing in Post-Soviet Eurasia: the World's Largest Agricultural Land Reserves at Stake, *Journal of Peasant Studies*, 38:2, pp. 299-323. <http://dx.doi.org/10.1080/03066150.2011.559010>
31. Von Braun, J., Meinzen-Dick, R. (2009). "Land Grabbing" by Foreign Investors in Developing Countries: Risks and Opportunities. IFPRI Policy, Brief 13. Retrieved: [http://www.landcoalition.org/sites/default/files/documents/resources/ifpri\\_land\\_grabbing\\_apr\\_09-2.pdf](http://www.landcoalition.org/sites/default/files/documents/resources/ifpri_land_grabbing_apr_09-2.pdf). Access: 25.09.2017
32. White, B., Borrás Jr., S.M., Hall, R., Scoones, I., Wolford, W. (2012). The New Enclosures: Critical Perspectives on Corporate Land Deals. *The Journal of Peasant Studies*, Vol. 39, pp. 619-647. <http://dx.doi.org/10.1080/03066150.2012.691879>
33. Zoomers, A. (2013). A Critical Review of the Policy Debate on Large-Scale Land Acquisitions: Fighting the Symptoms or Killing the Heart? *African Studies*, Volume 29, pp. 55-77. [http://doi.org/10.1163/9789004252646\\_004](http://doi.org/10.1163/9789004252646_004)
34. Zoomers, A., Noorloos, F., Otsuki, K., Steel, G., Van Westen, G. (2017). The Rush for Land in an Urbanizing World: From Land Grabbing Toward Developing Safe, Resilient, and Sustainable Cities and Landscapes. *World Development*, Vol. 92, pp. 242-252. <http://dx.doi.org/10.1016/j.worlddev.2016.11.016>

## THE IMPORTANCE OF ECONOMIC INSTRUMENTS IN THE PROCESS OF IMPLEMENTING ECOLOGICAL INVESTMENTS IN AGRIBUSINESS COMPANIES

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**Abstract.** The aim of this study is to show the importance of economic instruments in the process of implementing ecological investments in agribusiness companies. An analysis was conducted, based on opinion poll research, using the technique of a questionnaire among 236 intentionally selected agribusiness enterprises from Kujawsko-pomorskie and Pomorskie Provinces of Poland. The research assumes that economic instruments perform one of the fundamental functions in the process of implementing ecological investments in agribusiness enterprises. Economic activity is often in conflict with the needs of the natural environment. The organization of modern production processes in agribusiness enterprises must be directed towards ecology. This arises from the necessity to protect the natural environment and to observe the principles of sustainable development. Economic instruments play an important role in inspiring agribusiness entities to implement ecological investments and modernize existing production and ecological solutions. The research conducted has shown that it is financial incentives (subsidies, concessions, discounts etc.) that are the most popular among the surveyed agribusiness enterprises.

**Key words:** agribusiness, ecological investments, economic instrument, sustainable development.

**JEL code:** O13, Q5, Q56, R11

### Introduction

Man's intemperate pursuit of improvement in standards of living, especially in the sphere of production and service, has led to a significant deterioration of the quality of the natural environment. There was a rapid depletion of natural resources, including primary energy carriers, progressive degradation of the natural environment, including the irreversible decline of biodiversity and the ability of ecosystems to perform their functions, internationalization of the field of the natural environment, along with the emergence of global problems relevant to the maintenance of human civilization (Michalowski A., 2013).

The lack of harmony between economic and social development leads to a disturbance in the natural balance, which is why it has become necessary to take urgent remedial measures and reflect on the directions of contemporary transformations and the factors stimulating sustainable development, also in the field of agribusiness. Management in contemporary agribusiness enterprises must take into account those aspects of sustainable development which are related to environmental protection.

Sustainable development is defined as socio-economic development in which occurs the process of integration of political, economic and social activities, while preserving the natural balance and continuity of basic natural processes, in order to guarantee the possibility of satisfying the basic needs of individual communities or citizens of both the modern generation and future generations (Environmental Protection Law, 2001). A. Pawlowski (2009) proposes to expand the determinants of sustainable development by such areas as:

- ethical considerations (the question of man's responsibility for nature),
- the ecological aspect (protection of the natural environment and that processed by man, spatial planning is also included in this aspect),
- social consideration (not only the natural environment, but also the social environment can be degraded),
- political aspect (formulation of sustainable development strategy, its implementation and control),



- technical aspect (new technologies, saving raw materials),
- economic aspect (taxes, subsidies and other economic instruments),
- legal aspect (environmental law).

With the emergence of the broad idea of sustainable development, there was a need for a different approach to the very essence of development, in the ecological (environmental), social and economic spheres. This reorientation, among others, assumes: compliance with the environment or friendliness towards the environment, the necessity to preserve resources, contribution to lowering pollution levels, promotion of the extension of the catalogue of pro-ecological behaviours, reducing the amount and toxicity of waste, promotion the development of modern techniques and new technologies in the field of environmental protection and creation of growth and pro-innovative activities (Sieminski J. L., 2008).

It should be noted that the natural environment is involved in the functions of the enterprise, directly by providing natural resources for the production cycle, as well as a place that must assimilate by-products of manufacture and consumption as well as products whose life cycle is completed.

The aim of the research was to show the importance of economic instruments in the process of implementing ecological investments in agribusiness enterprises. The research was conducted in 2016 among 236 intentionally selected agribusiness enterprises from Kujawsko-pomorskie and Pomorskie Provinces of Poland. The research used a diagnostic survey in which a questionnaire technique was applied. The questionnaire was addressed to the owners or those responsible for environmental protection in the company who agreed to the survey. The paper assumes that economic instruments play an important role in inspiring agribusiness companies to implement ecological investments and modernize their existing production and ecological solutions. The Tschuprov's T association measure was used to test the significance and strength of the correlation. Its significance was examined on the basis of the  $\chi^2$  test. The level of significance was assumed at the alpha level of 0.05.

### **Environmental policy in agribusiness companies**

Enterprises are obliged to comply with regulations concerning protection of the natural environment resulting from an environmental policy. This policy is defined as "conscious and intentional activity of the state (or a group of states) based on a rational use of resources and riches of the natural environment, its adequate protection and efficient shaping, on the basis of theoretical and practical knowledge acquired by humanity" (Fiedor B., Graczyk A., 2015).

Environmental protection ought to include undertaking or neglecting activities that enable conservation or restoration of natural balance, particularly through rational shaping of the environment and management of its resources in accordance with the principle of sustainable development as well as prevention of pollution (Lipinski A., 2005).

The issue of environmental protection is one of the most important challenges of our time, which affects every human being to a greater or lesser extent. If the human population should effectively overcome environmental threats and wants to survive, it is necessary and even desirable to shape the right attitude towards environmental protection, and, all the more, to pursue such a policy.

In Poland, these regulations result from several normative acts, primarily from the Environmental Protection Law (2001). These are such aspects as:

- reasonable management of environmental resources;
- counterbalancing the negative impact on the environment;
- obtaining any permits required by law and compliance with the established standards for the use of the environment;
- application of technologies well adapted to the requirements of environmental protection;
- ensuring ecological safety of products;
- establishing claims (being the postulate of a competent security authority) for damages that may arise in the environment;
- preparing reports on the impact of a particular undertaking on the environment;
- submission of an ecological review at the request of an appropriate administrative authority;
- paying fees for using the environment (Burchard-Dziubinska M., 2011).

In conclusion, one of the main assumptions of the directions of environmental policy has become a departure from the traditional, narrowly understood environmental protection for sustainable development, i.e. subordination of the needs and aspirations of the society and the state to the opportunities that we have at our disposal (Alberski R., Lisicka H. & Sommer J., 2002). A similar point of view is presented by B. Hopwood, M. Mellor, G. Brien (2005) and W. Sobczyk (2014).

Activities for environmental protection cover the entirety of instruments used to implement it through legal, economic and educational measures.

### **Selected issues of investment outlays in agribusiness enterprises**

The restraint of the progressing degradation of the environment and the restoration of its degraded components requires its users to apply various protection methods. In this respect, the most important is the pursuit of appropriate pro-ecological investments. According to I. Wielewska (2015), the necessary condition for an investment to be considered ecological is its management towards environmental protection.

Investments are considered to be expenditures that are incurred in order to create new or expand existing estate, which will result in an increased stream of goods and services in the future. They can be described as increasing or maintaining the current level of the capital stock in the form of machinery, equipment, buildings and technical infrastructure or the investment of economic funds in an economic enterprise aimed at multiplying the owner's estate by giving the owner a certain income (Burzynska D., 2012).

Subject literature distinguishes the following types of investments undertaken in enterprises:

- investments being accumulated resources and economic savings (income or products) intended for further development of production or services,
- investments constituting economic outlays that are incurred for reproduction of various resources in the enterprise,
- investments constituting investment and multiplication of capital by conducting transactions on the capital market or the real estate market, etc.,
- investments as creation, recreation and increase of assets (including fixed assets) in the enterprise (Towarnicka H., 2004).

The contemporary approach to investment indicates that the pursuit of investment results not only in the increase in assets, but also other resources or other types of benefits (Burzynska D., 2012).

The implementation of pro-ecological investments is, therefore, connected not only with the search for appropriate technological solutions, but also with the involvement of significant financial resources. In practice, the most common situation occurs when technical problems are solved but capital is lacking. The concept of financing protective undertakings includes financing current expenditures on the functioning of devices and environmental protection services as well as financing pro-ecological investments. Therefore, there is a distinction between current costs and investment expenditures for environmental protection are distinguished.

Investment expenditures "are borne on an ongoing basis to ensure the growth of fixed assets in the future" (Lojewski S., 1997).

On the other hand, investment expenditures on environmental protection "cover financing of methods, technologies, processes, equipment or parts thereof, the primary objective of which is reduction, monitoring, collection, disposal, prevention or elimination of pollution or environmental losses resulting from the investment activity of the company" (Broniewicz E., Poskrobko B., 2003).

In Poland in 2016, total expenditure on environmental protection investments amounted to PLN 6.517.035.4 thousand. In turn, the expenditures of enterprises in this respect amounted to PLN 465.813.8 thousand. This accounted for 71.5 % of the total outlays. The highest expenditures were incurred by enterprises in Śląskie Province, where they amounted to PLN 906355.1 thousand and Mazowieckie – 761.752.8 thousand. On the other hand, the lowest expenditures on pro-ecological investments were incurred in Warmińsko-mazurskie Province and amounted to PLN 51.256.4 thousand. In Kujawsko-pomorskie Province, the total expenditure on environmental protection investments was by 84.346.7 lower than in Pomorskie Province and amounted to PLN 317.955.2 thousand. On the other hand, the expenditures of enterprises were at the level of PLN 259.369 thousand in Kujawsko-pomorskie Province and were by PLN 78.851.1 thousand lower than in Pomorskie Province (Ochrona..., 2017).

### **Financial instruments in the process of implementing ecological investments**

Financing can take place both through the budget system and the financial system of enterprises and the banking system, as well as through other specialized institutions (Sosnowska A., 2003).

The forms of financing of ecological investments currently available on the market can be divided (Table 1) into financial liabilities (credits, loans, bonds, leasing), equity (stocks and shares in companies), etc. These are more widely mentioned by J. Lunarski (2002) who argues that in order to finance various pro-ecological undertakings, financial aid (subsidies) is granted to enterprises, institutions and natural persons.

The following forms of financial aid are distinguished:

- subsidies that are non-returnable, one-time financial support;
- preferred loans (with an interest rate below the market interest rate, the subsidy is a difference in interest rate);
- tax breaks;
- proper subsidies, known as fixed (within a specified time) support for specific pro-protection activities (Wyrebek H., 2010).

Table 1

**Methods of financing ecological investments depending on the adopted criterion**

Criterion	Division	Examples of financing methods
Ownership	Public	Bailout
	Private	Credits, loans, venture capital
Involvement	Direct	Credit, surety, equity
	Indirect	Entrepreneurship Incubators, technology parks
Sources of financing	Own capital	Shares of owners, reinvested profits, venture capital
	Foreign capital	Credit, loan, commercial vouchers, bonds, factoring, forfeiting, franchises

Source: Sosnowska 2003, p. 84

Loans come from financial resources accumulated by banks, and the funds provide subsidies up to the level of the interest rate, thus lowering the cost of the loan for those undertaking ecological investments. Preferential crediting of investments that protect the environment can contribute, among others, to increasing the efficiency of sewage treatment plants and increasing the capacity of landfills.

Also, leasing institutions offer a form of financing ecological investments through leasing, which means putting an item into the possession of a user, who uses this item for a certain period against a payment; the item is (usually) subject to return. This form is one of the fastest growing forms of financing ecological investments in Poland. Several factors contribute to this process. First of all, thanks to leasing, one has an opportunity to easily access the latest technology without having to engage one's own funds, and thanks to the use of external capital support, the investor's financial liquidity increases. The savings on procedural actions related to the selection and purchase of particular equipment are also significant as well as the terms of the leasing contract, which are more lenient than those in the event of applying for a loan (Lipinski A., 2005).

The system of financing environmental protection in Poland consists mainly of extra-budgetary special-purpose funds, Bank Ochrony Środowiska (Bank of Environmental Protection), the Ekofundusz foundation, other ecological foundations administering mainly foreign funds, the central budget as well as municipal budgets and own funds of enterprises (Gorka K., 1998). The organizational structure of environmental protection funds (so-called *special-purpose funds*) consists of:

- National Fund for Environmental Protection and Water Management,
- provincial funds for environmental protection and water management,
- county (*powiat*) funds for environmental protection and water management,
- community or borough funds for environmental protection and water management (Lipinski, 2005).

The National Fund and provincial funds have a legal personality, which results from the Public Finance Act (2013) and conducts independent financial management to cover expenditures on resources and to finance statutory objectives. However, county funds are deprived of the legal personality. An important role in the environmental protection financing system is played by off-budget environmental protection funds. Their goal is to collect funds for financing environmental protection and water management in accordance with the principle of sustainable development (Lipinski A., 2005).

From the moment of Poland's accession to the European Union, it has been possible to use the aid funds (at first they were pre-accession funds, currently they are European Union funds in particular programming periods).

### Research results and discussion

To implement the assumptions of an ecological policy, an appropriate set of instruments is used, thanks to which it is possible to influence the behaviour and decisions of economic entities. The primary purpose of their application is to encourage business entities to make decisions consistent with the principle of sustainable development (Szadziewska 2011). Their role is presented in Table 2.

Table 2

**The role of economic instruments**

Role	Characteristics
<b>Stimulative</b>	consisting in encouraging economic entities to economically use the values and resources of the natural environment; they motivate to use such production techniques and technologies that reduce the pressure on the natural environment, and thus reduce the strain in this respect
<b>Redistributive (transfer)</b>	consisting in collecting and then transferring the collected funds for financing projects aimed at protecting the natural environment
<b>Informational</b>	consisting in the transmission of signals about significant environmental threats and the need for appropriate behaviours of business entities

Source: Szadziewska 2011, pp. 384-385

Environmental protection instruments can be called economic if they influence the estimates of benefits and costs of alternative business ventures undertaken by specific entities and affect their decisions and behaviour in such a way that the selected variants will lead to more desirable environmental effects. These are measures to exert influence on business entities in order to ensure the application of the principles of sustainable development in current and future production and service activities. The distinguishing feature of economic instruments is that they affect the financial results of enterprises through imposing financial liabilities on polluters, or using specific financial incentives in the case of protective enterprises (Podolak M., 2004).

T. Poskrobko (2007) proposes a division of economic instruments in environmental protection into:

- public levy instruments,
- instruments based on market transactions,
- administrative fines,
- ecological financial security,
- financial incentives.

The respondents were asked what they thought the meaning of economic instruments in the process of implementing ecological investments in agribusiness enterprises was (Table 3).

Public levy instruments are tools in the form of a price that companies must pay for using assets and resources of the natural environment. All kinds of taxes and fees were not particularly appreciated by the surveyed companies. 16.5 % of respondents considered taxes and fees as definitely necessary, and 30.1 % as necessary. The research showed that the correlation between the environmental investments being implemented in enterprises and public levy instruments is statistically significant, and the strength of the relationship is very weak (Tschuprov's  $T = 0.155$ ).

In turn, instruments based on market transactions (tradable emission rights) in the process of implementing ecological investments in agribusiness enterprises, the respondents (55.5 %)

deemed rather unnecessary. The research showed that the correlation between the environmental investments being implemented in enterprises and market transaction-based instruments is statistically significant, and the strength of the relationship is weak (Tschuprov's  $T = 0.313$ ).

Table 3

**The meaning of economic instruments in the process of implementing ecological investments in agribusiness companies**

Specification	Instruments									
	public levy instruments		based on market transactions		administrative fines		in the form of ecological financial security		financial incentives	
	N=236	%	N=236	%	N=236	%	N=236	%	N=236	%
<b>Definitely necessary</b>	39	16.5	15	6.4	92	39.0	56	23.7	134	56.8
<b>Rather necessary</b>	71	30.1	34	14.4	112	47.5	47	19.9	67	28.4
<b>Unnecessary</b>	56	23.7	131	55.5	7	3.0	99	42.0	15	6.4
<b>Difficult to say</b>	70	29.7	56	23.7	25	10.6	34	14.4	20	8.4

*Source: author's own study based on research conducted*

Ecological fines and penalties are sanctions for destroying elements of the natural environment or for exceeding admissible limits (violation of the conditions of using the environment). Their existence was deemed definitely necessary 39 % of the respondents, and 47.5 % as rather necessary. The research showed that the correlation between the environmental investments being implemented in enterprises and instruments of administrative financial penalties is statistically significant, and the strength of the relationship is weak (Tschuprov's  $T = 0.314$ ).

The functioning of instruments in the form of ecological financial security in the process of implementing ecological investments in agribusiness enterprises was considered necessary by slightly over 44 % of the respondents. The research showed that the correlation between the environmental investments being implemented in enterprises and instruments of ecological financial security is statistically significant, and the strength of the relationship is very weak (Tschuprov's  $T = 0.176$ ).

The financial incentives are the most important in the process of implementing ecological investments in agribusiness enterprises. They take the form of subsidies, concessions and discounts, by means of which business entities tend to implement various types of pro-ecological investments, thanks to which their negative environmental impact will be reduced. The research showed that the correlation between the environmental investments being implemented in enterprises and instruments of financial incentive is statistically significant, and the strength of the relationship is weak (Tschuprov's  $T = 0.304$ ).

**Conclusion**

Economic instruments have a significant impact on the effective management of the natural resources of the environment. Through the instruments, the state has the ability to influence or enforce appropriate behaviour of economic entities for the benefit of the environment.

The following conclusions emerge from the analysis of literature and research on the significance of economic instruments in the process of implementing ecological investments in agribusiness enterprises:

- 1) The use of economic instruments requires agribusiness enterprises to create complementary production infrastructure and pro-ecological activities in accordance with the principles of sustainable development, which should result in benefits in the field of environmental protection.
- 2) Environmental benefits are an important, but not the most important goal of enterprises' operations. It is the economic benefits that count in the first place.
- 3) Among the surveyed agribusiness enterprises, financial incentives (subsidies, concessions, discounts etc.) enjoy the greatest recognition among financial instruments.
- 4) The correlation relationship between the ecological investments being introduced by enterprises, and the ecological instruments used is statistically significant, and the strength of the relationship is weak or very weak.

## Bibliography

1. Alberski, R., Lisicka H., Sommer J. (2002), *Polityka ochrony srodowiska (The Policy of Environmental Protection)*, Wroclaw: Uniwersytet Wroclawski, p. 22.
2. Broniewicz, E., Poskrobko, B. (2003), *Nakłady na ochronę srodowiska. Metodyka i wyniki badań (Expenditure on Environmental Protection. Methodology and Research Results)*, Białystok: „*Ekonomia i Srodowisko*”, pp. 14-15.
3. Burchard-Dziubinska, M. (2011), *Kategorie ekonomii zrównowzonego rozwoju na poziomie przedsiębiorstwa (Categories of Economy of Sustainable Development on the Level of a Business)*, [in:] *Ekonomia zrównowzonego rozwoju w świetle kanonów nauki. Monografia naukowa (Economy of Sustainable Development in the Light of Scientific Canons. A Scientific Monography)*, Bazyli Poskrobko (ed.), Białystok: WSE, pp. 124-125.
4. Burzyska, D. (2012), *Rola inwestycji ekologicznych w zrównowonym rozwoju gmin (The Role of Ecological Investment in Sustainable Development of Borough Communities)*, Lodz: Wydawnictwo Uniwersytetu Lodzkiego, p. 213.
5. Fiedor, B., Graczyk, A. (2015). *Instrumenty ekonomiczne II polityki ekologicznej państwa (Economic Instruments of II State Ecological Policy)*. Wroclaw: *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, no 409, pp. 127-139.
6. Gorka, K. (1998). *Ekonomiczne aspekty ochrony srodowiska (Economic Aspects of Environmental Protection)*, [in:] *Ochrona srodowiska. Problemy społeczne, ekonomiczne i prawne (Environmental Protection. Social, Economic and Legal Issues)*, K. Gorka, B. Poskrobko, W. Radecki (ed.), Warszawa: PWE, p. 125.
7. Hopwood, B., Mellor, M., O'Brien, G. (2005). *Sustainable development: mapping different approaches*. *Sustainable Development*, 13 (1), pp. 38-52.
8. Lipinski, A. (2005). *Prawne podstawy ochrony srodowiska (Legal Bases for Environmental Protection)*, Krakow: Wolters Kluwer, pp. 391-397.
9. Lojewski, S. (1997). *Ocena ekonomiczna i ekonomiczno-ekologiczna systemów technicznych i przestrzennych. Zagadnienia metodyczne (Economic and Economic-ecological Evaluation of Technical and Spatial Systems. Methodological Issues)*, Bydgoszcz: Akademia Techniczno-Rolnicza im. Jana i Jędrzeja Śniadeckich w Bydgoszczy, p. 21.
10. Lunarski, J. (2002). *Zarządzanie srodowiskiem (Environmental Management)*, Rzeszow: Oficyna Wydawnicza Politechniki Rzeszowskiej, p. 67.
11. Michalowski, A. (2013). *Ekonomiczno-ekologiczne podstawy administrowania srodowiskiem (Economic-ecological Principles of Environment Management)*, *Zeszyty Wyższej Szkoły Administracji Publicznej w Białymstoku „Studia Krajowe i Międzynarodowe”*, no. 1, p. 7.
12. *Ochrona srodowiska 2017 (Environment 2017)*. (2017). Warszawa: GUS (Central Statistical Office), p. 391.
13. Pawlowski, A. (2009). *Teoretyczne uwarunkowania rozwoju zrównowzonego (Theoretical Aspects of Sustainable Development Concept)*, Koszalin: „*Rocznik Ochrona Srodowiska*”, no. 11, p. 988.
14. Podolak, M. (2004). *Polityka ekologiczna Polski w okresie transformacji (Environmental Policy of Poland in the Transformation Period)*, Lublin: Wydawnictwo UMCS, pp. 172-173.
15. Poskrobko, T. (2007). *Instrumenty ekonomiczne (Economic Instruments)*, [in:] *Zarządzanie srodowiskiem (Environmental Management)*, Bazyli Poskrobko (ed.), Warszawa: PWE, p. 153.
16. Sieminski, J. L. (2008). *Idea „rozwoju zrównowzonego i trwałego” obszarów wiejskich w Polsce na tle innych koncepcji. Ujęcie planistyczne (The Idea of 'sustainable and continual development' of Rural Areas in Poland vs other concepts. A Planning Aspect)*, „*Zeszyt Infrastruktura i Ekologia Terenów Wiejskich*, Polska Akademia Nauk, no. 2, p. 15.
17. Sobczyk, W. (2014). *Sustainable development of rural areas*. *Problemy Ekorozwoju – Problems of Sustainable Development*. vol. 9, no 1, 119-126.
18. Sosnowska, A. i inni (2003), *Systemy wspierania innowacji i technologii w krajach Unii Europejskiej i w Polsce. Poradnik przedsiębiorcy (Systems of Support for Innovation and Technology in the EU Member*

- States and in Poland. A Businessperson's Handbook), Warszawa: Agencja Rozwoju Przedsiębiorczości, p. 84.
19. Szadziewska, A. (2011). Instrumenty ekonomiczne ochrony środowiska i ich wpływ na wynik finansowy przedsiębiorstwa (Impact of Environmental Economic Instruments on Company Financial Outcome), Prace i Materiały Wydziału Zarządzania Uniwersytetu Gdańskiego, no. 1/1, pp. 383-385.
  20. Towarnicka, H. (2004). Strategia inwestycyjna przedsiębiorstwa (Investment Strategy of a Business), Wrocław: Wydawnictwo AE we Wrocławiu, p. 47.
  21. Ustawa z dnia 27 kwietnia 2001 r. *Prawo ochrony środowiska* (Environmental Protection Act - 27 April 2001), (Dz. U. z 2001 r. nr 62 poz. 627 z późn. zm.)
  22. Ustawa z dnia 27 sierpnia 2009 r. *o finansach publicznych* (Public Finance Act - 27 August 2009), (Dz. U. z 2013 r. poz. 885).
  23. Wielewska, I. (2015). Ecological investments as a necessary condition for sustainable development of agribusiness companies. In: *Economic Science for Rural Development. Rural Development and Entrepreneurship. Proceedings of the International Scientific Conference*. Jelgava: Latvia University of Agriculture, No 39, 47-56.
  24. Wyrebek, H. (2010). *Instrumenty ekonomiczne zarządzania środowiskiem* (Economic Instruments of Environment Management), Zeszyty Naukowe Uniwersytetu Przyrodniczo-Humanistycznego w Siedlcach, nr 87, 205-206.



## RENEWABLE ENERGY AND ITS IMPACT ON THE DEVELOPMENT OF RURAL AREAS

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**Abstract.** The aim of the study is to present the issues of renewable energy sources and their importance in the development of rural areas. In Poland, renewable sources of energy, out of which 71 % are biomass-based, are created in rural areas. The desk research method of an analysis was used in the paper. The analysis of the subject literature and data from the GUS, URE and EUROSTAT databases have rendered it possible to establish the facts, verify the data and present the results obtained. The research has shown that renewable energy sources are a prospective direction of energy development of rural areas, which is mainly due to the availability and inexhaustibility of natural energy carriers. At present, the attitude towards RES has changed because of the lack of support for RES or unfavourable conditions for certain sectors of RES, to name but a few. While it is true that RES not only allow to secure the energy needs of the region and bring about many positive social and economic phenomena, meeting the 15 % requirement in 2020 might be problematic and it might prove necessary to purchase energy from neighbouring countries.

**Key words:** renewable energy, energy security, rural areas.

**JEL code:** Q42

### Introduction

The natural environment is a set of elements closely related to each other by a network of mutual dependencies. Any interference, even with one of those elements, triggers larger or smaller transformations in the environment, which have both a local and a global dimension. This environment is also a source of valuable resources, not only conventional but also renewable. This provides inexhaustible energy resources, which is important for ensuring energy security.

Energy security is the main task of the state and should be understood as:

- 1) security of supply, i.e. ensuring continuity and quality of energy supply at the level resulting from social and economic needs. At the national level, this also means reducing dependence on energy imports;
- 2) economic security understood as ensuring that energy prices will not create barriers to economic development and will not lead to energy poverty;
- 3) ecological safety, which means that energy production will not cause excessive pollution of the environment or its irreversible changes (including depletion of resources) (Karaczun Z., 2012; Wilczynski M., 2013).

In the global economy, a steady increase in the use of unconventional energy has been observed for over than ten years. The precursors to the development of this energy sector are mainly the Member States of the European Union, which first ratified the Kyoto Protocol – an international treaty on an agreement on fighting global warming (Graczyk A., Wielewska I., Piaskowska-Silarska M., 2017).

In order to promote the development of renewable energy, many countries in the world, including Poland, increase their expenditures on RES technologies each year. This is to increase the importance of energy produced in this way, so that it is an alternative to the energy produced from coal or oil. In the future, this will allow even a complete departure from energy production from traditional sources (Michalcewicz-Kaniowska M., Zajdel M., 2017).

The use of renewable energy sources (RES) is closely related to the following factors: diversity of renewable sources, savings on fossil fuels, permanent renewal of resources, fixed unit cost of

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obtaining energy from these sources, minimal impact on the environment, occurrence of RES in various intensities in any location, no need for long-distance transmission of energy in connection with obtaining it from RES in any location (Nowacki M., 2010).

Energy from renewable sources is gaining more and more opportunities for use because it is perceived as ecologically "clean" and in accordance with the principles of sustainable development.

Rural areas are an excellent area for the development of renewable energy. This is due to the fact that agriculture has the largest potential of renewable energy resources, mainly biomass and biogas. In addition, rural areas are characterized by a considerable distance from the fields of conventional energy carriers and transmission networks, which results in an increase in the use of energy from renewable energy sources classified as so-called distributed energy.

It should be noted that the advantage of renewable energy sources is a less harmful and more efficient energy production process, as well as its distribution and maintenance of homeostatic equilibrium between: energy security, meeting social needs, competitive management and environmental protection.

The aim of the study is to present the issues of renewable energy sources and their importance in the development of rural areas. It was assumed that the use of RES in rural areas is related, among others, to the diversity of renewable sources, savings in fossil fuels, the minimization of negative impact of those sources on the natural environment, no necessity to send energy over large distances – it is possible to acquire it anywhere, on the spot, and energy security. The article uses the desk research method of an analysis. The choice of methods was determined by the availability of source materials (including literature in the subject of renewable energy sources, rural areas, innovation, data from the Central Statistical Office, ERO, EUROSTAT), which allowed to establish facts, verify data and present the results.

#### Research results and discussion

The deteriorating condition of the natural environment and the prospects of depletion of fossil fuel energy reserves have significantly influenced the formation of a sustainable energy policy, both in the European Union and in Poland (Wielewska I., Zuzek D.K., 2015).

Renewable energy sources are conducive to respecting the principles of sustainable development in the aspect of energy management. This principle is consistent with the basic objectives of the energy and climate policy of the European Union (Wielewska I., 2016).

Renewable energy source means "primary energy, which is perceived as inexhaustible from the human time horizon" (Reichel M., Czambor F., 2013). RES are renewable, non-fossil energy sources including wind energy, solar energy, aerothermal energy, geothermal energy, hydrothermal energy, hydro energy, wave, current and tide energy, energy obtained from biomass, biogas, agricultural biogas and bioliquids (RES Act of 2015).

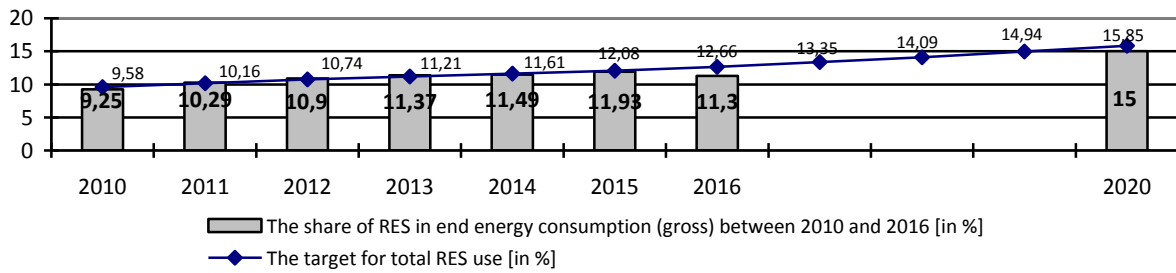
The European Union (EU) has imposed on all its Member States the obligation to produce and use renewable energy sources. Indices for the entire EU as well as its individual Member States are included in *Strategy Europe 2020* published in 2010 (European Commission 2010).

In Poland, specific tasks related to the use of energy from renewable sources were first presented in 2001 in the document called "Strategy for the Development of Renewable Energy", which sets quantitative objectives for the development of renewable energy in Poland by 2020. For Poland, this target objective is 15 % share of energy from renewable sources in the general balance until 2020 (Graczyk A., Wielewska I., Piaskowska-Silarska M., 2017).

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Source: author's own study based on GUS (2017) and KPD (2010)

Fig. 1. The specification of the share of RES use in end energy consumption in Poland between 2010 and 2016, with the target set in the National Action Plan

Taking into consideration the pace of changes that occur in the entire sector of renewable energy sources, it can be concluded that the 15 % output in 2020 will be very difficult to reach. Data suggest (Figure 1) that the share of RES ceased to increase and was 11.3 % in 2016 – 0.63 % less than in 2015, which shows that it was not consistent with prior assumptions (12.66 % in 2016) included in the National Action Plan (KPD) in the field of energy from renewable sources. This decrease may mean that Poland might have to purchase part of RES from another country.

The demand for energy, including renewable energy sources, is systematically growing. The structure of the acquisition of primary energy from RES according to sources in Poland and selected countries of the European Union is presented in Table 1. In the countries of the entire EU, biomass energy obtainment amounts to 44.6 %. Acquisition of energy from water takes the second place in the EU (14.3 %), and wind energy comes third (12.7 %). In the EU countries, it is the geothermal energy that has the lowest share in the structure of energy production from RES (3.2 %).

Table 1

The structure of energy obtainment according to RES in Poland and selected\* European Union member states [in %]

Item	UE=28	Austria	Czech Rep.	Finland	France	Nether-lands	Lithuania	Germany	Poland	Slovakia
<b>Solid biomass</b>	44.6	48.1	69.0	76.0	45.2	28.3	82.2	31.0	73.2	55.9
<b>Solar energy</b>	6.4	2.9	5.0	0.0	3.4	2.6	0.4	10.3	0.5	3.1
<b>Energy from water</b>	14.3	34.2	3.6	13.9	21.9	0.2	2.0	4.2	1.7	20.9
<b>Energy from wind</b>	12.7	4.5	1.2	1.9	8.5	13.5	4.8	17.5	10.4	0.0
<b>Biogas</b>	7.6	3.2	14.3	1.0	2.5	6.8	1.6	20.2	2.5	9.3
<b>Bio-fuels</b>	6.7	4.8	5.0	4.6	11.8	29.9	7.8	8.5	10.4	9.4
<b>Geothermal energy</b>	3.2	0.4	-	-	1.0	1.2	0.1	0.5	0.2	0.4
<b>Recyclable municipal waste</b>	4.6	3.0	1.9	2.6	5.7	17.5	1.1	7.7	0.4	0.9

\*presenting only selected EU states results from the availability of data from GUS (Statistical Office)

Source: Energy 2017, p. 27

The most widespread source of energy acquisition in all selected countries included in the Table 1 is solid biomass. The top countries are Lithuania, with 82.2 % share of biomass as a source of renewable energy, Finland (76.0 %) and Poland (73.2 %). Water is an eagerly used renewable energy source in many EU countries. The largest energy producers using this source are Austria (34.2 %), France (21.9 %) and Slovakia (20.9 %). In Poland, energy acquisition from this source fluctuates around 1.7 %. Wind is another source of energy. Germany (17.5 %), the Netherlands (13.5 %) and Poland (10.4 %) have the highest percentage of energy use from this source. Other renewable energy sources are used by individual countries to a lesser extent.

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According to the Polish Central Statistical Office data (2017), the indicator of biomass utilization for energy purposes in Poland in 2016 accounted for 70.74 % of total energy obtained from RES. In the period of 2012-2016, the share of wind energy increased from 4.79 % to 11.93 %, biofuels from 7.96 % to 10.16 %, biogas from 1.97 % to 2.88 %, solar energy from 0.17 % to 0.58 %, while the share of water energy decreased from 2.06 % to 2.03 %.

Currently, biomass is one of the most frequently used renewable energy technologies in Poland. The advantages of using it for energy purposes include, among others: the possibility of a constant supply of energy from the domestic market; providing additional income that is difficult to obtain in case of food overproduction; creating new jobs in rural areas; reduction of CO<sub>2</sub> emissions, and thus an improvement of the state of the environment; economic, commercial and industrial activation of rural communities; decentralization of energy production, greater energy security of Poland (Lewandowski W.M., Klugmann-Radziemska E., 2017).

Within the current legislation, it is the local boroughs that have the responsibility to prepare assumptions for plans for supplying heat, electricity and gas fuels. However, a small number of Polish boroughs meet this obligation. The main action in this direction should be improvement of local energy security, based mainly on energy from renewable sources, which are an environmentally beneficial alternative for dispersed rural settlements (Wielewska I., 2014a).

Some of the most important elements of energy policy implemented at the local level should be:

- striving to save fuel and energy in the public sector;
- maximizing the use of the locally existing potential of renewable energy, both for the production of electricity, heat, cold, combined production, as well as for the production of liquid biofuels and biogas;
- increasing the use of high-efficiency heat and power generation technology in combined systems as a favourable alternative to supplying heating systems and large facilities with energy;
- development of locally centralized heating systems, which allows to achieve improvement in the efficiency and ecological parameters of the heat supply process and increase the local level of energy security;
- modernization and adaptation to the current needs of the electricity distribution network customers, with particular emphasis on the modernization of rural networks and networks supplying areas characterized by low energy consumption (Graczyk A., 2010).

In Poland, rural areas occupy about 90 % of the country's area, and although the energy potential of most of those areas allows for energy self-sufficiency, they are characterized by a low degree of the use of modern energy sources, based more on satisfying energy needs with cheap, easily available, high-emission carriers that are not friendly to the environment and health of the local community. Coal and wood are most commonly used (over 80 %), which are burnt in inefficient home installations. This poses the threat of the so-called low emission, which includes pollutants emitted from sources at a height of up to 40 metres, i.e. emitted mostly by obsolete heating devices. On top of this, there is also the common use of poor quality fuels or burning waste. In rural areas, it is also common to occasionally run the heating stoves outside the heating season, which generates very large amounts of pollution. Another feature of these areas is the extremely poor condition of electricity distribution networks, which, combined with the distance from the generating units, causes power outages. The phenomenon of power outages does not only

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limit the development capacity of regions, but, above all, has a negative impact on the quality of life of the residents, particularly during the winter. Therefore, the energy policy in rural or little urbanized areas faces the same challenges as national power industry (Graczyk A., Wielewska I., Piaskowska-Silarska M., 2017).

Table 2

### RES installations in Poland

No.	Installation type	Number of installations	
		2016	2017
1.	Biogas power plants	301	305
2.	Biomass power plants	41	45
3.	Using solar radiation	473	579
4.	Wind power plants	1 193	1 206
5.	Water power plants	761	766
6.	Plants using co-combustion technology	35	35
7.	<b>Total</b>	<b>2 804</b>	<b>2 936</b>

Source: <https://www.ure.gov.pl/uremapoze/mapa.html> (access on 19.01.2018)

It is the renewable energy management alone that can be an opportunity to level the development conditions of rural areas, where there is a major dispersion of consumers and the infrastructure of energy supply is poor. Sustainable energy management should aim at ensuring a sufficient level of energy services for all people within the limits of nature's tolerance (Wielewska I., Zuzek D.K., 2015).

Newly emerging investments (according to Table 2, an increase by 132 during the year) are becoming a great opportunity for sustainable development of rural areas, including the interdependence of socio-economic factors (stimulation of local business initiative, providing jobs for less qualified workers, increasing their income) and ecological factors (prevention of greenhouse gas emissions, clean technology of energy production (Graczyk A., 2010).

It should be noted that in the power industry, also in the so-called distributed energy, it is equally important to apply new technologies, technologies of high energy and economic efficiency.

Agriculture is an integral part of the rural areas. It is both a user and a producer of energy.

Table 3

### Participation of agriculture in the national balance of needs for direct energy carriers and the use of renewable sources in agriculture – current state and future prospects

Type of prognosis parameter	unit	Number of units per year					
		1996	2002	2005	2010	2020	2030
<b>Energy demands of the country and agriculture</b>	PJ	1060	1080	1010	1150	1280	1400
<b>Participation of the country and agriculture in the national energy demands</b>	%	25.5	25.4	25.3	25.0	24.2	23.7
<b>National usage of RES</b>	PJ	145	170	210	345	724	1180
<b>Participation of RES in the national energy balance</b>	%	3.5	4.0	4.8	7.5	14.0	20.0
<b>Usage of RES in the country and agriculture</b>	PJ	80	90	100	145	273	385
<b>Usage of RES in agriculture and rural households</b>	PJ	47	49	52	60	78	83
<b>Participation of RES in the energy balance of the country and agriculture</b>	%	7.5	8.3	9.1	12.7	21.3	27.5
<b>Participation of RES in the energy balance of agriculture</b>	%	13.7	15.3	16.9	20.7	30.2	36.0

Source: Pabis J., 2011

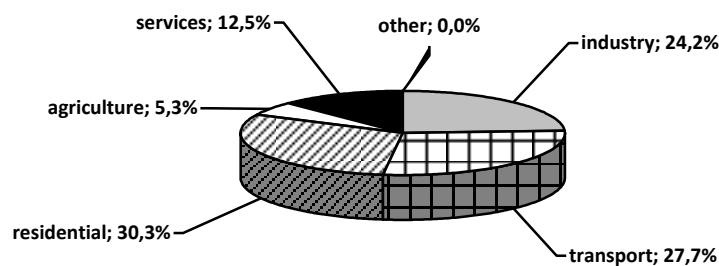
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The energy needs of rural areas and agriculture (Table 3) in 1996 were at the level of 1060 PJ, and in 2010 amounted to 1150 PJ. It is estimated that in 2020 they will be formed at the level of 1280 PJ, and in 2030 - 1400 PJ. Both the domestic use of RES and the share of renewable energy in the national energy balance is characterized by an increasing trend. The use of renewable energy in rural areas and in agriculture in 1996 was at the level of 80 PJ, in 2010 it amounted to 145 PJ. According to forecasts, in 2020 it should be in the range of 273 PJ, and in 2030 - 385 PJ. On the other hand, the use of renewable energy in agriculture and agricultural households is less dynamic: from 47 PJ in 1996 to the level of 83 PJ estimated in 2030.

In today's agricultural households, the demand for energy is growing; the energy being mainly used for production purposes, but also in the household. Energy technologies based on the use of renewable energy sources can be used on farms as an additional source of heat or electricity, and they also open the prospect of the total independence of the farm from the supply of energy and heat. The prevalence of low-power installations based on dispersed energy sources, producing and using energy directly on the farm, is part of sustainable agriculture (Wielewska I., 2014b).



**Source: author's own study based on EUROSTAT data**

**Fig. 1. Structure of end-customer energy consumption in Poland in 2015 by sector**

The largest share in the end-customer energy consumption in Poland in 2015 was held by households (30.27 %). Transport, with the share of 27.7 %, ranks second and industry (27.7 %) comes third. The share of agriculture was at 5.31 %. EUROSTAT data shows that the share of Polish agriculture in energy consumption was twice as large as in the EU-28.

The high level of mechanization of modern agriculture makes this sector of the economy one of the largest energy consumers. This is particularly evident in fruit-growing or dairy farms as well as large-scale farms focused on grain and fodder production (Michalcewicz-Kaniowska M., Zajdel M., 2017).

The use of renewable energy sources for production and household purposes would allow to minimize the percentage of harmful gases and dust emitted into the atmosphere, which are a consequence of the traditional combustion of fossil fuels. In every farm, there is a potential for production of energy from renewable sources. It should be noted, however, that in connection with the geographical location of RES and depending on weather conditions, time of day and year, renewable energy sources are characterized by high variability of the energy they offer (Wielewska I., 2014b).

Along with the socio-economic development of Poland, its energy and fuel needs are increasing, but meeting the requirements for reducing energy consumption and greenhouse gas emissions as

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well as increasing the use of renewable energy do not seem feasible in the next 10-15 years. As opposed to the energy needs of the country and non-agricultural part of the countryside, the energy needs of commodity farms will be decreasing, despite the predicted increase in end production of Polish agriculture until 2030. Energy has a significant share in production expenditures in agriculture. Changes in the level and technology of agricultural production, the increase in the prices of energy carriers and the reduction in the number of entities included in the category of farms have an impact on energy consumption. The increase in agricultural production is associated with an increase in energy demand, at least in the scope of its carriers, which are employed during the implementation of production operations (Wysokinski M., Trebska P., Gromada A., 2017).

The production of energy from renewable sources leads to: diversification of energy sources available in the countryside, creating active attitudes towards participation through the use of renewable energy in the national energy system (prosumerism), shaping ecological awareness of rural residents, improving the stability of energy supply in rural areas, improving conditions for business and the quality of life in the countryside (Wielewska I., 2014). The use of renewable energy that comes from agriculture allows for the creation of an additional source of income for farms and the creation of new jobs. All the above contribute to the development of rural areas.

Summing up, the development of renewable energy sources gives rise to a chance for sustainable development of the local economy in the energy sector by eliminating environmentally hazardous fossil fuels, by using economy-profitable and non-hazardous energy from renewable sources, by less harmful and more efficient energy production, its transmission, distribution and usage, as well as by maintaining a homeostatic equilibrium between: energy security, meeting social needs, competitive management and environmental protection.

### **Conclusions, proposals, recommendations**

- 1) The development of renewable energy sources is a fundamental objective of the European Union's energy and climate policy.
- 2) Energy from renewable sources is gaining more and more opportunities for use because it is perceived as ecologically "clean" and in accordance with the principles of sustainable development.
- 3) Poland has yet to fulfil EU obligations, so it must care about the popularisation of the idea of sustainable development and more actively support the process of investing in renewable energy, mainly at the basic level, i.e. in those boroughs where it is necessary to use distributed energy.
- 4) The pace of changes that occur in the entire sector of renewable energy sources might indicate that the 15 % output in 2020 will be very difficult to reach.
- 5) Renewable energy sources satisfy a small fraction of the country's energy demand, but they are of great local importance as they contribute to improving the energy supply for areas with poor energy infrastructure, i.e. undisturbed energy supplies, which affects energy security.
- 6) The increase in the share of RES in the fuel and energy balance of boroughs contributes to the improvement of the efficiency of using and saving energy resources and improving the condition of the environment.
- 7) Power industry, both in the world and in Poland, should be based on safe, clean and sustainable renewable energy sources. Effective energy use should be based on the principles of sustainable

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development, because the sensible use of energy from renewable sources is its component which brings visible environmental and energy effects, which also affects the development of rural areas.

## Bibliography

1. European Commission. (2008). Proposal for a Directive of the European Parliament and the Council on the Promotion of the Use of Energy Renewable Sources. Brussels: European Commission COM.
2. Energia ze źródeł odnawialnych w 2016 roku (*Energy from Renewable Sources in 2016*) (2017). Warszawa: Główny Urząd Statystyczny.
3. Graczyk, A. (2010). Energetyka jako czynnik równowazenia rozwoju obszarów wiejskich w Polsce do roku 2020 (Power Industry as a Factor of Sustainability of Rural Areas in Poland by 2020), [in:] Zrównowazony rozwój obszarów wiejskich. Aspekty ekologiczne (Sustainable Development of Rural Areas), Kryk B. (ed.), Wydawnictwo Economicus, Szczecin, p. 108.
4. Graczyk, A. M. (2010), Społeczne problemy rozwoju energetyki odnawialnej na obszarach wiejskich (Social Issues of the Development of Renewable Energy in Rural Areas), [in:] Zrównowazony rozwój obszarów wiejskich. Wybrane aspekty społeczne (Sustainable Development of Rural Areas. Selected Social Aspects.), Kryk B. (ed.), Wydawnictwo Economicus, Szczecin, pp. 92-93.
5. Graczyk, A., Wielewska, I., Piaskowska-Silaraska, M. (2017). Rozwoj odnawialnych źródeł w Polsce. Problemy bezpieczeństwa energetycznego i lokalnego wykorzystania zasobów (The Development of Renewable Sources in Poland. Issues of Energy Security and Local Use of Resources), Warszawa: Texter, pp. 1-116.
6. <https://www.ure.gov.pl/uremapoze/mapa.html> (access on 19.01.2018).
7. Karaczun, Z. (2012). Polska 2050 – na węglowych rozstajach (Poland 2050 – on the Coal Bifurcation), InE, IBS, ECF, Warszawa.
8. Komisja Europejska (*European Commission*). 2010. Energia 2020. Strategia na rzecz konkurencyjnego, zrównowozonego i bezpiecznego sektora energetycznego (*Energy 2020. A Strategy for a Competitive, Sustainable and Secure Energy Sector*).
9. (KPD) Krajowy plan działania w zakresie energii ze źródeł odnawialnych (2010) (*The National Action Plan for Energy from Renewable Sources (2010)*). Warszawa: Minister of Economy.
10. Lewandowski, W. M., Klugmann-Radziemska, E. (2017). Proekologiczne odnawialne źródła energii – Kompendium (Pro-ecological Renewable Energy Sources – A Compendium), PWN, Warszawa.
11. Michalcewicz-Kaniowska, M., Zajdel, M. (2017). Renewable Sources of Energy in Poland and in the Region – Research Results, [in:] Economic Science for Rural Development. Proceedings of the International Scientific Conference, Integrated and Sustainable Regional Development Production and Co-operation in Agriculture, No 45, Jelgava: Latvia University of Agriculture, pp. 149-158
12. Ministerstwo Gospodarki (Ministry of Economy). 2010. Kierunki rozwoju biogazowni rolniczych w Polsce w latach 2010-2020 (Directions of the Development of Agricultural Biogas Plants in Poland in 2010-2020). Warszawa: Ministerstwo Gospodarki.
13. Nowacki, M. (2010). Prawne aspekty bezpieczeństwa energetycznego w Unii Europejskiej (Legal Aspects of Energy Security in the European Union), Warszawa: Wolters Kluwer, p. 338.
14. Pabis, J. (2011). Odnawialne źródła energii uzupełnieniem energetyki w rolnictwie (Renewable Energy Sources as a Supplement for Energy in Agriculture), Warszawa: Agengpol, pp. 9-10.
15. Reichel, M., Czambor, F. 2013: Odnawialne źródła energii (Renewable Energy Sources) [in:] A. Krynski, M. Kramer, A. F. Caekelbergh (ed.) Zintegrowane zarządzanie środowiskiem. Systemowe zależności między polityką, prawem, zarządzaniem i techniką (Integrated Environmental Management. Systemic Dependencies between Politics, Law, Management and Technology), Warszawa: Wolters Kluwer, p. 574.
16. Sobczyk, W., Kowalska, A. (2012). *The Techniques of Producing Energy from Biomass*. TEKA Commission of Motorization and Energetics in Agriculture PAN, vol. 12, p. 257.
17. Ustawa z dnia 20 lutego 2015 r. o odnawialnych źródłach energii (*Renewable Energy Sources Act of 20 February 2015*) (Dz.U. z 2015 r. poz. 478, 2365 z późn. zm.).
18. Wielewska, I. (2014). *Rozwoj OZE na obszarach wiejskich i ich wpływ na środowisko przyrodnicze w opinii doradców rolnych* (The Development of RES in Rural Areas and their Impact on the Natural Environment, in the Opinions of Agricultural Advisors), Zeszyty Naukowe Szkoły Głównej Gospodarstwa Wiejskiego w Warszawie Problemy Rolnictwa Światowego (Scientific Journal Warsaw University of Life Sciences – SGGW Problems of World Agriculture), vol. 14 (XXIX), No. 3, pp. 186-195.
19. Wielewska, I. (2014a). *Selected Environmental Aspects of Sustainable Development in Rural Areas*, Folia Pomeranae Universitatis Technologiae Stetinensis, Szczecin: Seria Oeconomica, No. 314(77)4, p. 159.
20. Wielewska, I. (2014b). *Zainteresowanie rolników wykorzystaniem odnawialnych źródeł energii* (Interest of Farmers in the Use of Renewable Energy Sources), Roczniki Naukowe SERiA, vol. XIV, book 5, pp. 216-221.
21. Wielewska, I. (2016). Position of Energy obtained from Agricultural Biogas in Sustainable Power Industry [in:] Economic Science for Rural Development. Proceedings of the International Scientific Conference, Integrated and Sustainable Regional Development Production and Co-operation in Agriculture No. 42, Jelgava: Latvia University of Agriculture, pp. 179-185.

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22. Wielewska, I., Zuzek, D. K. (2015). *Making Investment in Renewable Energy on the Level of the Borough*, [in:] *Regional Development and its Determinants*, Polcyn, J., Glowski, p. (ed.), Pila: Wydawnictwo PWSZ w Pile, vol. II. pp. 81-90.
23. Wilczynski, M. (2013), *Zmierzch węgla kamiennego w Polsce (The Decline of Coal in Poland)*, Warszawa: Fundacja Instytut na rzecz Ekorozwoju.
24. Wysokiński, M., Trebska, P., Gromada, A. (2017). *Energochłonność polskiego rolnictwa na tle innych sektorów gospodarki (Polish Agriculture Energy Intensity Compared to Other Economic Sectors)*, *Roczniki Naukowe SERiA*, vol. XIX, book 4, pp. 238-243.

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## ECONOMIC ASPECTS OF CORPORATE SOCIAL RESPONSIBILITY AND SUSTAINABLE DEVELOPMENT IN COMPANIES

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**Abstract.** The aim of the article was to indicate economic aspects of corporate social responsibility (with special regard to expenditure on environmental protection) in companies based in Pomorskie and Malopolskie Provinces of Poland. The conducted analysis showed that more and more companies conduct their business based on the philosophy of corporate social responsibility, and the expenses borne by the companies on different directions of environmental protection investments are high, while these outlays, except for protecting biodiversity and landscape, are higher in Malopolskie Province. In both Provinces, the companies spend the most of their resources on air and climate protection, while in Malopolskie the enterprises allocate 28.5 % more funds for this purpose than in Pomorskie Province. Also, in terms of expenditures on sewage management, waste management and reduction of noise and vibrations, Malopolskie Province again overtakes Pomerania. Only expenditure on the protection of biodiversity and landscape is higher by 67.6 % in Pomerania as compared to Malopolskie.

**Key words:** corporate social responsibility, environmental protection outlays, sustainable development.

**JEL code:** Q56

### Introduction

Nowadays, the growing role of corporate social responsibility can be noticed, which uses the potential resulting from the use of immaterial enterprise resources, which cannot be bought, or have to be earned for years and years, and these resources become more and more valuable capital (honesty, loyalty, legality of the enterprise). Corporate social responsibility can be included in the modern enterprise management model, which improves and helps to operate in a competitive market and at the same time increases the company's innovativeness.

The need for the development of the aforementioned concept stems not only from the enterprises themselves, but also from the local community, competition, local and central authorities and many other participants of socio-economic life, having an indirect or direct impact on business entities (Zuzek, 2012).

Activities in the field of corporate social responsibility are increasingly taken into account by consumers, for whom not only the price and quality of the product are the most important. What also counts is how the company affects the environment or the local community; the expenditure on environmental protection investments is important, as is regard for the law. Building a strong and stable position on the market is an important element of competitive advantage. Each year, the concept of corporate social responsibility gains more and more supporters and its importance in society increases. It becomes a determinant in business management, which provides significant benefits both in the short and long term, which is extremely valuable from the perspective of the company.

The aim of the article was to indicate economic aspects of corporate social responsibility (with special regard to expenditure on environmental protection) in companies based in Pomorskie and Malopolskie Provinces of Poland. The conducted analysis showed that more and more companies conduct their business based on the philosophy of corporate social responsibility, and the expenses borne by the companies on different directions of environmental protection investments are high,

while these outlays, except for protecting biodiversity and landscape, are higher in Malopolskie Province.

## **Research results and discussion**

### **1. The concept and areas covered by corporate social responsibility activities**

The concept of corporate social responsibility (CSR) has found wide recognition in recent years among both practitioners and theoreticians of economic sciences. Increasingly, this term is used by economists, lawyers, political scientists, psychologists, sociologists and business ethicists. An important feature of this concept is its interdisciplinary nature which shows the need for integration and knowledge in various fields of science and business practice.

The idea of CSR goes back to the concept of sustainable development, established at the turn of the 1960s and 1970s in the United States and Western Europe, according to which not only the economic, but also the social and environmental aspect is important in economic development. This allows to keep a balance between these elements in the company's activities, and thus can contribute to the goals that are attributed to sustainable development, in particular the conservation of natural resources and maintaining ecosystems' stability, with all its positive effects such as improving human health and an improvement in general security and well-being" (Bogdanienko, 2011).

In the subject literature, many areas of corporate social responsibility activities can be found that are related to the market, the natural environment or the local community in which the enterprise operates. Responsible actions in this area should include the process of obtaining a product or service, starting from supplies, through manufacturing technology to marketing activities. Sustainable development in this area also depends on keeping deadlines for payments and deliveries, or monitoring the quality of products or services provided, which should meet the quality and safety standards required for them. An important aspect is also the company's support of the local economy by creating business cooperation with local business people (Chojnacka, 2013).

One of the key areas for companies is also the natural environment, due to the fact that its interests are usually represented by non-governmental environmental organizations. Along with the growing prospects of ecological threats and the fact that the environment is no longer becoming a factor but a barrier to development, the importance of its protection and sustainable development increases. The basic task of companies in taking care of the environment is to minimize the negative impact on them by reducing resource consumption, reducing pollutant emissions, recycling, and developing environmentally friendly technologies. Responsibility for the local community may refer to such issues as: support for local initiatives, cooperation with local authorities or social organizations. Business companies influence the development and integration of local communities by creating jobs, by providing adequate benefits and remuneration, and by paying taxes, which are the main source of revenue for the budgets of local governments. Positive perception of the company and its activities helps in efficient functioning in the local community and translates into gaining its support and acceptance of the actions undertaken (Chojnacka, 2013).

The subject literature also mentions two dimensions of corporate social responsibility, which consist of ten areas. In the internal dimension referring to the conditions of the company's functioning, there are six issues: human resources management, ethical programs for employees,

occupational health and safety, ability to adapt to changes, environmental protection management and corporate governance principles. In the external dimension, focusing on the importance of the company to external stakeholders, the following areas were distinguished: local community, trade partners, suppliers, customers, human rights and global environmental problems (Rok, 2004).

The basic activity in the process of implementing the CSR strategy is to determine the actions that should be implemented and to specify the knowledge in this area. It is important that the company's environment should recognize the need to take socially responsible actions and be convinced that it is a beneficial process for both them and the company itself. The basis for these activities should be detailed conveyance of information on the CRS, planned activities related to its implementation and conducting a dialogue with stakeholders in order to understand their needs, expectations and opinions. At this stage, it is also necessary to define the areas in which the company will be developing (Paliwoda-Matiolanska, 2011).

The next step is to set goals, procedures and activities that are extremely important from the point of view of effective implementation of corporate social responsibility. A detailed scope of activities supports the effective implementation of the developed policy, aimed at the use of opportunities and avoidance. The last link in the implementation phase is communicating the results of analyses and CSR goals. The next stage is the implementation of a system, which is based on effective implementation and realisation of tasks resulting from the developed procedures. This is the stage in which it is critical to constantly monitor the results and practices undertaken, in order to quickly rectify and prevent errors (Filek, 2002).

The last stage of the CSR implementation process is management (PDCA). It consists of monitoring the realisation of objectives and development and an assessment of the level of effectiveness of the implemented system and adopted policy. It is also important to efficiently reach the largest group of recipients possible. Presenting the projects completed by the company in a company newsletter or on an intranet site or on a bulletin board not only creates the company image, but also helps to motivate employees and encourages new clients to cooperate. An integral part of communication of corporate social responsibility is making reports. Not only are such studies an important element of building the image, but they also allow a wider audience to become acquainted with the achievements completed so far (Juzefczyk, 2013).

The list of benefits which arise from implementing CRS in the company's operation is incomparably longer than the one of unfavourable aspects of this strategy. This gives companies an impulse to act and make a considerable effort related to implementation and drives them to set ambitious goals, for example in the field of environmental protection, building relationships with the local community or creating better jobs. In today's economy, companies need to use various forms and methods of influencing the environment in order to gain the trust of clients, investors and employees. A well-implemented CSR will probably be a source of competitive advantage. Naturally, it will not happen overnight. CSR is a long-term strategy that requires time and patience, but in the long term it brings many benefits. For the company, this results in shaping a good image among employees who are more aware of the company's functioning, when they see that its activities affect solving significant social problems. It is also a good way of non-financial motivation for the employees who identify with the tasks performed by the company, which means that they work more efficiently and effectively. There is also a growth of interest among stakeholders who are more willing to cooperate with enterprises that, apart from good financial results, are also managed in a transparent manner and build their image responsibly. Building relationships with the

local community and authorities through active participation in social life and making decisions about investments will enable the development of local infrastructure and the community itself, which in turn will help to win its favour as well as gain trust and develop good relations with the local government. The benefits presented above are an example of the fact that the CSR strategy is not a cost but an investment for an enterprise that, in the long run, brings profit to the company (Zaplata, Kazmierczak, 2011).

## 2. Expenditure on environmental protection in Pomorskie and Malopolskie Provinces

As mentioned before, environmental protection is one of the key areas of business activity. Since economic activity often interferes with the needs of the natural environment, management in contemporary enterprises must address certain aspects of sustainable development related to environmental protection. This activity involves various methods of protection. In this respect, the most important is the pursuit of appropriate pro-ecological investments. According to I. Wielewska (2015), the necessary condition for an investment to be recognised as ecological is its management towards environmental protection.

In this study, special attention was paid to the activities and responsibility of enterprises for the condition of the environment and a comparative analysis was done of outlays on environmental protection in two Provinces, namely Pomorskie and Malopolskie, located on the opposite ends of Poland. Pomorskie is located in the northern part of Poland, and Malopolskie is located in the southern part. The area of Pomorskie is 18.3 thousand sq. km, and of Malopolskie – 15.2 thousand sq. km. The number of people per sq. km is higher in Malopolskie (223 people/sq. km) than in Pomorskie (126 people/sq. km) (Area and Population in Territorial Cross-section in 2017, p. 17) .

Table 1

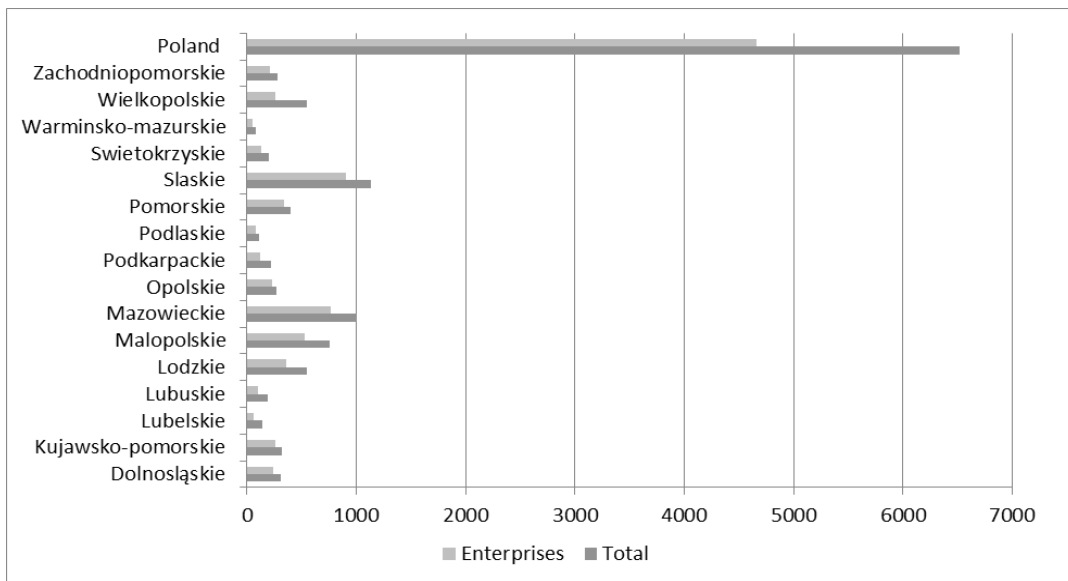
**Selected environmental threats in Poland, in Pomorskie and Malopolskie Provinces in 2016**

No.	Threats	Poland	Pomorskie Province	Malopolskie Province
1.	Industrial and municipal wastewater requiring treatment (in hm <sup>3</sup> )	2166.0	130.8	259.3
2.	Emission of dust air pollutants from particularly burdensome plants (thousands of tons)	38.6	1.9	2.1
3.	Emission of gaseous air pollutants from particularly burdensome plants (thousands of tons)	210849.4	6826,5	10059.5
4.	Waste, excluding municipal (thousands of tons)	128306.9	2092.4	4810.9

**Source: based on Environmental Protection, Central Statistical Office, Warsaw 2017, pp. 69-72.**

The data contained in Table 1 show that the scale of environmental pollution in both regions differs significantly. The region of Malopolskie Province is more polluted than Pomorskie in all the criteria presented. The state of pollution translates into expenditures that both regions allocate to various types of investment directions which support environmental protection.

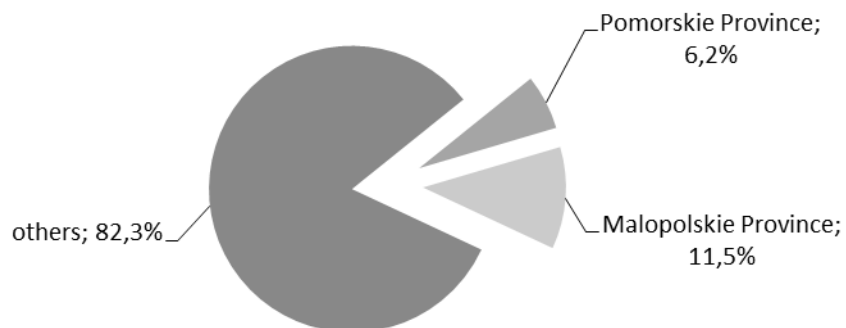
It should be noted that the total expenditure on environmental protection is the sum of outlays on fixed assets used to protect the environment and running costs. In turn, capital expenditures are financial or material outlays whose aim is to create new fixed assets or to improve (reconstruction, extension, adaptation or modernization) the existing fixed assets as well as expenditures on the so-called first investment equipment (Environmental Protection, 2017, p. 366).



Source: based on *Environmental Protection, Central Statistical Office, Warsaw 2017, p. 391*

Fig. 1. Capital expenditure on fixed assets used to protect the environment in 2016 in millions PLN.

The data presented in Figure 1 shows that in Poland, the expenditure on fixed assets for environmental protection amounted to a total of PLN 6517.0 million, of which expenditures borne by the enterprises themselves amounted to PLN 4658.1 million. The highest expenditures were incurred by enterprises in Śląskie Province (PLN 906.4 million), and the lowest in Warmińsko-Mazurskie Province (PLN 51.3 million).



Source: author's own study.

Fig. 2. Capital expenditure on environmental protection in enterprises located in Pomorskie and Małopolskie Provinces in 2016 [ % ]

In Pomorskie Province, expenditures on fixed assets amounted to PLN 402.3 million (6.2 %) and were by 5.3 % lower than those of Małopolskie (11.5 %). The most expenditures in Pomorskie Province allocated to the fixed assets of environmental protection were incurred by the Tri-City (Gdansk, Sopot, Gdynia) sub-region (58.2 %) and the least in Słupsk area. In Małopolskie Province, the largest expenditure was borne by Krakow urban sub-region, and the smallest by Nowy Targ urban sub-region (Table 2).

Table 2

**Capital expenditures on fixed assets for environmental protection in enterprises located in Pomorskie and Malopolskie Provinces, by sub-regions in 2016, in millions PLN**

No.	Specification	Capital expenditures on fixed assets for environmental protection	%
1.	Pomorskie Province	402.,3	100
2.	<b>Subregions:</b>		
3.	Chojnicki	33.7	8.4
4.	Gdanski	47.4	11.8
5.	Slupski	23.6	5.9
6.	Starogardzki	63.3	15.7
7.	Trojmiejski	234.3	58.2
8.	Malopolskie Province	752.7	100
9.	<b>Subregions:</b>		
10.	Krakowski	66.1	8.9
11.	m. Krakow	362.3	48.1
12.	Nowosadecki	32.4	4.3
13.	Nowotarski	31.0	4.4
14.	Oswiecimski	171.7	22.8
15.	Tarnowski	89.1	11.8

Source: based on *Environmental Protection, Central Statistical Office, Warsaw 2017, pp. 70-71.*

Table 3

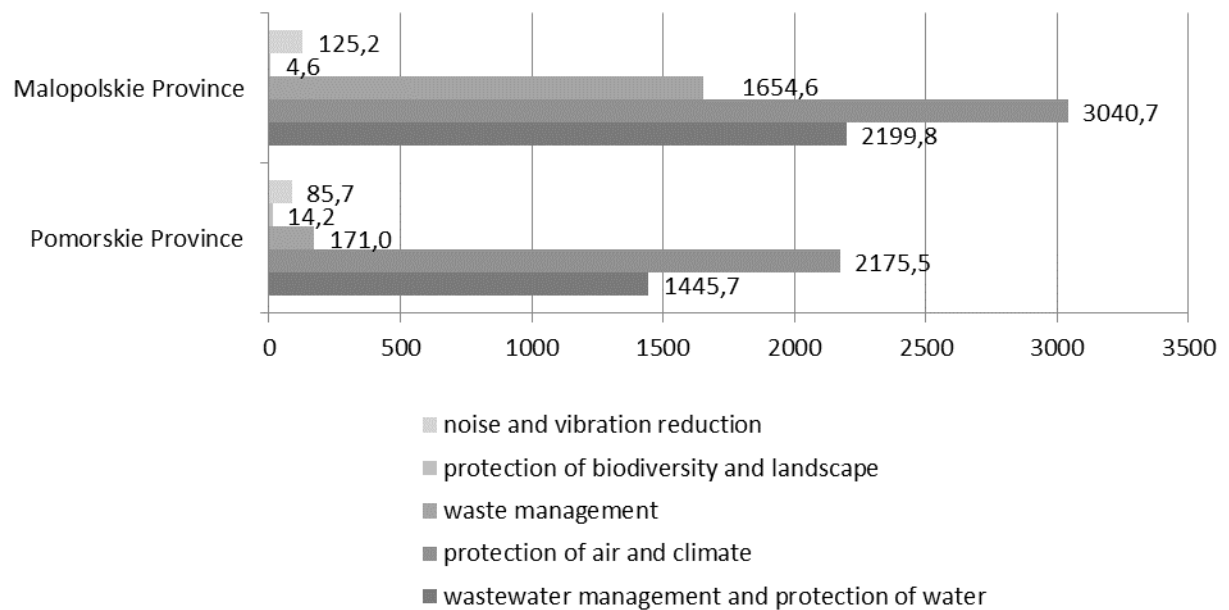
**Capital expenditures of enterprises on environmental protection, by directions of investment countrywide in 2016 (current prices)**

No.	Directions of investment countrywide	Total in thous. PLN	Enterprises in thous. PLN
1.	Air protection	2520672.7	2355706.7
2.	Wastewater management and protection of water	2277332.9	1257731.9
3.	Waste management	904242.5	750850.1
4.	Protection and restoration of utility value of soil, protection of groundwater and surface water	60134.5	45747.7
5.	Noise and vibration reduction	186828.2	45303.8
6.	Protection of biodiversity and landscape	109144.7	3881.3
7.	Protection against ionizing radiation	913.5	589.4
8.	Research and development activity	4625.0	4625.0
9.	Other environmental protection activities	453141.4	193697.9

Source: based on *Environmental Protection, Central Statistical Office, Warsaw 2017, pp. 391-395.*

The analysis shows that the enterprises from both Provinces consider their primary CSR activities to be conducting their business in the perspective of the impact on the natural environment and the company's environment, which is consistent with the principles of ecology. The most significant aspect in environmental protection from the point of view of expenditures is particularly air protection as well as sewage management and water protection. These two

directions of investment account for as much as 77.6 % of all outlays on fixed assets for environmental protection in the country.



Source: based on *Environmental Protection, Central Statistical Office, Warsaw 2017, p. 396.*

Fig. 3. Capital expenditures of enterprises on fixed assets for environmental protection, by investment directions in Pomorskie and Malopolskie Provinces in 2016 (PLN million)

Both in Pomorskie and Malopolskie Provinces, the companies spend the most resources on air and climate protection, while in Malopolskie, the enterprises spend 28.5 % more than in Pomorskie. Also, in terms of expenditures on sewage management, waste management and reduction of noise and vibrations, Malopolskie Province overtakes Pomorskie. Only expenditure on the protection of biodiversity and landscape is higher in Pomorskie Province by 67.6 % compared to Malopolskie Province.

## Conclusions

- 1) The economic aspects of corporate social responsibility are becoming an increasingly important element of Polish enterprises. The number of companies that operate according to the CSR philosophy is increasing. The focus of the company's activity is now on the activity accordant with the principles of eco-development, based on balancing profits and losses in three areas: economy, environment and society.
- 2) The analysis shows that in Poland, the expenditure on fixed assets for environmental protection amounted to a total of PLN 6517.0 million, of which the enterprises allocated PLN 4658.1 million for this purpose. In Malopolskie Province, 5.3 % more funds were spent on various directions of environmental protection than in Pomorskie Province. Only Pomorskie's enterprises spent 67.6 % more on protecting biological diversity than companies from Malopolskie.
- 3) It can be concluded that CSR awareness of contemporary Polish businesspeople is increasing, which translates into an increase in pro-ecological investments.

## Acknowledgement

Publication financed by BS 53/2014 "Contemporary changes in the functioning of the country and agriculture in the light of the Common Agricultural Policy of the EU" from subsidies for maintenance :



- of research potential granted by Ministry of Science and Author
- Higher Education Author

## Bibliography

1. Bogdanienko J. (2011). Odpowiedzialność społeczna a strategia organizacji (Social Responsibility and the Strategy of an Organisation). (in:) Biernatt M., Bogdanienska J., Skoczny T. (ed.), Społeczna odpowiedzialność biznesu. Krytyczna analiza (Corporate Social Responsibility. A Critical Analysis). Warszawa: Wydawnictwo Naukowe Wydziału Zarządzania Uniwersytetu Warszawskiego.
2. Chojnacka M. (2013). Zagrożenia społecznej odpowiedzialności w architekturze współczesnego otoczenia (Threats of Social Responsibility in the Architecture of Contemporary Environment). (in:) Społeczna odpowiedzialność biznesu (Corporate Social Responsibility), ed. by Rossa J., Chojnacka M., Gorzów Wielkopolski: Wydawnictwo Państwowej Wyższej Szkoły Zawodowej im. Jakuba z Paradyża.
3. Filek J. (2002). O wolności i odpowiedzialności podmiotu gospodarczego (Of Freedom and Responsibility of a Business Entity). Kraków: Wydawnictwo Akademii Ekonomicznej.
4. Juzefczyk A. (ed.), (2013). Wdrażanie narzędzi społecznej odpowiedzialności biznesu przez organizacje pozarządowe, Gdynia: Fundusz Inicjatyw Obywatelskich.
5. Ochrona środowiska (2017). (Environmental Protection). Warszawa: GUS.
6. Paliwoda-Matiolanska A. (2014). Odpowiedzialność społeczna w procesie zarządzania przedsiębiorstwem (Social Responsibility in the Process of Company Management). Wydawnictwo C.H.BECK, Warszawa
7. Powierzchnia i ludność w przekroju terytorialnym w 2017 roku (2017). (Area and Population in Territorial Cross-section in 2017). Warszawa: GUS.
8. Rok B. (2004). Odpowiedzialny biznes w nieodpowiedzialnym świecie (Responsible Business in an Irresponsible World). Warszawa: Akademia Rozwoju Filantropii w Polsce. Forum Odpowiedzialnego Biznesu.
9. Wielewska, I. (2015). Ecological investments as a necessary condition for sustainable development of agribusiness companies. In: Economic Science for Rural Development. Rural Development and Entrepreneurship. Proceedings of the International Scientific Conference. Jelgava: Latvia University of Agriculture, No 39, 47-56.
10. Zapłata S., Kazmierczak M. (2011). Ryzyko, ciągłość biznesu, odpowiedzialność społeczna. Nowoczesne koncepcje zarządzania (Risk, Business Continuity, Social Responsibility. Modern Management Concepts), Warszawa: Wydawnictwo Oficyna Wolters Kluwer Business.
11. Zuzek D. (2012). Społeczna odpowiedzialność biznesu a zrównoważony rozwój przedsiębiorstw (Corporate Social Responsibility and Sustainable Development of Companies). Tarnów: Zeszyty Naukowe Małopolskiej Wyższej Szkoły Ekonomicznej w Tarnowie, vol. 21, No. 2.

## DIVERSIFICATION OF THE DEVELOPMENT LEVEL OF MULTIFUNCTIONAL FARMS FROM THE CENTRAL POMERANIA REGION IN POLAND

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**Abstract.** Diversification of farm income sources is an important way of counteracting the low profitability of farmers' activities. It also contributes to a more efficient use of resources and ensures a long-term stabilization of household income for farmers. The aim of this study is to determine the level of development of multifunctional farms and to indicate which factors influence this development. The study was carried out on a sample of 256 farms in Central Pomerania. We hypothesized that the determinant of development in multifunctional agricultural holdings is the level of diversification of income sources, where higher income diversification is associated with an increase in total incomes of farmers' households and their higher profitability. In order to determine the degree of variation in the level of development of multifunctional farms, a linear ordering method based on Z. Hellwig's taxonomic measure of development (TMD) was used. Information weights were used to determine the factors that had the greatest impact on the studied phenomenon. The results show that multifunctional farms in the Central Pomerania region are characterized by a high level of development differentiation. The level of development depends on the degree of diversification of income sources as well as the period of management of the farm by its owner. The other characteristics related to the agrarian structure of the farms were of marginal importance. Hence, the state's policy on supporting the development of agricultural holdings should focus on activities that will result in expanding the opportunities for diversification of income sources. The article is a part of the discussion on the impact of diversification on rural development, including the development of diversified agricultural holdings.

**Key words:** multifunctionality of farms, development of farms, diversification of sources of income.

**JEL code:** O13, Q12, Q14

### Introduction

Multifunctional rural development refers to the paradigm of economic diversification in the context of the development of non-agricultural functions and non-agricultural employment of the rural population. In socio-economic terms, it refers to the rational management of production factors, while in a spatial context, to the optimal allocation of resources and diversification of economic activity in a rural space (Hopfer A., Bajerowski T., Suchta J., 2000; Sikora J., 2012). This process means moving away from monofunctional development based mainly on agricultural production, to create new non-agricultural jobs that contribute to the diversification of income sources in rural areas (Kłodzinski M., 1997; Duczkowska-Malysz K., 1993). It is connected with the development of entrepreneurship, mainly in the area of agricultural production services, in the technical and commercial services for the rural area, agri-food processing, investments in infrastructure development, environmental protection, tourism, crafts and industry development and the special sectors of agriculture (Kłodzinski M., 1995). The concept of multifunctionality is very broad (Salamon J., 2005). It may include farmers and their households, agriculture as an economic sector or a specific area, i.e. the rural areas (Adamowicz M., Zwolinska-Ligaj M., 2009; Cairol D., et al., 2009). In literature, multifunctionality is considered in microeconomic terms, i.e. in relation to agricultural holdings in which there is a shift of production factors between agricultural and non-agricultural activities. According to M. Adamowicz (2004), the multifunctional farm is one that produces products and services of the following types: a) (market) commodities - agricultural and foodstuffs, processed food, agrotourism, production services and others; b) self-procurements - self-supply of food, neighborhood assistance, self-help social services - education and care, care for the elderly and people with disabilities; c) non-market - public goods (food and food security,

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environmental protection and conservation, disaster prevention) and social services (positive and negative external effects, waste recycling, rural landscape, cooperation and social climate).

The aim of the study is to determine the level of development of multifunctional farms and to indicate which factors influence this development, on the example of selected farms in Central Pomerania region. We hypothesized that an important factor influencing the development of multifunctional farms is the level of diversification of income sources, where higher income diversification is associated with an increase in total income of farmers' households and their higher profitability. The level of diversification of income sources was determined on the basis of the number of farm income sources per hectare of agricultural land. The following tasks are set: 1) presentation the concept and the scope of multifunctionality of farms and identification the factors that influence their development; 2) to summarize and evaluate of variables that can explain the differentiation of the level of development of multifunctional farms in Central Pomerania region.

### **Multifunctionality of agricultural holdings**

The multifunctionality of farms is connected with the phenomenon of multi-employment of farmers and economic diversification of agricultural holdings. Multi-employment involves taking paid off-farm jobs by people engaged in agricultural activities (Wilkin J., 2010; Zmija K., 2016; Blad M., 2013). It means searching for a main non-agricultural source of income. Multifunctional farms can also have social character, which means the holding, while continuing agricultural production for the purpose of self-supply of households, simultaneously provides craft services (Michna W., 2005). Economic diversification of farms can be treated in two ways: firstly, as conducting other business activities linked to the farm, apart from agricultural activity. In this way, it provides a source of support for the core business, as well additional income apart from that of the core business. Secondly, diversification occurs when a given project is undertaken by a farmer instead of the agricultural activity, but by using the components of a farm as its base (Lobos-Kotowska D., Stanko M., 2015). Diversification thus means the mobilization of the following reserves of the farm stemming from: a) obtaining a larger part of the added value to the raw materials produced, through their refinement (through local processing) and direct sale of these products to city dwellers and / or tourists, often called "local product"; (b) the incorporation of the holding into the protected natural and cultural heritage and thereby launching the activities of landscaping and flora and fauna protection, traditional architecture, the cultivation of folklore, providing other people with access to the land, continuation and/or introduction of traditional plants and animals and methods of their cultivation and breeding; (c) the provision of services within the agricultural sector, consisting of the rental of agricultural equipment and / or the provision of services to other farmers, etc.; (d) the provision of outside agricultural services, consisting of the use of own farm resources, including machinery or means of transport, in the sphere of economic, social and communal services (Kaleta A., 2008). It can therefore be stated that diversification increases the strength of farm union with the environment and market, and widens their scope (Babatunde R.O., 2012). According to F. Ellis, diversification of income sources may be a conscious choice or a necessity (Ellis F., 2000). Diversification by choice is a well-thought-out economic strategy aimed at improving living conditions and increase income (Ellis F., 1998). It also contributes to the development of individual farms. Its importance lies in the fact that it significantly removes the demand-side constraints on development and creates a cost-effective way to reduce the negative effects of market uncertainty (Wozniak M., 2008). On the

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other hand, the necessity of diversification results first from the need to increase the income of the farmer's family, since the income from farming activities does not ensure the maintenance of farmer's household; secondly, from the active management of the risk of agricultural activity, and thirdly, from the necessity of having additional sources of income in order to increase investment or to secure its implementation in the absence of access to the credit market (Babatunde R.O., 2015).

The developmental potential of multifunctional farms is the result of many factors, exogenous and endogenous. The former consist of the capital and investors, the level of infrastructure development, markets, environmental conditions (climate, terrain), social mentality, involvement of local government, location with respect to economic centres and formal and legal constraints (Smolen M., 2002). Endogenous factors include, first and foremost, farm resources and their efficient use. The potential for diversification increases with the value of assets and their diversification (Schwarze S., Zeller M., 2005). This also applies to access to external financing of development projects, including non-agricultural ones. By diversifying income sources, farms are hedging against the risk of not receiving income from agricultural production (Janvry A., M. Fafchamps A., Sadoulet E., 1991; Kinsey B., Burger K., Gunning J.W., 1998; Mishra A. K., El-Osta H. S., Sandretto C. L., 2004; Zawadzka D., Kurdys-Kujawska A., 2015).

## Materials and methods

The subjects of the study were agricultural farms located in Central Pomerania, which, apart from agricultural activity, obtained income from non-agricultural activities. This region includes Koszalin and Slupsk subregions (total of 15 poviats, including 87 municipalities, including 12 urban gminas, 22 urban-rural gminas, 51 rural gminas and 2 gminas with a city status that have district rights). The analysed units were owners or managers of agricultural holdings. The study was conducted from May to June 2012, using a questionnaire survey. Non-probability sampling was used for selecting samples. The selection of units for the test was a random one, and it also had the character of snowball-sampling. 256 well-filled questionnaires were qualified for the study. In order to determine the degree of variation in the level of development of multifunctional farms, a linear ordering method based on Z. Hellwig's taxonomic measure of development (TMD) was used. Based on literature review as well as the available statistical data, variables have been identified that can explain the variation in the level of development of multifunctional farms. It was assumed that the level of development of multifunctional farms is diversified by factors that can be divided into three categories (1) demographic features of agricultural holdings including farmer's age, farm management period and employment; (2) capital resources, comprising the area of agricultural land and equipment in fixed assets on the farm; (3) socio-economic opportunities including, among others, the degree of diversification of income sources on the farm. Taking into consideration the above assumptions, potential diagnostic variables were created, including:  $X_1$  - share of arable land in the total area of agricultural land ( %);  $X_2$  - share of meadow and pasture land in the total area of agricultural land ( %);  $X_3$  - share of orchard surface in the total area of agricultural land ( %);  $X_4$  - share of own land in the total area of agricultural land ( %);  $X_5$  - share of leased land in the total area of agricultural land ( %);  $X_6$  - change in the area of agricultural land at the end of 2012 as compared to the end of 2006 ( %);  $X_7$  - the number of fixed assets in the holding per hectare of agricultural land;  $X_8$  - the number of people permanently employed on the farm, per hectare of agricultural land;  $X_9$  - the number of sources of income on the farm, per hectare of agricultural

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land;  $X_{10}$  - farmer's age (years) and  $X_{11}$  - farm management period (years). The diagnostic variables were statistically verified for the coefficient of variation (the limit of the coefficient of variation was assumed to be 0.1) and the correlation coefficient (the threshold for the correlation coefficient was 0.5). Variables that were strongly correlated with the others were eliminated. Of the eleven trait characteristics, those traits were included that have a weak association with one another and which represent traits excluded from the study. The final set of diagnostic features is presented in Table 1.

Table 1

**The final set of diagnostic variables**

<b>X1</b>	<b>share of arable land in the total area of agricultural land ( %)</b>
<b>X4</b>	share of own land in the total area of agricultural land ( %)
<b>X6</b>	change in the area of agricultural land at the end of 2012 as compared to the end of 2006 ( %)
<b>X9</b>	the number of sources of income on the farm, per hectare of agricultural land
<b>X11</b>	farm management period (years)

Source: authors' study

The study assumed that all variables that make up the final set of diagnostic features are stimulants<sup>1</sup>. For variables, basic descriptive statistics were calculated, as shown in Table 2.

Table 2

**Basic statistical characteristics of diagnostic variables**

Characteristic	Variables				
	X1	X4	X6	X9	X11
<b>Average</b>	75.38	85.73	101.11	0.35	14.93
<b>Median</b>	81.82	100.00	100.00	0.17	13.00
<b>Minimum</b>	0.00	0.00	14.29	0.01	1.00
<b>Maximum</b>	100.00	100.00	233.33	2.61	45.00
<b>Standard deviation</b>	25.17	30.38	17.24	0.49	9.72
<b>Coefficient of variation</b>	33.39	35.43	17.05	138.21	65.09

Source: authors' study

An indispensable method when using grouping and ordering methods is the normalization of variables that ensures their comparability. Variables were reduced to comparability using a procedure called unitarisation:

$$Z_{ij} = \frac{x_{ij} - x_{j,\min}}{x_{j,\max} - x_{j,\min}} \quad (1).$$

Where:

$Z_{ij}$  - normalized (unitarized) value of the  $j$ -th variable for the  $i$ -th object,  $x_{j,\min} = \min_i x_{ij}$ ,  $x_{j,\max} = \max_i x_{ij}$

Once the diagnostic features have been standardized, the value of the synthetic variable is determined (Salamaga M., 2010):

$$\mu_i = \frac{1}{m} \sum_{j=1}^m Z_{ij} \quad i = 1, 2, \dots, n; j = 1, 2, \dots, m \quad (2).$$

Synthetic variable  $\mu_i$  takes values from interval [0, 1] (Panek T., 2009). The higher the value of the  $\mu_i$  meter, the higher the level of development of the examined objects. Once the objects were ordered by value  $\mu_i$ , they were divided into three groups. For this purpose, variable  $\mu_i$  range was designated:

<sup>1</sup>Stimulants are such variables, whose growing values indicate the increase in the level of the studied phenomenon (development of farms), and so they are a desirable phenomenon (Kukula K., 2000).

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$$l = \frac{\max \mu_i - \min \mu_i}{3} \quad (3).$$

Ordered by the value of  $\mu_i$ , multifunctional farms could be divided into three homogenous groups in terms of development:

- I:  $\mu_i \in (\max \mu_i - l; \max \mu_i]$  - highest level of development;  
 II:  $\mu_i \in (\max \mu_i - 2l; \max \mu_i - l]$  - medium level of development;  
 III:  $\mu_i \in [\max \mu_i - 3l; \max \mu_i - 2l]$  - lowest level of development.

To determine the factors that had the greatest impact on the studied phenomenon, information weights have been used, as  $\omega_j$ : coefficient:

$$\omega_j = \frac{v_j}{\sum_{j=1}^m v_j} \quad (4).$$

Where:

$v_j$  - is the coefficient of variation of the  $j$ -th variable.

## Research results and discussion

The analysis shows that the majority of the examined multifunctional farms in Central Pomerania (75.53 %) have an average level of development (Table 3). Only 11.70 % of analysed multifunctional farms are classified as having the lowest level of development. The remaining farms were characterized by high levels of development.

Table 3

### Results of classification of multifunctional farms

Class	Number of farms	Average values of diagnostic measures				
		X1	X4	X6	X9	X11
<b>I</b>	13	90.25	100.00	111.53	0.65	25.18
<b>II</b>	71	78.09	89.32	99.68	0.29	14.30
<b>III</b>	11	42.56	48.11	98.61	0.35	7.58

Source: authors' study

Multifunctional farms with the highest level of development are characterized by a relatively high share of arable land in the total area of farmland owned by the farmer. In this group of farms, the degree of diversification was the highest. The number of income sources per hectare of farmland ( $X_9$ ) was 0.65 and was almost double the arithmetic average for all farms. It should be noted that in the group of farms with the highest level of development the processes of concentration of production assets were relatively faster than in other groups. The most significant manifestation of the changes was the increase in the used land at the end of 2012 compared to the end of 2006. In these units, the concentration of agricultural land increased by 11.53 %. It can be argued that enlargement of the area in these farms was possible thanks to supplementing incomes from non-agricultural activities. Thus, gaining income from non-agricultural activity may be an alternative means of obtaining funds to finance investments in agricultural holdings. Multifunctional farms with the highest levels of development show above-average farm management period values. This means that the owners of these farms have had considerable experience in managing a farm (average 25 years). They also have more knowledge and skills in recognizing market needs, hence, their increased activity in various areas (agricultural and non-agricultural). In addition, with the prolonged period of farm management, the accumulation of assets increases, which are needed

<sup>1</sup> The span of the class divisions was determined on the basis of the constant  $l$ , determined according to the formula:  $l = \frac{\max \mu_i - \min \mu_i}{3}$

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to start new ventures. As indicated by the results of the research, the multifunctional farms in the Central Pomerania region are characterized by, for the most part, an average level of development. These units are characterized by a relatively higher share of arable land in the total area of the farm (78 %) and the share of land (89 %), compared to the arithmetic average for all analysed farms. Variable  $X_{11}$  (farm management period) was similar to the mean of all farms analysed. Medium-level agricultural holdings were characterized by the lowest degree of diversification of income sources. The smallest group consisted of multifunctional farms with the lowest level of development. These entities were characterized by a small share of arable land in the total area of agricultural land (42.56 %), compared to other groups. In these farms, there is a great diversity in the structure of the area used, which makes it possible to diversify the sources of income. In addition, a small share of arable land can mean lower farm income, which further limits access to external sources of funding. This forces the farmer to look for other sources of income. A significant part of the area of agricultural land in these holdings were leased lands. Multifunctional farms classified as the lowest level of development were managed by farmers whose farm management experience is relatively small, averaging 7 years. It can be surmised that these are people working outside agriculture. Their pursuit of agricultural activity may result from succession due to the necessity of discontinuing agricultural activity by parents / in-laws, as this is a precondition for early retirement, supplementary agricultural retirement, periodic agricultural retirement or a disability pension. Analysing the different variables that differentiate the level of development of farms in Central Pomerania, it can be noted that during the analysed period, the development of multifunctional farms was influenced by two factors, i.e. the diversification of income sources ( $X_9$ ) and the management of the farm ( $X_{11}$ ). Other factors that were part of the agrarian structure were less significant (Table 4).

Table 4

**Value of  $\omega_i$  coefficient for all diagnostic characteristics**

Specification	Variables				
	X1	X4	X6	X9	X11
Coefficient $\omega_i$	0.11	0.12	0.06	0.48	0.23

Source: authors' study

### Conclusions and suggestions

- 1) Multifunctional farms in the Central Pomerania region are characterized by a distinct level of development differentiation.
- 2) The results show that the capital of a farm, including the size and structure of its assets, the level of diversification of income sources and the management period of the farm, have a significant impact on this diversification.
- 3) The key factor influencing the level of development of multifunctional farms in the Central Pomerania is the level of income differentiation and the period of management of the farm. Diversification of income in agricultural holdings, including having fixed income from outside of the farm, increases the stability of the farmers' household income and can condition their investment decisions. The period of farm management is directly related to access to its resources. These resources (land, capital, labour) determine the opportunities for non-agricultural activity and the degree of diversification of farm incomes and thus affect the level of development of agricultural holdings. The study results confirm the thesis included in the introduction.

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4) Multifunctional farms have the possibility of rapid develop, but, but then it is imperative to take action on the part of various public institutions to increase the level of diversification of income sources. Major areas of support should focus on reducing barriers for market entry, increasing access to external funding sources, improving rural infrastructure, developing support programs for rural entrepreneurship, and conducting training initiatives to identify opportunities for additional revenue generation and financial management.

The presented results are a contribution to further research in the field of development of multifunctional farms. They can provide a comparative material to study the regionalization of development of multifunctional farms not only in Poland but also in other countries.

## Bibliography

1. Adamowicz, M. (2004). Wielofunkcyjne gospodarstwa rolne jako podmiot w rozwoju wsi i rolnictwa (Multifunctional farms as an entity in the development of the village and agriculture). [in:] Adamowicz M. (ed.). *Wiejskie gospodarstwa domowe w obliczu problemow transformacji, integracji i globalizacji* (Rural households towards problems of transformation, integration and globalisation). Wydawnictwo Szkoły Główniej Gospodarstwa Wiejskiego, Prace Naukowe KPAiM, 33, Warszawa, p. 30.
2. Adamowicz, M., Zwolinska-Ligaj, M. (2009). Koncepcja wielofunkcyjności jako element zrównowoczonego rozwoju obszarów wiejskich (The concept of multifunctionality as an element of sustainable development of rural areas). *Zeszyty Naukowe Szkoły Główniej Gospodarstwa Wiejskiego w Warszawie. Polityki Europejskie, Finanse i Marketing*, 2 (51), p. 18.
3. Babatunde, R.O. (2012). Assessing the Effect of Off-farm Income Diversification on Agricultural Production in Rural Nigeria. ASC Working Paper 106.
4. Babatunde, R.O. (2015). On-farm and Off-farm Works: Complement or Substitute? Evidence from Nigeria. MSM Working Paper 02.
5. Bład, M. (2013). Wielozawodowość w rodzinach rolniczych w Polsce. Stan i tendencje zmian w latach 2005-2010 (Pluriactivity in agricultural families in Poland. Status quo and trends of changes in 2005-2010). *Zagadnienia Ekonomiki Rolnej*, 2 (335), pp. 71-84.
6. Cairoli, D., Coudel, E., Knickel, K., Caron, P., Kroger, M. (2009). *Multifunctionality of Agriculture and Rural Areas as Reflected in Policies: The Importance and Relevance of Territorial View*. *Journal of Environmental Policy & Planning*, 11:4, pp. 269-289.
7. Duczowska-Malysz, K. (ed.) (1993). *Przedsiębiorczość na obszarach wiejskich: w stronę wsi wielofunkcyjnej* (Entrepreneurship in rural areas: towards a multifunctional village). Instytut Rozwoju Wsi i Rolnictwa - PAN, Warszawa, pp. 6-7.
8. Ellis F. (2000). *The Determinants of Rural Livelihood Diversification in Developing Countries*. *Journal of Agricultural Economics*, Volume 51, pp. 289-302.
9. Ellis F. (1998). *Household Strategies and Rural Livelihood Diversification*. *The Journal of Development Studies*, Volume 35 (1), pp. 1-38.
10. Hopfer, A., Bajerowski, T., Suchta, J. (2000). Możliwości wielofunkcyjnego rozwoju obszarów wiejskich północno-wschodniej Polski na przykładzie Warmii i Mazur (Possibilities of multifunctional development of rural areas of north-eastern Poland on the example of Warmia and Mazury). [in:] Stasiak A. (ed.). *Możliwości wielofunkcyjnego rozwoju wsi polskiej w kontekście integracji z Unią Europejską. Aspekty regionalne* (Possibilities of multifunctional development of the Polish countryside in the context of integration with the European Union. Regional aspects). Wydawnictwo Szkoły Główniej Gospodarstwa Wiejskiego, Studia, T. CX, Warszawa, p. 219.
11. Janvry, A., Fafchamps, A.M., Sadoulet, E. (1991). *Peasant Household Behavior with Missing Markets: Some Paradoxes Explained*. *The Economic Journal*, 101, pp. 1400-1417.
12. Kaleta, A. (2008). Dywersyfikacja źródeł dochodów ludności wiejskiej (*Diversification of the income sources of the rural population*). Wydawnictwo Uniwersytetu Mikołaja Kopernika, Toruń, pp. 54-56.
13. Kinsey, B., Burger, K., Gunning, J.W. (1998). Coping with Drought in Zimbabwe: Survey Evidence on Responses of Rural Households to Risks. *World Development*, 26 (1), pp. 89-110.
14. Klodzinski, M. (1995). Rozwój rolnictwa w powiązaniu z wielofunkcyjnością terenów wiejskich (The development of agriculture in relation to the multifunctionality of rural areas). [in:] Klodzinski M., Rosner A. (eds.). *Rolnictwo w gospodarce Opolszczyzny. Znaczenie, perspektywy, zagrożenia* (Agriculture in the economy of the Opole region. Meaning, perspectives, threats). Wydawnictwo Szkoły Główniej Gospodarstwa Wiejskiego, Warszawa, pp. 22-23.
15. Klodzinski, M. (1997). Istota wielofunkcyjnego rozwoju terenów wiejskich (*The essence of multifunctional development of rural areas*). [in:] Klodzinski M., Rosner A. (eds.). *Ekonomiczne i społeczne uwarunkowania i możliwości wielofunkcyjnego rozwoju wsi w Polsce* (Economic and social conditions and possibilities of multifunctional rural development in Poland). Wydawnictwo Szkoły Główniej Gospodarstwa Wiejskiego, Warszawa, p. 41.
16. Kukula, K. (2000). *Method of Unitarian Unity*. PWN, Warsaw.

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17. Lobos-Kotowska, D., Stanko, M. (2015). Dywersyfikacja działalności rolniczej jako instrument wspierania rozwoju gospodarstwa rodzinnego (na przykładzie agroturystyki) (Diversification of agricultural activity as an instrument to support the development of a family farm (on the example of agritourism)). [in:] Litwiniuk p. (ed.), Prawne mechanizmy wspierania i ochrony rolnictwa rodzinnego w Polsce i innych państwach Unii Europejskiej (Legal mechanisms for supporting and protecting family farming in Poland and other European Union countries). Fundacja Programów Pomocy dla Rolnictwa, FAPA, Warszawa, p. 397.
18. Michna, W. (2005), Zróżnicowanie funkcji gospodarstw rolnych w ujęciu przestrzennym. Program wieloletni 2005–2009 (Differentiation of farm functions in spatial terms. Monographs of Multi-annual Programme 2005-2009). Instytut Ekonomiki Rolnictwa i Gospodarki Żywnościowej- PIB, Warszawa, p. 12.
19. Mishra, A. K., El-Osta, H. S., Sandretto, C. L. (2004). *Factors Affecting Farm Enterprise Diversification*. *Agricultural Finance Review*, pp. 151-165.
20. Panek, T. (2009). Statystyczne metody wielowymiarowej analizy porównawczej (Statistical methods of multi-dimensional comparative analysis). Wydawnictwo Szkoły Głównej Handlowej, Warszawa.
21. Salamaga, M. (2010). Mierniki podobieństwa grupowania obiektów (*Meters of the similarity of grouping of objects*). *Wiadomości Statystyczne*, 6(589), Warszawa.
22. Salamon, J. (2005). Badania wielofunkcyjnego rozwoju obszarów wiejskich województwa świętokrzyskiego (Research on multifunctional development of rural areas of the świętokrzyskie voivodship). *Infrastruktura i ekologia terenów wiejskich*, 4. Polska Akademia Nauk, Oddział w Krakowie, pp. 145-155.
23. Schwarze, S., Zeller, M. (2005). *Income Diversification of Rural Households in Central Sulawesi, Indonesia*. *Quarterly Journal of International Agriculture* 44, 1, pp. 61-73.
24. Sikora, J. (2012). Wielofunkcyjność obszarów wiejskich w Polsce (Multifunctional character of rural areas in Poland). *Journal of Agribusiness and Rural Development*, Volume 2(24), pp. 215-226.
25. Smolen, M. (2002). Czynniki różnicujące rozwój gospodarczy gmin w regionie krosnieńskim (Factors differentiating the economic development of communes in the Krosno region). Wydawnictwo Uniwersytetu Rzeszowskiego, Rzeszów.
26. Wiklin, J. (2010). Wielofunkcyjność rolnictwa – nowe ujęcie roli rolnictwa w gospodarce i społeczeństwie (Multifunctionality of agriculture - a new approach to the role of agriculture in the economy and society). [in:] J. Wiklin (ed.), *Wielofunkcyjność rolnictwa. Kierunki badań, podstawy metodologiczne i implikacje praktyczne* (Multifunctionality of agriculture. Research directions, methodological foundations and practical implications). Instytut Rozwoju Wsi i Rolnictwa - PAN, Warszawa, p. 23.
27. Wozniak, M. (2008). Dywersyfikacja szansa rozwoju indywidualnych gospodarstw rolnych w globalnej gospodarce (Diversification as an opportunity for development of individual agricultural farms in global economy). *Zeszyty Naukowe Szkoły Głównej Gospodarstwa Wiejskiego, Ekonomika i Organizacja Gospodarki Żywnościowej*, Nr 67, Warszawa, pp. 15-24.
28. Zawadzka, D., Kurdys-Kujawska, A. (2015). *Diversification of Income Sources and their Significance in the Risk Management of Farms*. *Zeszyty Naukowe Uniwersytetu Szczecińskiego*, 855, *Finanse, Rynki Finansowe, Ubezpieczenia*, 74, pp. 619-628.
29. Zmija, K. (2016). Strategie różnicowania działalności gospodarczej przez rolników posiadających drobne gospodarstwa rolne (Strategies for business activities diversification implemented by farmers possessing small farms). *Roczniki Naukowe Stowarzyszenia Ekonomistów Rolnych i Agrobiznesu*, Volume XVIII, Issue 3, pp. 419-425.

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## COLLECTIVE PROTECTION EQUIPMENT AND MEASURES IN CONSTRUCTION DURING WORK AT HEIGHT

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**Abstract.** The aim of the paper is to identify in the construction sector problems associated with the work at height arising from incorrect or insufficient planning and use of collective protective equipment, to provide practical proposals for the improvement of collective protection measures at construction sites. Practical suggestions for the improvement of collective protection measures at construction sites are presented in the paper: the system has been developed as a solution of for collective protection means to be foreseen and included in the project report. Practical solutions for collective protection measures are presented. A structural flowchart of the labour protection system at the construction site has been developed in order to ensure the control of the availability and technical condition of collective protection equipment as well as their advance planning and informing of the employees.

**Key words:** labour protection.

**JEL code:** R19, L89

### Introduction

At workplaces, people spend about one third of their lives. The content of work and the workplace have a positive effect on the employee ensuring the achievement of career goals and economic well-being. At the same time, it greatly affects the state of human health, productivity and motivation. The greatest value of any company is its employee, moreover, healthy and able-bodied to qualitatively carry out the duties assigned to him.

The construction sector is one of the most important economy sectors in the European Union and Latvia looking at the indicators of the finance and the number of employees. It meets people's demand for new housing, office spaces and commercial premises, builds a new infrastructure and improves the existing one.

From the standpoint of labour protection, construction shall be considered as one of the most dangerous sectors since the workers often suffer from work accidents and occupational diseases. This is one of the sectors where work at height is carried out most often. During such work, it is possible to fall from a height into foundation pits and trenches excavated already in the zero-cycle phase, from scaffolds, buildings, work decks, mobile towers, work platforms, temporary ladders, stairs, roofs where different types of work are performed, through unfenced and uncovered openings of roofs or interfloor constructions etc. (INSPECTA, 2008). Work at a height is considered one of the most dangerous jobs - every year there are many accidents caused by falling from a height. Almost always these accidents have serious consequences, often lethal.

The employer's duty is to provide a safe working environment for its employees - including everything necessary to work safely at height (Riga Stradins University, 2011). Based on the results of the work environment risk assessment, the employer needs to establish measures to prevent falling from heights:

- 1) eliminate the hazard, i.e. the very work at height (which is practically impossible in the construction industry);
- 2) ensure an adequate protection against falling from height:
  - use of collective protection equipment (scaffolds, protective fencing, protective nets etc.);
  - use of personal protection equipment if use of collective protection equipment is not possible;
  - training of employees who carry out work at height (Riga Stradins University, 2013).

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As a key measure, it should be noted a well-thought-out safe work programme to protect against falling from height where the risks are first reduced by technical and organizational measures. Application of collective labour protection measures is primary compared to personal protective equipment (Labour Protection Law, 2001) since they protect a larger number of employees and their safe use is not significantly dependent on the employee himself.

Since technical solutions of the construction projects are different and situation at the construction site is constantly changing due to the interaction and development of different work stages, it is necessary to identify and eliminate the risks associated with the problems of planning and use of collective protection equipment and their compliance with the regulatory enactments. Improving the collective protection solutions at construction sites will reduce the impact of hazardous work environment risk factors and the probability of accidents.

### 1. Analysis of accidents in construction sector

Construction is considered one of the most dangerous sectors since it is featured by a high accident rate at a workplace. According to Eurostat, about 4.200 people die every year in work-related accidents in the European Union, of which about 1.000 are employed in the construction industry, accounting for 24 % (European Commission, 2016). In Latvia, construction workers more than average suffer from work accidents and occupational diseases.

According to statistical data of the State Labour Inspectorate accident, within the period 2008 to 2014 there were 10.669 accidents at work, of which 1.074 in construction sector, i.e. average 10 % of the total number (Table 1).

Table 1.

#### Distribution of workers suffered in accidents by industries in Latvia within 2008 to 2014

	2008	2009	2010	2011	2012	2013	2014	Total
<b>Accidents at workplace</b>								
<b>Construction sector</b>	234	120	102	138	174	157	149	1.074
<b>%</b>	13	10	8	10	11	9	8	~10
<b>Total in all sectors</b>	1.781	1.203	1.232	1.397	1.545	1.748	1.763	10.669
<b>Grave accidents at workplace</b>								
<b>Construction sector</b>	74	37	27	30	41	45	42	296
<b>%</b>	28	21	15	15	19	20	22	~20
<b>Total in all sectors</b>	265	175	175	196	219	230	213	1.473
<b>Lethal accidents at workplace</b>								
<b>Construction sector</b>	12	7	5	10	11	3	5	53
<b>%</b>	28	22	20	29	31	10	12	~22
<b>Total in all sectors</b>	43	32	25	34	35	31	41	241

Source: State Labour Inspectorate, 2013 - 2015

According to data of the State Labour Inspectorate, one of the main traumatic factors in fatal and severe accidents is falling from height and impact caused by object falling from height. Statistical data for the period 2008 to 2014 are given in Table 2.

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Table 2.

**Distribution of workers suffered in accidents by traumatic factors  
 within 2008 to 2014**

	2008	2009	2010	2011	2012	2013	2014	Total
<b>Number of workers suffered in accidents at workplace</b>								
<b>Falling from height</b>	523	411	405	425	517	543	494	3.318
<b>%</b>	29	34	33	33	33,5	31	28	31
<b>By falling object</b>	173	83	128	142	139	156	191	1.012
<b>%</b>	10	7	10	10	9	9	11	9,5
<b>Total number of accidents</b>	1.781	1.203	1.232	1.397	1.545	1.748	1.763	10.669
<b>Grave accidents at workplace</b>								
<b>Falling from height</b>	128	84	85	88	119	118	108	730
<b>%</b>	48	48	49	45	54	51	51	50
<b>By falling object</b>	27	16	14	26	23	26	26	158
<b>%</b>	10	9	8	13	11	11	12	11
<b>Total number of accidents</b>	265	175	175	196	219	230	213	1.473
<b>Lethal accidents at workplace</b>								
<b>Falling from height</b>	12	2	3	8	6	6	4	41
<b>%</b>	28	6	12	24	17	19	10	17
<b>By falling object</b>	5	5	8	7	6	7	5	43
<b>%</b>	12	16	32	21	17	23	12	18
<b>Total number of accidents</b>	43	32	25	34	35	31	41	241

Source: State Labour Inspectorate, 2013 - 2015

The most frequent causes of grave and lethal accidents are failure to comply with occupational safety regulations or instructions (27 %), unsatisfactory instruction and training of employees (14 %), and insufficient attention (12 %). Analysing these causes of accidents, it can be concluded that most of the grave and lethal accidents can be prevented by organizational measures without the need of large financial investments.

Problems with a formal approach and lack of training of employees are also confirmed by statistics on the working life of accidents victims: 2/3 of them had a short-term length of employment (up to 3 years) (State Labour Inspectorate, 2015).

## 2. Integration of collective protection measures in the construction design

To ensure a safe working environment at the construction site when working at height, it is necessary to plan the provision of collective protection equipment for a new construction project already during the design preparation stage. It must be ensured that issues of safety and collective protection are integrated into the construction design. Hence, well-thought-out decisions for safe and efficient work shall be developed. Also, the amount of work to be carried out using safety belts should be minimized when use of collective protection equipment is not possible.

As confirmed by the analysis of the construction sites survey, at present time the collective work protection equipment is being overlooked at construction sites, often the equipment is damaged or completely removed, causing the risk of falling for the workers.

One of the main reasons why employees are not paying attention to the state and availability of collective protection equipment is a rapid pace of work and tight work schedules. It is therefore necessary already in the construction design to envisage the technologically effective systems of

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collective protection equipment, which do not extend the production process schedule while qualitatively performing their functions.

## **2.1. Implementation of integration process**

In order to be able integrate in the construction design or in the project report the solutions for collective protection equipment during the performance of construction work, it is necessary to review the construction process flowchart (Figure 1) prepared up in accordance with the Construction Law. Timely planning and ensuring the participation of a labour protection specialist at the design stage of the construction allow including well-considered labour protection solutions in the construction design.

The contractor himself is also the general contractor at the same time. Looking at Figure 1, it can be seen that the Labour Protection Coordinator and the responsible foreman must participate in the fulfilment of the design conditions and the corresponding note in the building permit. Therefore, in order to integrate the collective protection measures into the final design, it is necessary to involve the labour protection specialists and the responsible foreman already at the time of the design meetings when the final design is being developed and its parts are mutually coordinated.

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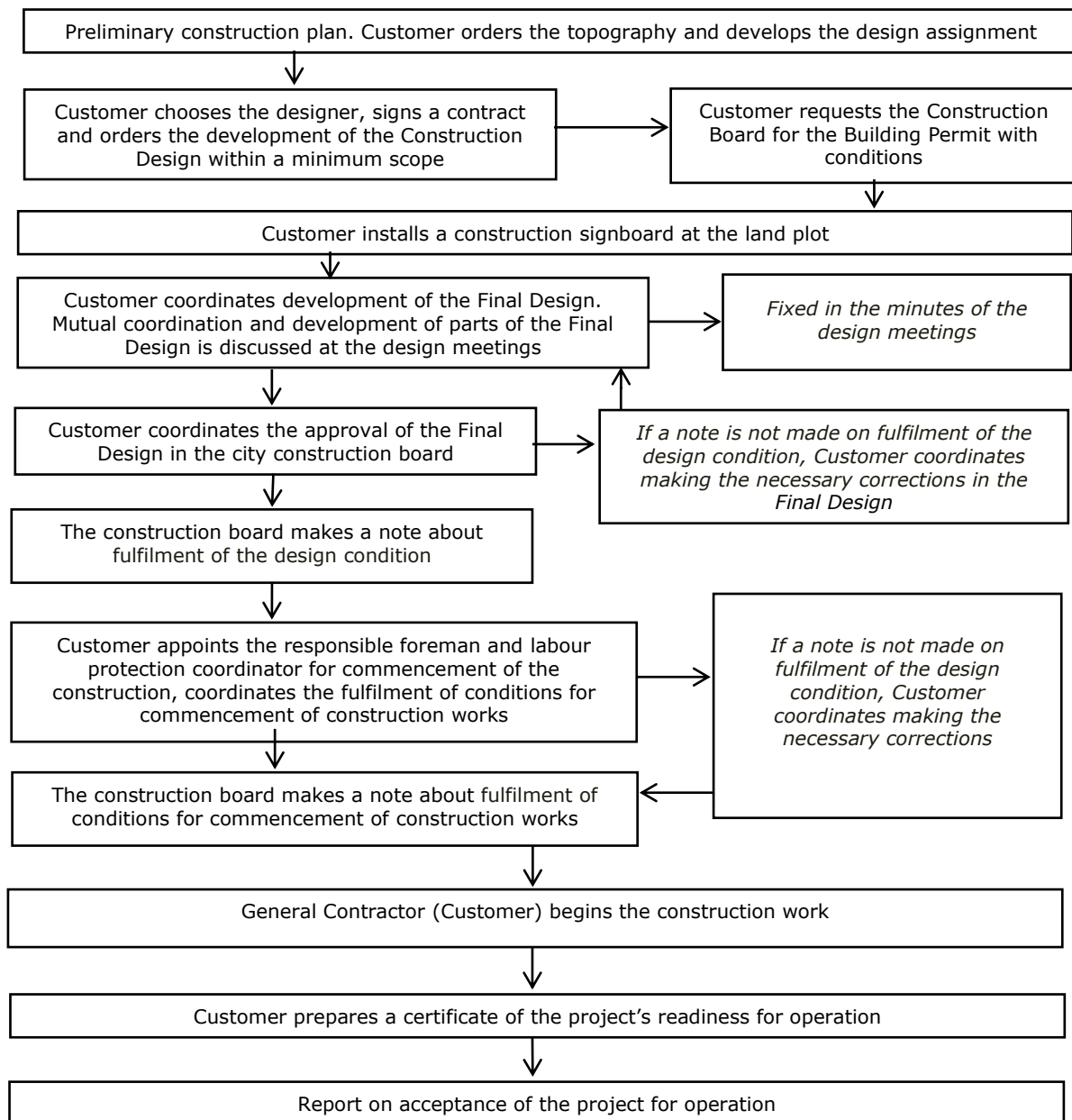


Fig. 1. **Construction process flowchart**

A solution when the labour protection specialist is involved in design meetings can be used to solve and improve also other occupational safety issues in the construction process. However, when it comes to the inclusion of collective protection measures in the final design, the following persons will be required:

- 1) labour protection specialist who provides information regarding the necessary labour protection solutions as well as the requirements of regulatory enactments;
- 2) the designer of construction structure who provides information on new, unfamiliar materials and technologies, points to the points of complicated units; includes the collective labour protection solutions in the final design; indicates possible technical solutions that can be implemented as permanent also during operation of the building;
- 3) responsible foreman who provides information on the organization of necessary work and its performance phases at the construction site. According to the Cabinet of Ministers Regulation of 19 August 2014 No.500 "General construction regulations", the responsible foreman will be in charge of occupational safety and health at the construction site;

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4) the labour protection coordinator in the design drafting phase, who advises, notes the constructively complicated stages of the construction work, develops the labour protection plan. If the project construction is complicated and more building contractors will work at the construction site, the construction promoter (the customer) shall be obliged to assign the labour protection coordinator in accordance with the Cabinet of Ministers Regulation No.92 of 25 February 2003 "Requirements for labour protection during construction work" and the Cabinet of Ministers Regulation No.500 of 19 August 2014 "General construction regulations".

When the customer has entered into an agreement with the designer, has received a conditional building permit and installed a construction signboard on the land plot, he shall also involve the labour protection specialist and the responsible foreman in the development of the final design, and shall appoint the labour protection coordinator for the project planning stage. Thus, the competent persons can go into details and participate in the development of the final design, plan the reliable and efficient solutions for the construction process.

At the design meetings, solutions are being developed for the inclusion of collective protection equipment in the structures of the construction project. The meetings are recorded in order to avoid subsequent disagreements. The designer gradually includes the labour protection solutions in the construction project (Figure 2). In turn, the labour protection coordinator develops the work protection plan to be included as part of the work organization plan and submits it to the designer.

After development of the final design, it is checked in relation to the labour protection issues by the labour protection specialist, the responsible foreman and the labour protection coordinator. If all necessary measures are included in the design, it will be submitted further to the customer for approval so that the design could be subsequently coordinated with the city construction board.

The flowchart shown in Figure 2 will allow to include the well-thought-out collective protection solutions in the final design. It will facilitate and improve the labour protection on complicated stages of construction. It should be noted that it is not enough to simply include the collective protection solutions in the construction project. It is necessary to carry out their supervision throughout the construction process in order not to make changes for the reduction of construction costs in relation to the labour protection solutions, as well as to ensure their technical condition and availability in work performance.

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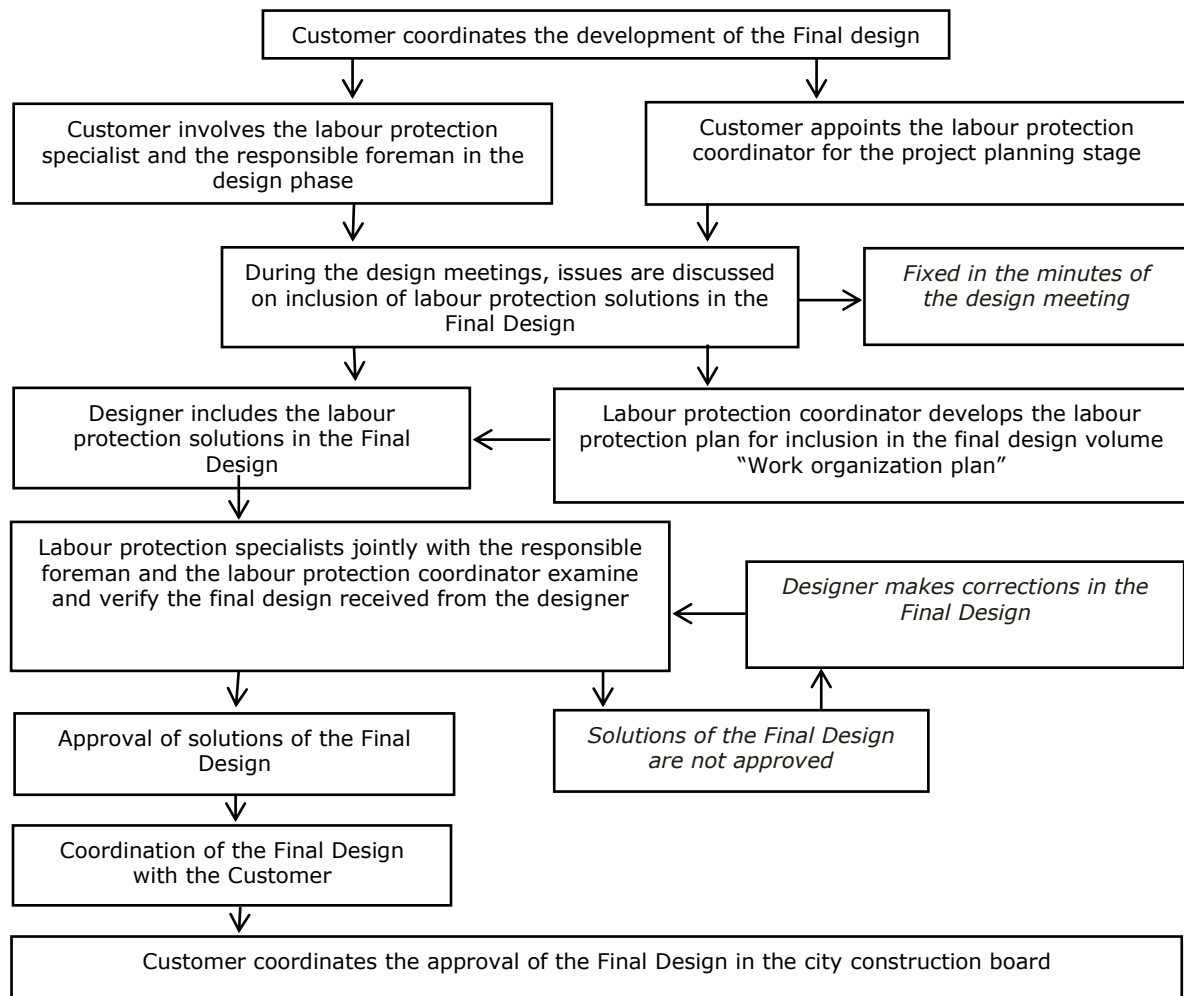


Fig. 2. Flowchart of protection equipment integration in the construction design

## 2.2. Collective protection measures in projects with structures of monolithic reinforced concrete

When carrying out work where the building frame is made of monolithic reinforced concrete structures, there is a high risk of falling. The construction process requires carrying out the reinforcement, forming and concreting works of a complicated technology. Work is often done in large and unconstrained areas, the work processes are permanently changing, safety devices are often removed and relocated, safety belts are not always used when necessary. Consequently, the labour protection measures must be carefully planned and monitored.

In practice, there are often cases when a safety device against falling is installed but it creates additional risks for workers at the construction site. Therefore, when designing the collective protection solutions, care should be taken not to create additional risks for employees at the construction site.

### *Solutions for the integration of collective defence equipment into reinforced concrete structures*

One of the most effective and convenient rail mounting solutions is to incorporate the railing fastenings in the ceiling and wall constructions. Metal or plastic pipeline (approximately 15 - 25 cm long) is placed and secured to the reinforcement frame and then concreted, thus creating a solid foundation for railing structures. The railing structures are made of a smaller diameter pipe or a square tube subsequently placed in the foundation. This solution allows the rails to be installed and disassembled much quicker and practically in any required location.

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The handrail design itself is developed with the corresponding mounting points for the foot rail, middle rail and top rail at heights specified in regulatory enactments. It facilitates the assembly of wood as well as the correct height control during labour safety tours. The railing structures are mobile, so they can also be used in other projects. This solution is simple, economical and durable.

A faster, safer and at the same time more expensive solution is to use the industrially manufactured protection railing guard. Fastenings of respective diameter must be provided in the final design for these rails that, like the metal pipes, must be fastened to the metal frame and concreted in the supporting structure.

In construction of residential buildings, the exterior walls of the reinforced concrete frame are often masoned. To perform these works, it is necessary to remove the protection guards. It means that employees engaged in these works will have to wear safe belts and it will be necessary to constructively arrange their fastening spots - the anchor points. One of the solutions is to imbed in concrete two reinforcement bars in the columns 10 - 20 cm below the slab, but later they will need to be cut off and, if there are many openings, then the process will very labour-consuming. Another solution is to provide for the anchorage points in the reinforced concrete columns, at which upper part a tie can be wrapped up, fastened and then connected with ropes for the anchoring of personal protection equipment.

Although the anchor points are provided for strengthening of the safety belts, an additional protection needs to be provided with use of catch nets. It will provide both the additional protection in case of falling worker as well as against falling materials and other objects. The final design should provide for the fastening of these systems in the structures of the reinforced concrete frame.

If it is necessary to carry out the frame erection works within a wide area, the mounting points (cone-shaped pipes) should be provided in the reinforced concrete columns or walls for a separately installable ALSINA system structure that is intended for the protection of workers against falling with personal protection equipment added.

This system can be used in cases when it is necessary to install the formworks and the collective protection equipment (railings and safety nets). The ALSINA system has been manufactured and tested in accordance with the requirements of DIN EN 795 and ANSI Z359.6 / CSA Z259.16. This protection system eliminates accidents in risky situations besides unprotected edges and at big heights. The system includes a retractable device with a blocker, which automatically locks when an acceleration suddenly occurs. Thus, an accidental fall can be stopped and the injury risk can be reduced (Encofrados J.Alsina, S.A. – Central, 2016).

Before performance of work, the system must be tested. The work life of the equipment is average 5 to 10 years. The protective equipment must be in a proper condition, therefore the tests must be carried out in accordance with the requirements specified by the manufacturer (Encofrados J.Alsina, S.A. – Central, 2016).

### **2.3. Collective protection measures in projects with structures of prefabricated reinforced concrete panels**

Construction of the building frame from prefabricated reinforced concrete structures is a relatively fast and technologically arranged process where the frame structures are delivered ready to the construction site. In order the necessary labour protection solutions would be implemented industrially, they must be initially provided for in the drawings of the final design.

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The construction design may provide for the railing fastening in the facade parts of external reinforced concrete panel walls. These anchors are permanent, they are later covered when warming the building with stone wool insulation.

Since the bottom edge of the window opening is lower than one meter, it requires the installation of a railing to protect against falling. The final design can provide that the reinforced concrete wall panel structures are delivered with wooden plank frames incorporated in windows. These are permanent elements in the frame of the building and later they will be covered with heat insulation. One or two railings for protection against falling are mounted in these frames onsite at the construction site (in the materials storage), they are removed when it is necessary to perform window assembly works. Reinforced concrete wall structures are later installed with already mounted railing in the window openings, thus eliminating the risk that the rails should be installed at height using personal protective equipment.

A film is mounted at these wooden frames of window openings to protect from draught in and maintain heat in the building. The film is installed on an already assembled reinforced concrete structure. Consequently, such collective protection solution is capable to eliminate more risks.

#### **2.4. Incorporation of anchor points in the final design**

Anchor point is a stationary or temporary safety point, to which safety means are fastened, including ropes and slings, and which in combination with personal protection equipment is designed to prevent an employee from entering the risk area of falling or, when the work is carried out in an area where the risk of falling exists, to ensure that the fall will be stopped (Labour protection requirements..., 2014).

Inadequate anchor points in practice is often used for performance of work. In facade finishing, ropes are often used to access the workplace and carry out the work. The safety system consists of two ropes, which are fixed at one point. According to Cabinet Regulation No.143 of 18 March 2014 "Labour protection requirements when working at height", they must be individually fixed at stationary anchor points. Also, the anchor point itself where the rope is fixed is not compliant with the requirements of the standards LVS EN 795 or LVS EN 517.

According to the Cabinet of Ministers Regulation No.143 "Labour protection requirements when working at height" of 18 March 2014, two ropes are used but their protection against rubbing against rough surfaces is not provided.

It is important that the construction design preliminarily provided for anchor points meeting the requirements of LVS EN 795 or LVS EN 517 standards. Integrating such proven and certified systems of solutions will allow employees to perform their work safely.

#### *Solutions for integration of anchor points into the final design*

When constructing residential buildings, work often needs to be done on balconies when protective guard is not yet installed or has to be removed, for example, to accept the materials. In this case, workers should wear safety belts but they need to be fastened. The designer must provide for locations of anchor points where the worker can attach his own personal equipment to carry out the work. The construction project shall include incorporation of mobile anchors into the balcony surface structures.

It is efficient and economical to use mobile and reusable anchor points that are incorporated into reinforced concrete structures. Thus, such anchorages can also be used in other construction

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projects. These anchor points meet the requirements of standard LVS EN 795 Class B, their installation and inspection must be carried out according to the manufacturer's recommendations (Skydda, 2016).

In Finland, special horizontal safety lines are often used, which are intended to strengthen the safety straps of the worker when the work is carried out at open and unprotected edges. Such horizontal safety lines should be fixed to a beam of type I, reinforced concrete columns or roof. Depending on the chosen mounting location, the type of the safety line design is also chosen. It is important to choose a system that is manufactured and tested to meet the requirements of the standards, and only thereafter it can be fastened against the intended structure. Layouts of anchor structures and safety system must be provided for in the final design.

The final design must provide for remaining and permanent anchor points incorporated in the roof structures. Thus, the work safety will be improved not only during the construction but also during the operation and maintenance of the building. According to the requirements of LVS EN 795 or LVS EN 517, it is possible to select respective anchor points for structures of different roof slope and covering.

The designer of the building structures section must anticipate all necessary anchor points, determine the dimensions and incorporate them in the design plans so as to ensure the safety of builders.

### **3. Management of construction project labour protection system**

Based on the performed studies - data on causes of accidents at workplace, analysis of the results of surveys of employees at construction sites and information on collective protection equipment obtained during inspection of construction sites, it can be concluded that it is necessary to arrange the organizational structure of the construction site labour protection in relation to the training and informing of employees, as well as the control over fulfilment of requirements of labour protection, including collective protection.

#### **3.1. Organizational structure of labour protection system at the construction site**

Each day workers at the construction site have a rapid pace of work and tight work deadlines, various construction works are interacting and more contractors are simultaneously employed. Priority at construction sites is given to performance of work while labour protection requirements are neglected, they are often forgotten. Insufficient attention is paid to the planning of labour protection measures prior to the commencement of construction work; often urgent solutions are sought directly during the construction work.

Also, workers employed at construction sites most often formally are acquainted with the labour protection plan. Information therein delivered for the employees is only partly useful. The employees are undertrained and insufficiently informed.

Therefore, in order to arrange the organizational structure of the construction site labour protection system, we offer the following stages of activities:

- thorough planning of safety measures prior to commencement of work;
- training and informing of employees;
- control over observance of labour protection requirements.

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### **3.2. Planning of labour protection measures**

Safety solutions need to be planned before starting the construction work; safe working methods must be provided in all phases and periods of construction.

In accordance with the Cabinet of Ministers Regulation No.92 of 25 February 2003 "Labour protection requirements for construction work", the customer must appoint the labour protection coordinator for the project fulfilment phase, i.e. for the construction phase. This appointment must be submitted to the city construction board as one of the conditions for obtaining a note in the building permit on execution of requirements for commencement of construction works.

The labour protection specialist needs to be appointed as the labour protection coordinator for the project fulfilment phase, thus the problems of labour protection at the construction site will be solved by an individual competent person, as well as supervision will be retained over realization of collective protection means integrated in the construction project. In practice, a person with a certificate of construction practice in the management and supervision of construction works and a basic level of knowledge in labour protection is usually appointed as a labour protection coordinator. This person has other official duties at the construction site; therefore, a superficial attention is paid to the supervision of labour protection requirements.

Prior to the commencement of construction work, the labour protection coordinator shall for the project fulfilment phase carry out an examination of the labour protection plan and, if necessary, make corrections thereof.

#### *Incorporation of labour safety requirements in the organized procurements*

The project manager organizes a price survey for each type of work and chooses an appropriate contractor. Within the framework of the tender, a price request is sent to different companies along with the final design documentation, quality requirements, deadlines for execution and the most important contractual conditions.

According to the authors, the documentation of the procurement request must also be accompanied by the necessary labour protection requirements for the type of work involved. Consequently, the contractors will be able to plan not only the work to be done in a timely manner, but also safe working methods, including the detailed costs of labour protection in their estimates. The labour protection coordinator for the project implementation phase shall define the labour protection requirements for each type of work in the procurement tender and shall include them in the price request form.

Upon receipt of the bids, the project manager together with the labour protection coordinator and the responsible foreman shall choose the contractor to conclude the contract. The contract is accompanied by labour protection requirements with the WS Barometer assessment conditions as well as by rules and regulations of the construction site with the specified penalties for violations of labour protection.

#### *Preparation of the employer's labour protection plan*

Prior to commencement of works, the project manager, labour protection coordinator and responsible foreman shall organize a contractor's project start-up meeting, in which together with the responsible person of the subcontractors shall discuss complicated and dangerous work phases, introduce to the site's labour protection plan and jointly develop the contractor's labour protection plan for the type of work to be carried out. The meetings shall be recorded.

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In the labour protection plans, it is necessary to provide the following information regarding the collective protection equipment:

- technical systems and supporting equipment for each type of work;
- detailed design for formwork, if any;
- scaffolding, footways and other safe working platforms to be used;
- safe anchor points for safety belts (mobile anchor points, safety lines);
- plans for protecting fences and protective covers, indicating the amount of fencing to be installed, the amount of wood and plywood needed, and the possibilities for turnover of the materials (if individual buildings have the same layout).

If the necessary information is included in other construction documents or in drawings of the construction design, then the labour protection plan may contain only indications of the place where the information can be found.

Labour protection methods need to be planned so as to minimize the amount of work carried out using the safety belts.

### **3.3. Training and awareness of employees**

Before the work is started, the labour protection coordinator shall train and instruct the contractor's workers. At the end of the training, employees of the construction site shall pass a test on labour protection issues included in the training. If all test answers are correct, the general contractor shall issue a labour protection card and a pass to the site (of business card format).

The issued safety cards are registered in a special register and valid for one year. In turn, the validity of the site passes is specified until completion of the works but not more than one year. If works at the construction site are carried out for more than one year, the contractors receive retraining and complete a knowledge test. After the test is completed, new labour protection cards and site passes will be issued. At the entrance to the construction site, the security guard shall check the passes and their validity. The labour protection coordinator, following the register of issued labour protection cards, can plan the necessary training.

Labour protection cards must be issued not only to the contractor's employees but also to the employees of the general contractor. Prior to the start of work, the main contractor's staff is being trained, after which they take a test to receive the safety card and the site pass. Thus, knowledge of labour protection requirements will be ensured also at the level of management of the construction site.

### **3.4. Control over observance of labour protection measures**

Since in construction there are different work phases and processes interacting with each other, and the work at the construction site is carried out by workers of several enterprises simultaneously, a sufficient control over technical condition of the collective protection equipment is not ensured. It is therefore necessary to regularly check the availability and adequacy of collective defence equipment on a daily basis.

As one of the work duties, instruct the assistant foreman to carry out a daily inspection of the condition of collective protection equipment. The established situation must be fixed. In case of non-compliance, the assistant foreman shall inform the labour protection coordinator and the responsible foreman and shall immediately organize the restoration and repair of collective protection equipment or shall bar the approach to the hazardous place.

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To carry out control over labour protection at the construction site, the labour protection coordinator once a week shall conduct labour protection walkdowns, shall fix the established situation in the WS Barometer observation form and shall determine the overall safety level of the construction site.

It is important at the construction sites to carry out weekly WS Barometer walkdowns, and it is equally important for the general contractor to share with the contractors the established labour protection situation at the construction site. Therefore, the obtained results should be discussed during weekly project meetings while the labour protection coordinator must point to the violations and preventive measures taken.

Since disagreements often appear in the construction, all labour protection violations must be formulated in writing, drawing up a report on occupational safety violations with photo fixations. Such violation report must be drawn up immediately, setting the deadline for eliminating non-compliances and submitting it to the responsible contractor. The elimination of labour protection violations within the specified time limits is controlled by the assistant foreman and the responsible foreman, informing the labour protection coordinator accordingly. If dangerous violations occur repeatedly, then the work must be immediately suspended in accordance with provisions of the contract. Works at the site can only be resumed once the hazard has been eliminated.

### **Conclusions, proposals, recommendations**

In order to develop well-thought-out solutions for safe and efficient work performance at the construction site, as well as to reduce the amount of work to be carried out using safety belts when use of collective protection equipment is not possible, it is necessary to start planning of labour protection requirements for the construction process already in the design phase.

In order to ensure a safe work environment at the construction site when working at height, it is recommended to plan the provision of collective protection equipment for the new building already in the project preparation phase (development of the construction project) and to take the following measures:

- 1) ensure that issues of occupational safety and collective protection equipment are integrated in the construction project (for a particular project, taking into account the specifics of the construction (for the construction of a monolithic reinforced concrete frame or panel building frame, to provide respective collective protection measures, such as railing mounting places and anchor points);
- 2) to develop sound labour protection plans, providing for safe working methods in all phases of work, to include technical systems and supporting equipment for respective work phases, pay a special attention to formwork and formwork removal (to develop detailed plans), provide anchor points for hooking of safety belts (for example, ALSINA system, safety lines or mobile anchorage points for carcass construction work before installation of protective guard), include a safe access to the work platforms. The labour protection plan shall also include the detailed drawings with collective protection measures, indicating the number of risk areas, the required amount of wood and plywood for protective guards and hoods of openings, the possibilities of materials circulation for other projects.

During the project implementation phase, the supervision and control over observance of labour protection requirements, including collective protection requirements, should be ensured, as well as should make sure that all employees at the construction site are instructed, trained and familiar

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with labour protection requirements. In the project implementation phase (the construction board has given approval for the fulfilment of conditions for commencement of construction works), it is recommended to take the following measures:

- 1) To develop a summary of labour protection requirements by types of work to be enclosed with the price request documentation when organizing the construction work procurements. Thus, the contractor will become familiar with the labour protection requirements prior to conclusion of the contract. Labour protection requirements must be added to the contract;
- 4) Prior to commencement of works, the general contractor together with the contractor shall develop the labour protection plan for individual type of work and shall discuss hazardous work phases;
- 5) Prior to commencement of works at the construction site, the employees of both the general contractor and the contractor must be trained, given an additional instruction, familiarized with the labour protection plan and requirements for collective protection equipment. After training, the labour protection coordinator should arrange a test of knowledge. The site passes and labour protection training certificates are issued to employees who are familiar with labour protection requirements at the construction site. Only then can the construction work be started;
- 6) Availability and technical condition of collective protection equipment must be checked on a daily basis;
- 7) It is recommended to use the Finnish WS Barometer system for the assessment of condition of collective protection equipment at the construction site, which has been supplemented by the author with evaluation criteria for ropes, fastenings and anchor points in accordance with Latvia regulatory enactments;
- 8) During the project meetings, employees of the construction site must be informed about the established discrepancies as well as good practice examples.

## Bibliography

1. Encofrados J. Alsina, S.A. – Central (2016). ALSIPERCHA Fall Arrest System [online]. Barcelona, Spain: Alsina Formwork Solutions, [viewed 25 October 2017]. Available from: <http://www.alsipercha.com/en/alsipercha/alsipercha-construction/>
2. European Commission (2016) [online]. *Eurostat. European Statistics* [viewed 26 October 2017]. Available from: <http://ec.europa.eu/eurostat>
3. General Construction Regulations (2014) [online]. Republic of Latvia Cabinet Regulation No.500 Adopted 19 August 2014, [viewed 25 October 2017]. Available from: <https://likumi.lv/doc.php?id=269069>
4. INSPECTA (2008). *Occupational safety, working at heights*. Labour protection information – explanatory material. Riga: State Labour Inspectorate. 16 p.
5. Labour Protection Law (2001), [online]. Republic of Latvia, Saeima adopted 20 June 2001 [viewed 25 October 2017]. Available from: <https://likumi.lv/ta/en/id/26020-labour-protection-law>
6. Labour protection requirements for construction work (2003) [online]. Republic of Latvia Cabinet Regulation No.92 Adopted 25 February 2003, [viewed 25 October 2017]. Available from: <https://likumi.lv/ta/en/id/71958-labour-protection-requirements-in-performing-construction-work>
7. Labour protection requirements when working at height (2014) [online]. Republic of Latvia Cabinet Regulation No.143 Adopted 18 March 2014, [viewed 25 October 2017]. Available from: <https://likumi.lv/doc.php?id=265121>
8. Riga Stradins University (2011). A memo to employees who work at a height. Riga: Riga Stradins University Institute for Occupational safety and environmental health. 18 p.
9. Riga Stradins University (2013). Labor protection practice standard for the construction industry. Riga: Riga Stradins University Institute for Occupational safety and environmental health. 158 p.
10. Skydda (2016). Fall Protection [online]. Sweden: Skydda [viewed 25 April 2017]. Available from: <http://www.skydda.com/en/fall-protection/anchorage/wc785462~p141114>

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11. State Labour Inspectorate (2013). *State Labour Inspectorate in 2013, Annex 1 Operational Report* [online]. Riga: State Labour Inspectorate [viewed 16 October 2017]. Available from: <http://www.vdi.gov.lv/lv/parmums/parskati/>
12. State Labour Inspectorate (2014). *State Labour Inspectorate in 2014, Annex 1 Operational Report* [online]. Riga: State Labour Inspectorate [viewed 16 October 2017]. Available from: <http://www.vdi.gov.lv/lv/parmums/parskati/>
13. State Labour Inspectorate (2015). *State Labour Inspectorate in 2015, Annex 1 Operational Report* [online]. Riga: State Labour Inspectorate [viewed 16 October 2017]. Available from: <http://www.vdi.gov.lv/lv/parmums/parskati/>

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## ENVIRONMENTAL AWARENESS OF SOCIETY AND RESULTING ENVIRONMENTAL THREATS

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**Abstract:** The aim of the research was to assess the level of environmental awareness of inhabitants of Malopolska province, which may be a basis for further deliberations on the need for environmental education in this region. The research was carried out from May to September 2017 on a representative sample of 180 respondents. This article presents the questions from the questionnaire, which made it possible to assess the level of environmental awareness and perception of current threats to the natural environment by inhabitants of Malopolska province.

**Keywords:** environmental awareness, environmental education, environmental threats.

**JEL code:** Q56

### Introduction

Development of technology, production on a mass scale, and increasing population contribute to intensified use of natural environment resources. There is increasing pressure on the environment, particularly in highly developed countries, while the amount of natural resources is not increasing. The negative effect exerted by global production and consumption on the condition of the natural environment has become a subject of interest to governments of highly developed countries in recent years. Preventing the progressive degradation of the environment and restoring its damaged components require its users to use various ways of protection (Wielewska 2015; Wielewska 2017).

Awareness of threats which results from inefficient use of natural resources is accompanied by little knowledge about the sources and effects of this action. Lack of environmental education is mainly determined by the experience of individual entities and local communities (Glinski, 1988). That is why the increase in environmental awareness and shaping such attitudes require explanation of individual problems and environmental threats in an accessible way and reference to examples from the nearest environment.

The aim of the research was to assess the level of environmental awareness of inhabitants of Malopolska province, which may be a basis for further deliberations on the need for environmental education in this region.

This article presents the results of author's research using the method of diagnostic survey with a questionnaire, which is a technique for gathering information consisting in filling out (usually individually) special questionnaires, usually with a high level of standardization, in the presence or more often in the absence of the poll-taker (Pilch, 1995). The research was carried out from May to September 2017 on a representative sample of 180 respondents. This article presents the questions from the questionnaire, which made it possible to assess the level of environmental awareness and perception of current threats to the natural environment by inhabitants of Malopolska province.

### Research results and discussion

#### 1. The essence and notion of environmental awareness

Environmental awareness is a tool for implementing the idea of sustainable development and programs aimed to accomplish it. Contemporary society is facing the challenge of changing the lifestyle. The hitherto (consumption-oriented) lifestyle leads to an uncontrolled use of natural environment resources, to its progressive degradation, which poses a threat of significant

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deterioration of the life quality of future generations. Therefore, one should try to develop a new, more responsible lifestyle, create an empathic society where it is possible to implement the principles of sustainable development. Such a society should realize the responsibility for their actions and their negative effects in a longer time perspective. It should also show a high level of environmental awareness, perceived as knowledge and attitude towards the natural environment, its problems and threats (Rzeszewski, 2005).

Popularization of environmental knowledge and shaping environmental awareness in the society must be the paramount goal and condition of sustainable development (Zuzek, Mickiewicz 2014; Kielczewski 2001). The only rational measure for shaping environmental attitudes in the society is environmental education and formation of environmental awareness in individual social groups, conducted both by institutions and social organizations or media (Terlecka, 2014). The effective environmental protection is possible when the entire society is involved in cooperation (Wielewska, Gliniak, Sobczyk, Prus, 2017).

Environmental awareness is also shaped under the influence of so-called social influence instruments used by a country, which can be divided into formal and informal. The formal instruments of influence are actions legalized by applicable laws, and even institutionalized. Then the main role played environmental education, access to information on the environment, and lobbying in legislative organizations. Informal instruments include informal environmental education (carried out based on open-access information, conversations in informal groups of interested parties), information measures (e.g. exhibitions, shows, seminars, organization of mass campaigns for environmental protection, publication and distribution of training materials), social pressure (e.g. demonstrations and manifestations aiming to draw attention to the aspects associated with threats to and protection of the natural environment), or social services (e.g. information centers) (Terlecka, 2014).

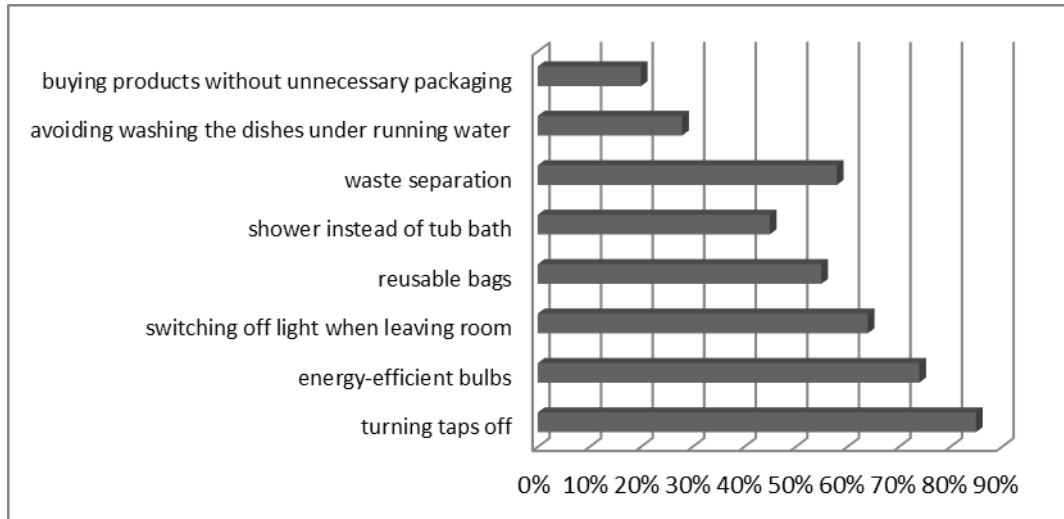
High level of environmental awareness influences purchasing decisions of the society. People involved in the matters of environmental protection correct their habits and more and more often choose environmentally friendly products. Such an attitude influences producers who are, in a sense, forced to change the manner of production to a more environmentally friendly one, taking into account the environmental aspects in all life cycles of the product (Nycz-Wrobel, 2012).

Among the actions which are favorable to popularization of environmental awareness, the following should be mentioned: showing examples of using ecology in economy, particularly when it is perceived as an integral part of a business action strategy; conducting systematic pro-environmental education of the society, especially with interdisciplinary profile; disseminating information about scientific achievements in the field of ecology and environmental protection; developing institutional and legal bases for environmental protection; creating strategies for prevention of social conflicts concerning environmental protection; creating pro-environmental lobby; as well as administrative authorities connected with shaping the awareness and popularization of the pro-environmental model of society. Environmental awareness can be expressed in all these forms (Kielczewski 2001; Tuszyńska 2008).

## **2. Pro-environmental actions taken by inhabitants of Malopolska province – research results**

The conducted research shows that inhabitants of Malopolska province have a sense of responsibility for the environment that surrounds them. 94 % of the respondents believe that they

themselves have an effect on the condition of the natural environment. The main causes for such an attitude include, above all, the care for your own and family's health (64 %) and the conviction of the validity of your actions (36 %). To implement pro-environmental behaviors, the respondents claim it is essential to introduce environmental education at all educational stages (39 %) and to create desired behavior models and promote them through media (42 %). The respondents declare that in their daily lives they try to implement behaviors that protect the environment (Fig. 1).

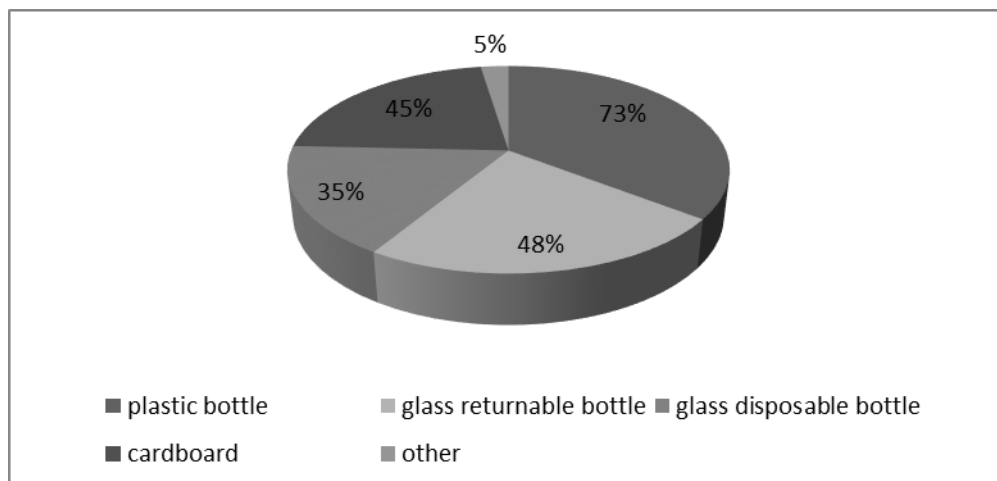


Source: author's research

Fig. 1. Pro-environmental behaviors declared by inhabitants

The most common pro-environmental actions have, above all, economic importance since they concern limiting the consumption of electricity or water in households. A much smaller number of people decide to separate waste or try to buy products without unnecessary packaging.

In 2015, the Polish Ministry of the Environment put forward an initiative to impose an obligatory deposit on each plastic bottle, the purpose of which was to encourage entrepreneurs to recycle and to save money in budgets of local governments.



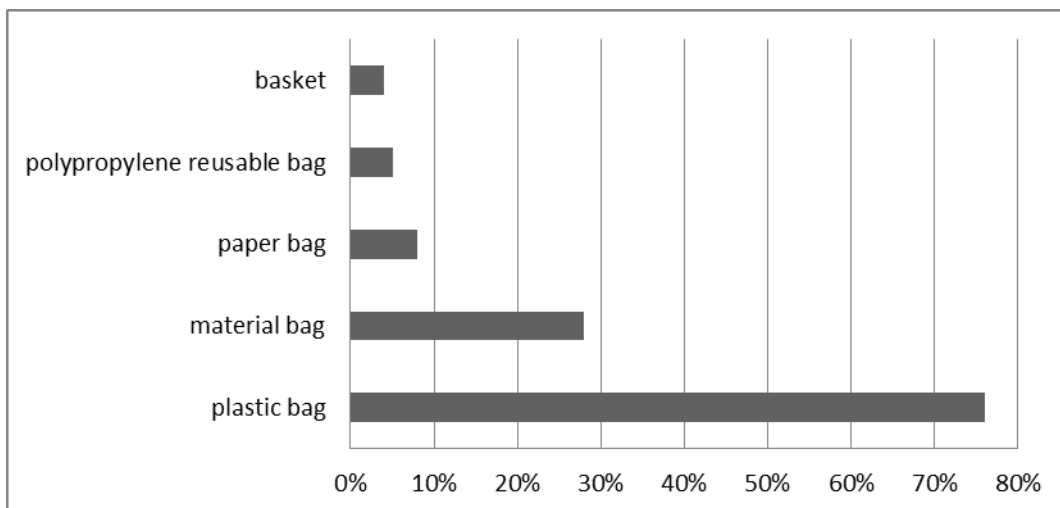
Source: author's research

Fig. 2. Types of packaging in which inhabitants usually buy beverages

The conducted research showed that, when shopping, 67 % women and 75 % men choose plastic bottles, which are a very 'difficult' recycling material. Glass returnable bottles are chosen by only 23 % women and 18 % men, beverages in disposable bottles are rarely bought, similarly to cardboard (which was chosen by 17 % men and 12 % women).

The impact of packaging, including shopping bags, on the natural environment should be assessed throughout their entire life cycle, beginning from procuring raw materials necessary for production, and ending at the stage of waste recovery or disposal. Assessment of only one stage may not take into account significant threats, which are observed at other stages. For this reason, relatively objective assessment tools are used, including packaging life cycle analysis – LCA. These tools take into account different ecological criteria (consumption of natural resources, destruction of the environment, energy consumption, emissions to air, water, soil, industrial utilization of waste, effect on human health etc.). When investigating only the phase of waste, it can be stated that packaging which, once used, can be subjected to industrial recovery processes, i.e. material recovery through recycling (material and organic) or energy recovery, is better for the environment. This means both possible usability in terms of materials from which packaging is made and availability of recovery facilities ([https://www.plastech.pl/pub/downloads/Stanowisko\\_COBRO.pdf](https://www.plastech.pl/pub/downloads/Stanowisko_COBRO.pdf)).

It has been known for a long time that plastic bags are hardest to recycle. Therefore, the best choice is reusable eco bag or material bag, while a large number of people decide to use disposable plastic bags when shopping.

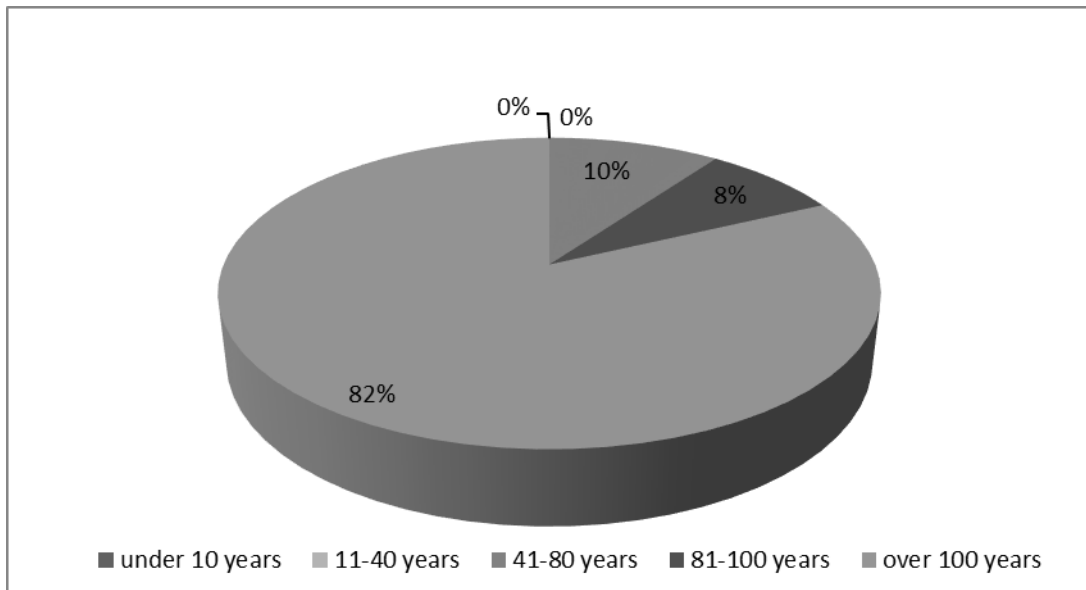


Source: author's research

Fig. 3. Types of bags the respondents choose most often

The conducted research showed that women are more thoughtful when choosing the type of shopping bag, since 32 % women use disposable plastic bags, whereas as many as 65 % men decide to use this type of packaging. In the case of reusable plastic bags, the percentage of responses was 43 % and 36 %, respectively. The most worrying is the fact that only a small percentage of respondents use reusable eco bags, baskets, or material or paper bags. That is why since 1 Jan 2018 there is a fee for using disposable plastic bags. The main purpose of the changes is to limit the use of non-ecological plastic bags and to convince consumers to use reusable packaging or packaging made of paper.

Due to the fact that plastic bag is the most frequently chosen shopping bag among the respondents, they were asked about the plastic bag decomposition time.

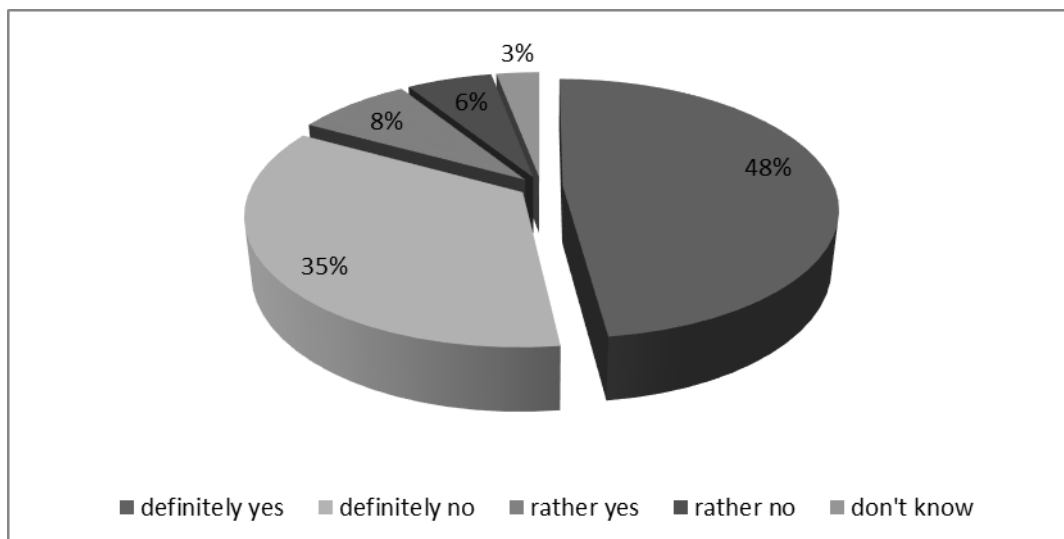


Source: author's research

Fig. 4. **Plastic bag decomposition time according to respondents' answers**

When analyzing the understanding of the problem, it can be stated that a significantly higher percentage of men (58 %) know that it takes over a hundred years for a plastic bag to decompose, and only 42 % women gave the same answer. Worrying might be the fact that almost 10 % respondents indicated that plastic bag would decompose in 41-80 years, which suggests they lack knowledge on this subject.

Saving water also has a significant effect on the condition of the natural environment since the more water we use, the more water needs to be treated and the more sewage (which has to be purified before discharge) is discharged ([http://ochrona-srodowiska.4fm.pl/oszczedzanie\\_wody.html](http://ochrona-srodowiska.4fm.pl/oszczedzanie_wody.html)).



Source: author's research

Fig. 5. **Significance of the subject of saving water in the context of environmental protection**

Only 30 % women and 33 % men gave a definite answer to the posed question, while 42 % women and 37 % men believed that saving water is rather important for environmental protection. There was a small percentage of respondents who stated that large water consumption does not have a negative impact on the environment. The results are not satisfactory, taking into account

the fact that, due to acid rain and environmental pollution, the amount of drinking water is decreasing. That is why saving it should be important to every city and village dweller.

### **Conclusions, proposals, recommendations**

The natural environment is a value which is widely accepted and declared by Polish society. However, the positive attitude to nature does not fully correspond with actual choices of environmental values and environmentally friendly consumer behaviors (Wielewska, Zuzek, 2015).

- 1) The conducted research shows that the level of environmental awareness among the inhabitants of Malopolska province to whom the research concerned is not too high. The inhabitants assess their own interest in environmental protection as average.
- 2) Based on the conducted research, it can be stated that there is still a lot to do in the field of environmental education of society. Publicizing the information on the adverse effects of human activities on the environment has initiated the process of environmental education. Education and increasing the level of environmental awareness alone are not enough. Therefore, it is necessary to change society's thinking, ideas and habits.
- 3) The interest in and care of the matters of the natural environment should be implemented into daily life. This requires administrative actions as well as legal-institutional solutions to control people's actions with respect to protection of the natural environment.

### **Acknowledgement**

The publication was financed from subsidies for maintenance of research potential granted by Ministry of Science and Higher Education

### **Bibliography**

1. Glinski, p. (1988). Swiadomosc ekologiczna spoleczenstwa polskiego – dotychczasowe wyniki badan (Environmental awareness of the Polish society – hitherto research results). „Kultura i Spoleczenstwo”, no 3.
2. [https://www.plastech.pl/pub/downloads/Stanowisko\\_COBRO.pdf](https://www.plastech.pl/pub/downloads/Stanowisko_COBRO.pdf)
3. [http://ochrona-srodowiska.4fm.pl/oszczedzanie\\_wody.html](http://ochrona-srodowiska.4fm.pl/oszczedzanie_wody.html) (2017-10-22)
4. Kielczewski, D. (2001). Ekologia spoleczna (Social ecology), Wydawnictwo Ekonomia i Srodowisko, Bialystok, p. 163.
5. Nycz-Wrobel, J. (2012). Swiadomosc ekologiczna spoleczenstwa i wynikajace z niej zagrozenia srodowiska naturalnego (na przykladzie opinii mieszkancow wojewodztwa podkarpackiego) (Ecological awareness of society and the resulting natural environment threats (on the example of opinions of the Subcarpathian voivodship inhabitants)). „Ekonomia i Nauki Humanistyczne. Zeszyty Naukowe Politechniki Rzeszowskiej”, (19) 3, p. 64.
6. O edukacji ekologicznej w Polsce (On ecological education in Poland), (2014). M. K. Terlecka (Red.), *Edukacja Ekologiczna. Wybrane problemy*, Wydawnictwo Armagrap, Krosno, p. 11.
7. Pilch, T. (1995). Zasady badan pedagogicznych (Principles of educational research). Warszawa, pp. 86-87.
8. Rzeszewski, M. (2005). Poziom swiadomosci ekologicznej mieszkancow i turystow odwiedzajacych Miedzyszroje w swietle zagadnien zrownowazonego rozwoju (The level of ecological awareness of inhabitants and tourists visiting Miedzyszroje in the light of sustainable development issues), „Z badan nad wplywem antropresji na srodowisko” no. 6, pp. 78-84.
9. Tuszynska, L. (2008). Swiadomosc ekologiczna Polakow w drodze do rozwoju zrownowazonego i trwalego (Poles' environmental awareness on the road to sustainable and long-lasting development). *Problemy Ekologii*, (6), p. 326.
14. Wielewska, I. (2015). *Ecological Investments as a Necessary Condition for Sustainable Development of Agribusiness Companies* [in:] *Economic Science for Rural Development. Rural Development and Entrepreneurship. Proceedings of the International Scientific Conference, No 39, Latvia University of Agriculture, Jelgava*, p. 48.
15. Wielewska, I. (2017). *Eco-innovations and Sustainable Development of Businesses in Rural Areas of Kujawsko-pomorskie Province of Poland* [in:] *Economic Science for Rural Development. Proceedings of the International Scientific Conference, Integrated and Sustainable Regional Development Production and Co-operation in Agriculture No 44, Latvia University of Agriculture, Jelgava*, p. 207.
16. Wielewska, I., Gliński, M., Sobczyk, W., Prus, p. (2017). *Ecological Education for Sustainable Development of Rural Areas* [in:] *Economic Science for Rural Development. Proceedings of the International Scientific*

Conference, Integrated and Sustainable Regional Development Production and Co-operation in Agriculture  
No 45, Latvia University of Agriculture, Jelgava, p. 252.

17. Wielewska, I., Zuzek, D.K. (2015). Environmental Awareness of Rural Population in the Light of the Authors' Research. *Problems of World Agriculture* Volume 15 (XXX) Number 4, Warsaw University of Life Sciences Press, Warsaw, p. 215.
18. Zuzek, D., Mickiewicz, B. (2014), Aktywnosc przedsiebiorstw w kontekscie wdrazania zasad zrownowazonego rozwoju w wojewodztwie malopolskim (Enterprises' activity in context of sustainable development principles implementation in Malopolska province). *Optimum. Studia Ekonomiczne*, (16) 6, p. 565.

## **CORPORATE SOCIAL RESPONSIBILITY AS A CHANCE FOR SUSTAINABLE SOCIAL-ECONOMIC DEVELOPMENT OF SMALL AND MEDIUM ENTERPRISES IN POLAND AND LATVIA**

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**Abstract:** In scientific literature, one can come across different approaches to the idea of corporate social responsibility (CSR). It is mainly due to the fact that individual dimensions of this phenomenon are very broad. Most studies of CSR focus on larger organizations, thus there are only few studies focusing on small and medium enterprises (SMEs). Therefore, there is a need to adapt the principles and instruments of corporate social responsibility to the specificity of the sector of small and medium enterprises, which is of great importance for the development of economies all over the world.

The main goal of this paper is to describe the meaning of actions within CSR in the SME sector, both in Poland and in Latvia, taking into account the possibility of carrying them out and barriers in implementing them. The tasks of the research: 1) to explore the main areas of CSR which relate to SMEs and sustainable socio-economics development; 2) to observe and analyse CSR main areas for SMEs in Poland and Latvia; 3) to make conclusions about CSR importance for SMEs in sustainable development.

**Keywords:** corporate social responsibility, small and medium enterprises, sustainable development.

**JEL code:** O44; Q01; R11

### **Introduction**

Activities of small and medium enterprises and also the objectives they pursue are more and more frequently determined by the idea of sustainability. This stems from their desire for responsibility to the environment they operate in. Greater awareness of entrepreneurs in noticing problems associated with their impact on their environment contributes to these aspects being taken into account at the stage of building a strategy or a relationship with different groups of stakeholders. Adoption of such an attitude is defined as the concept of corporate social responsibility and is one of the most modern and promising business strategies (Sikorska, 2010).

Source literature on the concept of CSR indicates that there is a great interest, mainly among big enterprises, in such activities. Therefore, there is a need to adapt the principles and instruments of corporate social responsibility to the specificity of the sector of small and medium enterprises, which is of great importance for the development of economies all over the world (E-monitor, 2009).

The main goal of this paper is to describe the meaning of actions within CSR in the SME sector, both in Poland and in Latvia, taking into account the possibility of carrying them out and barriers in implementing them. The tasks of the research: 1) to explore the main areas of CSR which relate to SMEs and sustainable socio-economics development; 2) to observe and analyse CSR main areas for SMEs in Poland and Latvia; 3) to make conclusions about CSR importance for SMEs in sustainable development.

Research methods: logical construction, analysis and synthesis, the graphic and monographic methods and in-depth expert interviews.

### **Research results and discussion**

#### **1. Theoretical approach to corporate social responsibility**

In scientific literature one can come across different approaches to the idea of corporate social responsibility (CSR). It is mainly due to the fact that individual dimensions of this phenomenon are very broad (Wasowska, Pawlowski, 2011). The idea of the concept is to promote actions, taking

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into account social conditions in which the enterprise operates. This phenomenon applies to economy, society and adopted values, and also to the relations with the surrounding environment. It includes the interests of consumers, local communities and the natural environment ([www.mg.gov.pl/#les/upload/7904/podrecznik.pdf](http://www.mg.gov.pl/#les/upload/7904/podrecznik.pdf)).

The beginning of realizing the idea of CSR results from the concept of sustainable development, according to which not only the economic but also the social and environmental aspects are important in economic development. It should be emphasized that "social commitment allows the pursuit to maintain balance between the economic, ecological and social aspects in corporate activities, which contributes to accomplishment of goals which are attributed to sustainable developmental (protection of natural resources, maintaining stability of ecosystems, improvement of human health and of general well-being) (Bogdanienko, 2011).

The need for the development of the aforementioned concept stems not only from the enterprises themselves, but also from the local community, competition, local and central authorities and many other participants of socio-economic life, having an indirect or direct impact on business entities (Zuzek, 2012).

Corporate social responsibility is often described as a moral and lawful obligation towards the whole environment (both internal and external), which surrounds each enterprise (Zbiegan-Maciąg, 1997). In other words, it is a certain sensitivity to the issues of the external environment, including social or ecological sensitivity and the ability to maintain equilibrium between the interests of customers, employees and stockholders, as well as providing certain services for the local community (Zemigala 2007). Therefore, it is a strategy of competitive advantage based on providing a lasting value to stakeholders (Gasparski, Lewicka-Strzalecka, Rok, Szulczewski, 2004). This approach is a new tendency of changes in sustainable development, with observance of the principles of economics, ecology and ethics (Korpus, 2006).

Due to its multifaceted approach, the CSR concept is the responsibility for the liabilities that is taken by an enterprise as a result of its functioning in the society (Adamczyk, 2009). S. Young (2005) has a similar view on this phenomenon, believing that it is a strategic and long-term approach based on the principles of social dialogue, transparent relations and looking for beneficial solutions for all economic entities. Implementation of the indicated tasks should take into account not only ethical or legal values, but also respect for employees, society and the natural environment, in order to improve the life quality of all citizens.

## **2. Key areas of corporate social responsibility**

In scientific literature, one can find several areas of interest to social responsibility. The most common one is the classification according to the objective-subjective criterion. It allows to distinguish the following types of responsibilities (Paliwoda-Matiolanska 2009):

- economic – associated with maximization of profits, minimization of costs, making strategic decisions or executing the policy of dividing the profits, and creating competitiveness,
- legal – arising from observing the law, environmental protection regulations and consumer rights, counteracting corruption, fulfilling all contract obligations,
- ethical – eliminating undesirable behaviours, treating law as an unconditional minimum and taking actions exceeding this minimum, ethical leadership, actions compliant with social expectations,

- philanthropic – care for the improvement of social life quality, commitment in voluntary work, charity activity, and also commitment to local communities.

D. Aarts (2011) also distinguishes four main areas of corporate social responsibility: workplace, natural environment, community, and market. More and more entrepreneurs recognize that employees want to work in companies that not only offer interesting and financially attractive workplace, but also care about the state of the natural environment and try to contribute to the fight against global challenges.

Small and medium enterprises more concentrate, to preserve the culture and personal values, the reputation and the recognition of their customers, and keep the more responsibility about the local social-economic environment sustainability (P.Castejon, B. Lopez, 2016).

Some authors have highlighted the recent drastic socioeconomic and political changes, beyond a CSR management of externalities and towards a value creation for the common good.

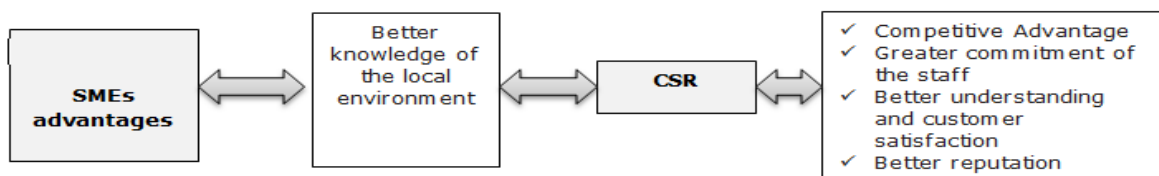
Table 1

**National corporate responsibility index – country scores**

No in rating	Country	NCSRI
<b>Countries with high corporate responsibility index</b>		
1.	Switzerland	20.64
2.	Sweden	19.50
3.	Finland	18.99
<b>Countries with medium high corporate responsibility index</b>		
22.	Brazil	-11.74
23.	Colombia	-11.99
24.	South Korea	-12.13
<b>Countries with moderate low corporate responsibility index</b>		
46.	Latvia	-24.81
47.	Indonesia	-25.03
48.	Estonia	-25.12
55.	Poland	-26.36
<b>Countries with low corporate responsibility index</b>		
75.	Ukraine	-31.66
76.	Georgia	-32.26
77.	Russian Federation	-32.38

Source: Skouloudis et al., 2016

In this context, a growing number of companies are shaping CSR strategies to stimulate innovation and differentiate themselves from peers. NCSRI was selected as it signifies the first CSR-specific index to rank a considerable sample of countries around the world according to CSR penetration and endorsement in line with related global standards and initiatives. It shows the level of country in global CSR.



Source: author's compilation based on P.Castejon, B. Lopez 2016

**Fig. 1 Linkage between advantages and benefits of CSR in SMEs**

As shown in Fig. 1. SMEs are the main factor in creation of wealth and the basic engine of the regional/ local economy. They represent a commitment to their territorial/local community through

continuity, which is demonstrated by a higher degree of investment and even employment together with social responsibility. As a main focusing in this case is better understanding and customer satisfaction in local area. These theoretical and practical assumptions provide a basis for sustainability and interaction for corporate social responsibility.

### **3. Possibilities of fulfilling the assumptions of CSR and benefits obtained by enterprises**

Development of the concept of social responsibility does not refer only to large enterprises. One can notice numerous initiatives to popularize this phenomenon also in small and medium enterprises which are a dominant part of enterprises in economy. In Poland, this sector covers 99.9 % of all operational entities, 99.2 % of which are small entities (including 96.0 % micro) ([www.stat.gov.pl](http://www.stat.gov.pl)). Small enterprises are of great economic importance, and social importance for the economy because they are, among other things, a source of workplaces, alleviate the effects of mass layoffs in large enterprises, quickly react to changes in consumers' consumption attitudes, adapt to the market, and quickly eliminate supply gaps (Sipa, 2010).

Enterprises from the SME sector are also characterized by a range of specific quality features thanks to which they can aspire to be recognized as socially responsible enterprises. These features include (Sipa, 2010):

- 1) dominant role of the owner in the company's management,
- 2) development of structural external relational capital, connected with building good relations with stakeholders (especially the ones from the closest environment),
- 3) dynamism, flexibility, and openness of the business model,
- 4) quick reaction to changes taking place in the environment and the possibility of reacting quickly to internal problems (close contact with employees).

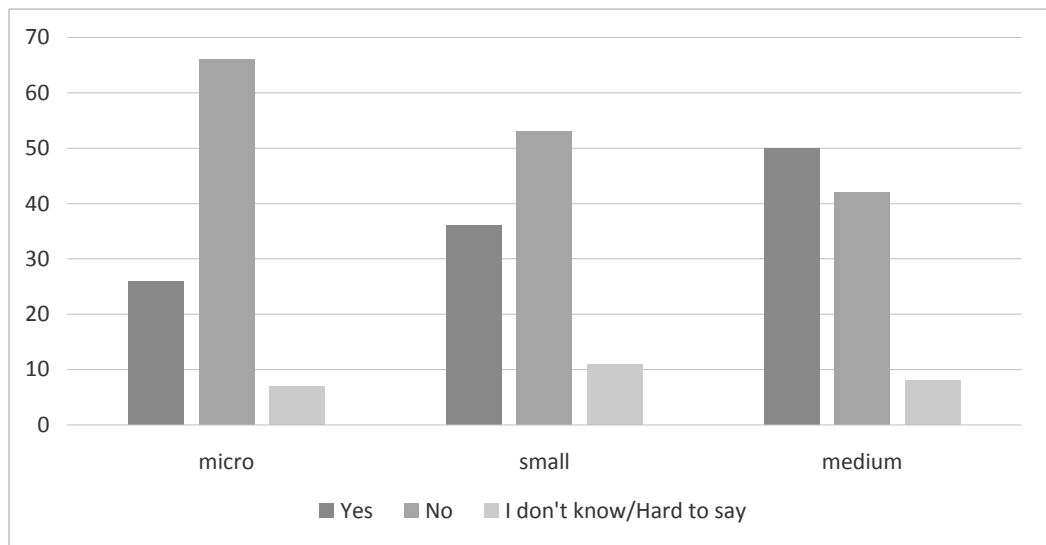
In small and medium enterprises, despite the existence of many features that favour implementation of the concept of social responsibility, actions taken by them in this scope are still limited. Entrepreneurs are often faced with choices associated with rational management (Sitek, 2009). This causes occurrence of divergences in achieving economic and social objectives. Another problem is lack of models of socially responsible actions for this type of enterprises. It is not always appropriate to imitate the actions taken by large companies because most of them implement the concept of CSR thinking about promoting their business. It should also be highlighted that taking actions within corporate social responsibility by the SME sector depends mostly on the owners, their skills and experience, and in particular their system of values.

Using the concept of corporate social responsibility is beneficial not only for a given company, but also for the whole society. Strategic approach to the concept of CSR is gaining importance in competitiveness of enterprises. Entrepreneurs usually point to benefits from implementing such an approach. This mainly refers to the improvement of the image, savings, the possibility to stand out, increased interest of investor, lifting employees' morale, and reducing the risk of the business (Kroik, Malara, 2011). The following benefits for socially responsible enterprises can be distinguished (Ocieczak, Gajdzik, Kuczynska-Chalada, 2011):

- enhancement of the corporate image,
- building a new reputation as a socially responsible enterprise,
- creating new business possibilities (new markets, innovations, better technical solutions etc.),
- ensuring stabilization and understanding in the environment,

- increased attractiveness of an enterprise as employer (socially responsible business takes care of employees' development),
- increased work efficiency through improvement and rationalization of processes,
- a synergy effect in the company and in the environment as a result of intensive communication within the company and with different social groups.

The results of the conducted research with respect to understanding the notion of corporate social responsibility indicate that more than 70 % of large enterprises are familiar with this idea. In the case of the sector of small and medium enterprises, 50 % of medium enterprises, 36 % of small enterprises and 26 % of micro-enterprises declared knowledge of this notion (Fig. 2).



**Source: Assessment of the status of implementation of CSR standards. A set of indices of social responsibility in micro, small, medium and large enterprises. Report (2011), MillwardBrown SMG/KRC, PwC for PARP, Warszawa**

**Fig. 2 Knowledge of the concept of CSR in Poland with respect to the size of the enterprise**

Each enterprise has a direct or indirect impact on the environment it functions in. This requires responsible actions not only from you but also from your suppliers, not only in the economic aspect but also the social and environmental one. That is why it is surprising that only 37 % of the studied entities assess their business partners' compliance with the principles of business ethics understood as abiding by agreements, ensuring equality between parties, paying the amount due on time, handling complaints professionally etc. Less than 20 % of enterprises assess their suppliers in terms of their relations with employees and compliance with work safety regulations. As many as 40 % of companies do not assess their business partners in terms of the actions they take within the scope of corporate social responsibility at all (Fig. 3).

The studied enterprises were convinced that actions taken within the scope of CSR are sufficient. More than 50 % of respondents were of this opinion. The areas of CSR into which the studied entities were planning to increase their commitment in the perspective of the next few years included a change in enterprise organization as well as improvement of relations with employees and business partners.



**Source: Assessment of the status of implementation of CSR standards. A set of indices of social responsibility in micro, small, medium and large enterprises. Report (2011), MillwardBrown SMG/KRC, PwC for PARP, Warszawa**

**Fig. 3 Assessment of suppliers and business partners in areas concerning CSR**

In Latvia case, authors conducted in-depth expert interviews with SMEs owners in Zemgale region (n=30). Business owners noted in their interviews that at the initial stage of their company's operations they had encountered some problems to establish CSR standards in company:

- selection of the team, its motivation and guidance;
- availability of skilled workers;
- lack of professional specialized knowledge;
- attracting customers and ensuring the stability of working with them;
- providing high-quality service for customers
- lack of working capital;
- bureaucratic problems;
- the right choice of premises for the implementation of the business.

In addition, they enthusiastically built and provided stable communication networks with suppliers and customers offering non-standard ways of attracting them. In order to solve the issue of increasing working capital for business development, entrepreneurs developed more efficient schemes for running their business, worked actively with the banking and financial sectors, participated in financing programs for young businessmen, and also attracted money from their relatives and friends. All interviewees noted that the problems had a positive impact on the company's development and building up CRS. They taught to work with people, to get new knowledge and experience, to actively cooperate with suppliers, clients and colleagues, to improve the quality of products and services, to search for new markets for the realization of their products, to look for alternative ways of business development, to assess additional directions, constantly think about the development of the company.



**Source: Assessment of the status of implementation of CSR standards. A set of indices of social responsibility in micro, small, medium and large enterprises. Report (2011), MillwardBrown SMG/KRC, PwC for PARP, Warszawa**  
**Fig. 4 Areas where enterprises intend to increase their commitment to CSR in Poland**

As shown in Fig. 4, the percentage of enterprises which see the need to increase commitment in some areas ranged between 12 % and 15 %. As many as 30 % companies declare that they are not intending to become involved in activities in the interest of the local community, and over 1/5 in activities benefitting environmental protection. The entrepreneurs' declaration that they are not planning to take new actions in individual areas of CSR, while earlier indicating they have little knowledge of the subject of corporate social responsibility, indicates that lack of awareness in this matter is the cause of such state of things. Such an attitude confirms the need to popularize the idea of socially responsible business and wide-ranging trainings as well as supporting programs.

### Conclusions, proposals, recommendations

- 1) The idea of corporate social responsibility, thanks to the systems approach to creating values with taking into account social and ecological aspects is a tool for supporting business in adapting to the challenges of the current economy. To make a profit, an enterprise must not only build a value for stakeholders, but also earn their customers' loyalty, increase the effectiveness of their business, and simultaneously minimize costs and be innovative.
- 2) Popularization of the idea of CSR is extremely important with respect to pro-environmental solutions used. These solutions are not only more and more affordable for small and medium companies, but it pays off to implement them.
- 3) Theoretical and practical assumptions about SMEs role in local environment and advantages from CRS provide a basis for sustainable social-economic development.
- 4) In Poland, 50 % of medium enterprises, 36 % of small enterprises and 26 % of micro-enterprises declared knowledge about concept of CSR
- 5) In Poland, 40 % of companies do not assess their business partners in terms of the actions they take within the scope of corporate social responsibility at all.
- 6) In Latvia case, SMEs business owners noted in their interviews that at the initial stage of their company's operations they had encountered some problems to establish CSR standards in

- company: selection of the team, its motivation and guidance; lack of professional specialized knowledge; attracting customers and ensuring the stability of working with them;
- 7) In Latvia case, all interviewees (n=30) noted that the problems had made a positive impact on the company's development and building up CRS.

## Acknowledgement

The publication was financed from subsidies for maintenance of research potential granted by Ministry of Science and Higher Education

## Bibliography

1. Adamczyk, J. (2009), *Spoleczna odpowiedzialnosc przedsiebiorstw (Corporate Social Responsibility)*. PWE, Warszawa, pp. 43
2. Aarts, D. (2011), *Spoleczna odpowiedzialnosc przedsiebiorstw (Corporate Social Responsibility)*, (w:) *Sztuka public relations. Z doświadczeń polskich praktyków (The Art of Public Relations. Experiences of Polish Practitioners)*, Wyd. II poszerzone, Związek Firm Public Relations, Warszawa, pp. 207-210
3. Bogdanienko, J. (2011), *Odpowiedzialnosc spoleczna a strategia organizacji (Social Responsibility and Organisational Strategy)*, (w:) Biernatt M., Bogdanienska J., Skoczny T. (red.), *Spoleczna odpowiedzialnosc biznesu. Krytyczna analiza (Corporate Social Responsibility. Critical Analysis)*, Wydawnictwo Naukowe Wydziału Zarządzania Uniwersytetu Warszawskiego, Warszawa, pp. 23-25
4. Castejón, P., López B. (2016) *Corporate sSocial Responsibility in Family SMEs European Journal of Family Business (2016) 6*, pp. 21-31
5. "E-mentor" 2009, no 5 (32), <http://www.e-mentor.edu.pl/artukul/index/numer/32/id/691> [05.10.2017].
6. Gasiński, T., Piskalski, G. *Zrównoważony biznes. Podręcznik dla małych i średnich przedsiębiorstw (Sustainable business. Handbook for Small and Medium Enterprises)*, <http://www.mg.gov.pl/#les/upload/7904/podrecznik.pdf>, p. 3.
7. Gasparski, W., Lewicka-Strzałecka, A., Rok, B., Szulczewski, G. (2004), *Odpowiedzialnosc spoleczna i etyka biznesu w polskim zyciu gospodarczym (Corporate Social Responsibility and Ethics in Polish Economic Life)*, Wydawnictwo IFIS PAN, Warszawa 2004, pp. 18.
8. Korpus, J. (2006), *Spoleczna odpowiedzialnosc przedsiebiorstw w obszarze ksztaltowania srodowiska pracy (Corporate Social Responsibility in Shaping the Work Environment)*, Wydawnictwo Placet, Warszawa, pp. 84.
9. Kroik, J., Malara, Z. (2011). *CSR i zrównoważony rozwój w warunkach silnej konkurencji (CSR and Sustainable Development under Strong Competition Conditions)*. w: *Zeszyty Naukowe XXV*, red. J. Kroik, Z. Malara, J. Gołota, Ostrołęckie Towarzystwo Naukowe im. Adama Chętnika, Ostrołęka, pp. 424.
10. *Ocena stanu wdrazania standardow spolecznej odpowiedzialnosc biznesu. Zestaw wskaźnikow spolecznej odpowiedzialnosc w mikro, malych, srednich oraz duzych przedsiebiorstwach (Assessment of the status of implementation of CSR standards. A set of indices of social responsibility in micro, small, medium and large enterprises)*. Raport (2011), MillwardBrown SMG/KRC, PwC dla PARP, Warszawa.
11. Ociecek, W., Gajdzik, B., Kuczyńska-Chałada, M. (2011). *Corporate Social responsibility in steelworks*, w: *Zarządzanie wartością przedsiębiorstw (Enterprise Value Management)*, red. M. Jabłoński, Wyższa Szkoła Biznesu, Dąbrowa Górnicza, pp. 333-334.
12. Poliwoda-Matiolańska, A. (2009). *Odpowiedzialnosc spoleczna w procesie zarzadzania przedsiebiorstwem (Corporate Social Responsibility in the Process of Business Management)*. C.H. Beck, Warszawa, pp. 67-68
13. Sikorska M. (2010). *CSR w Polsce. Forum UNDP. Zarządzanie zasobami ludzkimi (CSR in Poland: UNDP Forum. Human Resource Management)* [w:] J. Kochanowicz, M. Marody (red.), *Kultura i gospodarka (Culture and Economy)*, Wydawnictwo Naukowe Scholar, Warszawa, pp. 143.
14. Sipa, M. (2010). *Czynniki wpływające na zwiększenie obszaru działalności małych przedsiębiorstw (Factors Expanding The Area Of Operation Of Small Enterprises)*. [w:] J. Wnuk, J. Ryśnik (red.), *Współczesne koncepcje i strategie zarządzania. Teoria a praktyka (Theory and Practice)*. Wyższa Szkoła Ekonomiczno-Humanistyczna, Bielsko-Biała, pp. 43-65.
15. Sitek, M. (2009). *Wpływ wybranych czynników na rozwój małych i średnich przedsiębiorstw w Polsce (Influence of Selected Factors on the Development of Small and Medium Enterprises in Poland)*. [w:] M. Okręglińska, O. Ławińska (red.), *Determinanty rozwoju małych i średnich przedsiębiorstw w Polsce (Determinants of the Development of Small and Medium Enterprises in Poland)*. Wydawnictwo Politechniki Częstochowskiej, Częstochowa, pp. 157-173.
16. Skouloudis, A., Isaac, D., Evaggelinos, K., (2016) *Revisiting the national corporate social responsibility index*. *Int. J. Sustain. Dev. World Ecol.* 23 (1), pp. 61-70.
17. Wąsowska, A., Pawłowski, M. (2011). *Metody pomiaru spolecznej odpowiedzialnosc biznesu – przegląd literatury (Methods for Measuring Corporate Social Responsibility – Literature Review)*. „Przegląd Organizacji”, no 11, p. 14-17.
18. [www.stat.gov.pl](http://www.stat.gov.pl)
19. Young, S. (2005), *Etyczny kapitalizm. Jak na powrót połączyć prywatny interes z dobrem publicznym (Ethical Capitalism. How to Reconcile Private Interest with Public Good)*. *Metamorfoza*, Wrocław, pp. 75

20. Zbiegień-Maciąg, L. (1997). *Etyka w zarządzaniu (Ethics In Management)*. CiM, Warszawa 1997, pp. 48.
21. Zuzek, D. (2012). *Spoleczna odpowiedzialnosc biznesu a zrównowazony rozwoj przedsiebiorstw (Corporate Social Responsibility and Sustainable Development of Companies)*. Tarnow: Zeszyty Naukowe Malopolskiej Wyzszej Szkoły Ekonomicznej w Tarnowie, vol. 21, No. 2.
22. Żemigła, M. (2007), *Spoleczna odpowiedzialność przedsiebiorstwa. Budowanie zdrowej, efektywnej organizacji (Corporate Social Responsibility. Building a Healthy, Effective Organization)*, Wydawnictwo Wolters Kluwer, Kraków, pp. 99.



## INNOVATIVE ACTIVITY OF ENTERPRISES IN THE PERIPHERAL REGION

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**Abstract.** The purpose of the work is to characterize the state of innovative activity of enterprises operating in the peripheral region, as well as to define the prospects for its increase with an indication of the most important barriers of this activity. The work presents the results of empirical research carried out in the Lublin province on a sample of 147 enterprises. The study used the diagnostic poll method using an interview questionnaire. The research allowed for a positive verification of the hypothesis about the existence of a small group of enterprises focused on development in the studied area, active in the area of introducing innovations, noticing the need to implement them and capable of overcoming numerous barriers in this process. Limitations of innovation are more often noticed by entrepreneurs active in the area of the innovation implementation. The main barriers limiting the innovative activity of the assessed enterprises include financial barriers. Barriers related to limited access to knowledge in the innovation process against the background of financial barriers are not very important.

**Key words:** innovations, rural enterprises, factors and barriers to innovation, effects of innovative activity.

**JEL code:** R11

### Introduction

The research undertaken so far on the conditions and possibilities of stimulating innovation processes in peripheral regions focused on their low innovative potential and unfavourable, permanent barriers for innovation. These factors led to deepening disproportions in the level of development of peripheral regions in comparison to the regions considered as development centres.

In consideration of the explanation of the causes of developmental problems of peripheral regions, the authors refer primarily to the concept of geographical proximity, accessibility and agglomeration effects (agglomeration economies), which do not manifest themselves in peripheral regions, limiting their innovation. In literature, the proximity and accessibility are emphasized as crucial for shaping economic, social and institutional relations on a local and regional scale that are the foundation for stimulating innovation (Copus A., Skuras D., Tsegenidi K., 2008). The role of the social factor in shaping the pace and scale of innovation processes is an important thread of the discussion (Rodriguez-Pose A., 1999).

In the case of peripheral regions, one can indicate a certain specificity of the course of innovation processes in enterprises. Enterprises and entire industries implement mainly incremental innovations. Companies from peripheral regions need to improve the process of learning and start cooperating with various entities in order to be able to use external knowledge from distant sources in their internal innovation processes (Isaksen A., Karlsen J., 2016). However, most entrepreneurs rely mainly on their own initiative and communicate or cooperate with a small number of entities (Innovation Systems..., 2005).

In addition to the limited access to knowledge, the innovative activity of entrepreneurs in peripheral regions largely limits the significant costs of innovative activity and the level of indebtedness. In turn, these attitudes are stimulated by such factors as technical qualifications of employees, presence on foreign markets and the scale of employment (Coronado D., Acosta M., Fernandez A., 2008).

However, as shown by the results of research carried out in European regions, the location is not the sole factor explaining the state of activity of enterprises in the field of innovative activity. The research results show that in regions with conditions highly unfavourable to innovative activity,

which include peripheral regions, it is also possible to find examples of enterprises and territories advanced in terms of the state of innovation (Varis M., Littunen H., 2012, Smallbone D., North D., Kalantaridis C. 1999, North D., Smallbone D., 2000). Thus, geographical proximity does not have to be a necessary or a sufficient condition for innovative processes resulting from the availability of knowledge. The importance of geographic proximity should also be assessed together with other dimensions of closeness, such as cognitive and organizational proximity, resulting from embedding in local institutions (Boschma RA, 2005, Fitjar RD, Rodríguez-Pose A., 2011, Araujo L., Silva S., Teixeira A., 2013).

Companies operating in rural peripheral regions with difficult conditions may be subject to adaptation processes, while in practice specific environmental conditions may lead to different innovative patterns (De Noronha Vaz, MT, Cesario, M., & Fernandes, S. 2006). Successful adaptation to local conditions can rely on proactive product and market development in order to overcome the limited size and scope of local markets, adopt a laborious development path to exploit the potential benefits of remote rural labour markets and relatively low subcontracting (Smallbone D. North D., Kalantaridis Ch., 1999). Regarding the limitation of access to knowledge, it can be noticed that companies implementing innovations compensate for the lack of access to local knowledge transfers by making cooperation on a wider scale. It is characteristic for companies with strong internal capabilities to compensate for the lack of local knowledge exchange with cooperation, while companies with weaker internal capabilities depend more on the regional knowledge infrastructure (Grillitsch M., Nilsson M., 2014). It is possible to find examples where the need for external help in obtaining knowledge and information necessary to undertake innovative activity makes companies find it wherever it is, regardless of geographical limitations. (North D., Smallbone D., 2000).

Implementation of innovations in the peripheral region requires the entrepreneurs to undertake cooperation with various types of partners. In particular, the factor conducive for innovation is the development of international contacts in the field of innovation, including the one with customers, suppliers of equipment, materials, components or software, consultants, laboratories or private research and development institutions (Fitjar R.D., Rodríguez-Pose A., 2011, Araujo L., Silva S., Teixeira A., 2013). It is characteristic that the implementation of more advanced innovations depends on cooperation with universities and other subjects in the field of science. In turn, when implementing less advanced innovations, enterprises cooperate to a greater extent with business support entities - Knowledge Intensive Business Services (KIBS). The cooperation of enterprises with KIBS is perceived as a factor reducing regional inequalities (Todtling F., Lehner P., Kaufmann A., 2009, Muller 1999). Strengthening the innovation of enterprises in rural areas is one of the basic factors stimulating processes of economic development and creating jobs in these areas. According to the research results, the innovative production companies have the best opportunities for creating jobs in the rural economy (North D., Smallbone D., 2000, Drejer, I., & Vinding, AL 2005). Conclusions from other studies indicate that factors such as the collocation of companies belonging to highly specialized industrial niches and the pro-activity of local knowledge institutions (Virkkala S., 2007) as well as public subsidies for innovations are important for acquiring knowledge in peripheral regions (Varis M., Littunen, H., 2012).

The system of entrepreneurship and innovation centres in the Lublin Voivodeship can be considered as well developed and available to potential clients; however, the quality of the institution's offer requires constant improvement (Płoszaj, A. 2012). The activity of local authorities

in case of support of innovation of local economies also requires strengthening (Zwolinska-Ligaj, M., Adamowicz, M. 2017). In rural areas, the chances of improving innovation are related to the strengthening of the role of such rural development instruments as Local Action Groups (LAGs) implemented under the Leader Programme (Guzal-Dec D., Zwolinska-Ligaj M., 2017a, 2017b).

The research process included formulation and justification of the research problem concerning the condition and determinants of the enterprises' innovation activity revival in the studied area, formulation of the hypothesis, identification of variables, selection of methods, development of research tools and conducting field research, statistical and quantitative development of results, and finally – theoretical analysis of the obtained material and deriving conclusions. Innovative activity was tested according to the types of innovations compliant with the OECD guidelines (Oslo Manual ..., 2005).

The purpose of the work is to characterize the state of innovative activity of enterprises operating in the peripheral region, as well as to define the prospects for its increase with an indication of the most important barriers to this activity. A hypothesis about the existence of a small group of enterprises focused on development in the studied area, active in the area of introducing innovations, perceiving the need to implement innovations and capable of overcoming numerous barriers in this process was formulated. Enterprises that do not undertake innovative activities reside in the existing markets, being unable to introduce changes of a developmental nature due to the difficult economic situation and high costs of innovative activity or they do not see the need for changes.

Empirical research was carried out in two districts of the Lublin Province (Pulawski and the Bialski district)<sup>1</sup>. In each of the districts, seven municipalities were selected for the study taking into account their degree of development and the specificity of their differentiated location in the district area and the nature of their economy. In each of the fourteen examined municipalities, based on the REGON register, 10 to 15 companies were selected for the survey<sup>2</sup>. A method of diagnostic survey with the use of an interview questionnaire addressed to the owners (or managers) of the companies was used as the tool of the research. A total of 147 interviews was collected, including 80 in the Bialski district and 67 in the Pulawski district. The research was conducted from July 1st to August 10th, 2015. The results of the research were processed using the Statistica 10 Program.

## **Research results and discussion**

### **Characteristics of enterprises**

The enterprises which created the sample, were characterized by well-established market experience. Most of them - 93.9 % - were created after the beginning of the system transformation process - after 1989. The sample consisted mainly of micro and small enterprises. Enterprises with full-time employment of up to 9 persons accounted 62.3 % of the sample, while from 9 to 49 persons - 35.0 %. The surveyed enterprises represented only the private sector. These enterprises mostly operated in the form of individual business activities (60.5 %). Almost every fifth entity (18.6 %) had the status of a family business.

The surveyed enterprises most often represented the services sector, including such industries as: wholesale, retail trade and repairs (18.4 %), accommodation and food service activities

<sup>1</sup> The research was financed from the Pope John Paul II State School of Higher Education in Biala Podlaska funds under the statutory research of the Department of Economics and Management.

<sup>2</sup> The selection was made on the basis of the municipality type, the number of economic entities in the municipality, the reflection in the sample of the branch structure of the economic operators in the municipality and the highest employment level.

(11.6 %), transport and warehouse management (6.1 %), other services (22.4 %). In the sector of industrial processing and construction, there were 6.1 % and 15.6 % of entities respectively.

Over half of the enterprises (51.7 %) operated on local markets, including 43.6 % on the regional and/or municipal market. The regional scale of activity concerned 19.1 % of entities, and national - 22.4 %. 6.8 % of the entities reported their presence on foreign markets. A large group of respondents represented entities with an established market situation. Almost half (47.6 %) of the surveyed entrepreneurs assessed that the company is in a good and very good economic and financial situation. The average and the bad and very bad grades were formulated by, respectively - 44.9 % and 7.5 % of the respondents. In addition, almost half (46.2 %) noted the development of the company's activity within 3 years of the survey.

### **Innovative activity**

Despite the fact that a significant group of entrepreneurs noted the development of the company, their overall activity in the area of innovation implementation should be considered as small. In the tested sample, only 16.3 % of enterprises implemented at least one innovation in the period 2010-2014. The most frequently implemented innovations had the character of product innovation, entailing the introduction of new or significantly improved products or services (Table 1).

Product innovations were introduced in the case of 12.9 % of enterprises, whereas in almost half of these enterprises no more than one innovation was introduced. In addition to product-oriented innovations, entrepreneurs undertook actions, to a lesser degree, within the process innovations by introducing changes consisting of the introduction of new or significantly improved processes, mainly related to the methods of producing products and/or providing services (6.2 %). Innovation in marketing was the third area of innovation activity. Entrepreneurs mainly made significant changes in design projects or packaging of products or services (5.5 %). The dimension of innovative activity in the case of which no activity was recorded were organizational innovations related to the implementation of the new methods in terms of operating principles, e.g. quality management systems, the division of tasks and decision-making powers among employees, relations with the surrounding - other enterprises or public institutions.

The image of very low innovation activity in the surveyed group is improved by entrepreneurs' declarations regarding planned innovative activities (Table 1). The largest number of respondents (37.8 %) declared having a product innovation implementation plan. The second important direction of planned innovations was to change the methods of manufacturing products/providing services (reported by 24.5 % of respondents). Other observed directions of innovative activity reported by about 10 % of the surveyed entities included: changes in methods of supporting the processes, significant changes in the design/construction or packaging of products or services, division of tasks and decision-making powers among employees. Despite the lack of involvement of entrepreneurs in organizational innovations so far, they have therefore been accentuated in their plans.

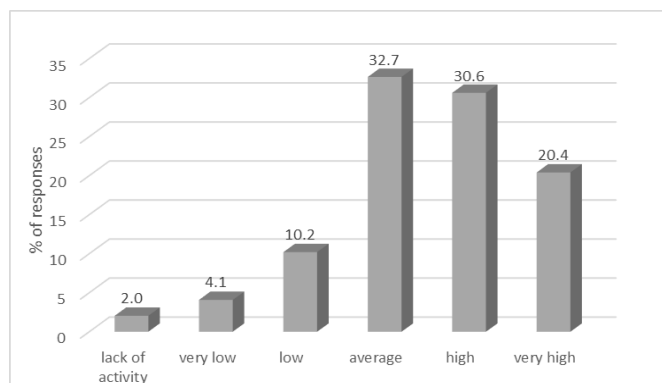
Table 1

**Implementation status in the period 2010-2014 and declared implementation plans for the selected types of innovations in the studied group of enterprises**

No.	Type of innovation	Examples of innovations	Percentage of enterprises in which a certain number of innovations was implemented				The percentage of enterprises in which innovation is planned to be implemented
			none	1	2-5	>5	
<b>1.</b>	<b>Product</b>		87.1	6.1	6.1	0.7	37.8
<b>2.</b>	Process-new or significantly improved	methods of manufacturing products/providing services	93.9	4.8	1.4	-	24.5
		methods in the field of logistics and/or delivery and distribution methods	98.0	2.0	-	-	7.7
		methods supporting processes, e.g. accounting	99.0	1.0	-	-	10.5
<b>3.</b>	Organizational - implementation of a new method in the field	of operating principles, e.g. quality management systems	100.0	-	-	-	6.3
		division of tasks and decision-making powers among employees	100.0	-	-	-	9.7
		relations with the surrounding - other enterprises or public institutions, e.g. using subcontracting for the first time	100.0	-	-	-	0.7
<b>4.</b>	Marketing	significant changes in the design/construction or packaging of products or services	94.5	4.8	0.7	-	10.5
		new media or product promotion techniques	98.0	2.0	-	-	6.3
		new methods in the distribution of products or sales channels	99.0	1.0	-	-	4.9
		new methods of pricing the products and services	100.0	-	-	-	4.9

*Source: authors' calculations based on empirical research*

The objectively low innovation activity in the studied group was accompanied by a fairly high self-esteem of the innovative activity of the enterprise against the background of competitive enterprises, where more than half of the surveyed entrepreneurs rate innovative activity as high and very high compared to competitors (Fig. 1).



*Source: authors' calculations based on empirical research*

**Fig. 1. Self-evaluation of the company's innovative activity against the background of competing enterprises in the period 2010-2014 ( % of responses)**

Entrepreneurs assessed their activity in the area of studied innovation areas as minimal. However, according to the opinions formulated by the respondents, this area of activity will not constitute a priority in the development of the enterprise. It can be pointed out that there is a

small gap between the current and future - desired - role of innovation in the enterprise. Only in the case of enterprises already involved in innovative activity, the importance of product innovations in the future was noticed (Table 2).

Table 2

**The assessment of the current and desired state of enterprise innovation according to the state of innovative activity of enterprises and the type of innovation, assessment made on a scale of 0-5, where 0 is lack of and 5 - very big**

No.	Type of innovation	The assessment of the current state in enterprises						Desired state in enterprises					
		Total		Introducing innovations		Others		Total		Introducing innovations		Others	
		$\bar{x}$	S	$\bar{x}$	S	$\bar{x}$	S	$\bar{x}$	S	$\bar{x}$	S	$\bar{x}$	S
1.	Introducing new or significantly improved products or services to the market	0.66	1.37	3.17	1.61	0.16	0.52	2.37	1.87	4.04	0.81	2.04	1.85
2.	Introducing marketing innovations	0.48	1.02	1.54	1.77	0.27	0.63	2.22	1.67	3.25	1.11	2.02	1.69
3.	Introducing new or significantly improved processes	0.46	1.10	2.00	1.82	0.16	0.52	2.03	1.81	3.42	1.02	1.76	1.82
4.	Implementation of new methods regarding organization	0.27	0.77	0.63	1.35	0.20	0.57	1.27	1.51	1.50	1.41	1.22	1.53

*Source: authors' calculations based on empirical research*

The non-parametric Mann-Whitney U test showed that the implementation of innovations was associated with higher assessments of the economic and financial situation ( $U = 1057$ ,  $p = 0.028$ ) and the company's development ( $U = 962$ ,  $p = 0.009$ ). However, the statistical significance of differences was not demonstrated in the case of such features as employment ( $U = 1399$ ,  $p = 0.936$ ) or geographical range of the enterprise ( $U = 1220$ ,  $p = 0.181$ ).

The average assessment of the economic and financial situation of the enterprise in the group of enterprises implementing innovations can be described as good, while in other entities as mediocre (the assessment was carried out in scale of 1 to 5, with 1 being very bad and 5 very good, where the average ratings of compared groups were respectively -  $\bar{x} = 3.83$ ,  $s = 0.92$  and  $\bar{x} = 3.45$ ,  $s = 0.84$ ). Entrepreneurs introducing innovations indicated much stronger that the company developed during the analysed period, while entrepreneurs from the compared group formulated rather mediocre assessments of the organization's progress (the assessment was carried out in scale of 1 to 5, with 1 indicating a definite lack of development and 5 a considerable development, where the average ratings of the compared groups were respectively -  $\bar{x} = 3.79$ ,  $s = 1.32$ ,  $\bar{x} = 3.13$ ,  $s = 1.05$ ).

Taking into account the sectors of enterprises' activity, the highest percentage of entities undertaking innovative activity was in the agriculture sector and services - 20.0 % and 17.6 %, respectively. A slightly lower share was in the group of enterprises in the sector of industry and construction - 11.8 %.

Entrepreneurs who were active in the innovation sphere noticed a number of benefits accruing from it. The most important were increase in competitiveness of goods or services, adaption of a company's offer to the customers or contractors' expectations and improvement of a company's image. Among other effects were the acquisition of new clients, the development of human resources of an organization and the reduction of costs. It is interesting that in the examined group

of innovative enterprises, there were clearly visible effects of innovative pro-ecological activity aimed at reducing the pressure of the organization on the natural environment (Table 3).

Table 3

**The effects of innovative activity achieved in enterprises  
 in the period 2010-2014**

No.	Effects	Percentage
1.	Higher competitiveness of products/services	71.4
2.	Meeting the expectations of clients/contractors	67.3
3.	The improvement of the company's image	61.2
4.	Acquisition of new customers	49.0
5.	Improving of OHS and employees' health	42.9
6.	Improving employees' qualifications	37.5
7.	Reducing the costs	36.7
8.	Reducing the pressure of the company on the natural environment	18.4

Source: authors' calculations based on empirical research

Low innovative activity in the examined group of enterprises was associated with the observation of its barriers, mainly of a financial nature. The respondents pointed out up to three main barriers. Limiting the financing of innovative activities, both from external and internal funds, while the cost of obtaining innovation is perceived as a high, can be defined as the main limitation of innovative activity (Table 4).

Table 4

**Barriers most severely restricting the company's innovative activity**

No.	Barriers	Number of indications	
		number	percentage
1.	Lack of financial resources from external sources	66	24.4
2.	Lack of own financial resources	64	23.6
3.	Too high innovation costs	41	15.1
4.	No demand for innovations	26	9.6
5.	Lack of qualified personnel	16	5.9
6.	Lack of information about markets	10	3.7
7.	Difficulties in finding partners	9	3.3
8.	Lack of information about technology	6	2.2
9.	There are no barriers	33	12.2
<b>Total</b>		<b>271</b>	<b>100.0</b>

Source: authors' calculations based on empirical research

However, at the same time, quite a large group of entrepreneurs not noticing the existence of innovation activity's barriers is drawing the attention. It is also interesting that in the group of enterprises implementing innovations, 12.5 % of entrepreneurs reported lack of barriers, whereas in the remaining ones - 24.4 %.

**Conclusions**

The undertaken research on the innovative activity of enterprises operating in the peripheral region indicate its limited scope and to a large extent they coincide with the results of researches on the innovation of enterprises undertaken in other peripheral European regions. The researches allowed affirmative verification of the hypothesis about the existence of a small group of enterprises on the examined area which are focused on development, active in the sphere of introducing innovations, aware of the need to implement them and capable of overcoming

numerous barriers in this process. In particular, the following conclusions can be drawn from the undertaken research:

- 1) Despite the generally low level of innovative activity, mainly of productive character, a much larger group of examined enterprises declared their willingness to introduce innovations; however, the noticeable declared increase of importance of innovative activity in the future concerned those enterprises that were already involved in innovative activities during the research period. These enterprises noticed the need to implement innovations.
- 2) In the examined group of enterprises, it is possible to indicate pro-developmentally oriented entities which in a further perspective are able to have a stronger, positive impact on local development processes. Undertaking innovative activity was connected with achieving good economic and financial results and showing a considerable development and strengthening the competitive position of the company over the research period.
- 3) Despite the low pro-innovation activity, a significant group of examined entrepreneurs does not hold the view that it deviates from competitors in this area. A significant group of enterprises which do not undertake innovative activities, implement the existing models of organization's functioning in relatively stable competitive environment, simultaneously not noticing the need for radical changes and the barriers of innovative activity. Other groups do not appear to be capable of introducing changes of developmental nature due to the difficult economic situation and high costs of innovative activities.
- 4) Barriers of innovative activity are not noticed by quite a large group of respondents (22.4 %). Restrictions of innovations are more often noticed by entrepreneurs active in the sphere of implementing innovations who had to face the practice of introducing changes. The main barriers limiting the innovative activity of the examined enterprises include financial barriers. Barriers related to the limited access to knowledge in the innovation process in comparison with financial barriers are not very important.

## Bibliography

1. Araujo, L., Silva, S., Teixeira, A. (2013, March). Knowledge Spillovers and Economic Performance of Firms Located in Depressed Areas: Does Geographical Proximity Matter? In Proceedings of the 17th APDR Workshop Firm Performance and Growth. A Regional, Institutional and Policy Perspective, Aveiro: University of Aveiro, 185-208.
2. Isaksen, A., Karlsen, J. (2016). Chapter 16: Innovation in Peripheral Regions in: Shearmur, R., Carrincazeaux, C., Doloreux, D. (Eds.). Handbook on the Geographies of Innovation. Edward Elgar Publishing.
3. Boschma, R. A. (2005). Proximity and Innovation: a Critical Assessment, *Regional Studies*, 39, 61-74.
4. Copus, A., Skuras, D., Tsegenidi, K. (2008). Innovation and Peripherality: An Empirical Comparative Study of SMEs in six European Union Member Countries. *Economic Geography*, 84(1), 51-82.
5. Coronado, D., Acosta, M., Fernandez, A. (2008). Attitudes to Innovation in Peripheral Economic Regions. *Research Policy*, 37(6), 1009-1021.
6. De Noronha Vaz, M. T., Cesario, M., Fernandes, S. (2006). Interaction Between Innovation in Small Firms and Their Environments: An Exploratory Study. *European Planning Studies*, 14(1), 95-117.
7. Drejer, I., Vinding, A. L. (2005). Location and collaboration: Manufacturing firms' use of knowledge intensive services in product innovation. *European Planning Studies*, 13(6), 879-898.
8. Fitjar, R. D., Rodríguez-Pose, A. (2011). Innovating in the Periphery: Firms, Values and Innovation in Southwest Norway. *European Planning Studies*, 19(4), 555-574.
9. Grillitsch, M., Nilsson, M. (2014), Innovation in Peripheral regions: Do collaborations Compensate for a Lack of Local Knowledge Spillovers?, No 2014/33, Papers in Innovation Studies, Lund University, CIRCLE - Center for Innovation, Research and Competences in the Learning Economy, [https://EconPapers.repec.org/RePEc:hhs:lucirc:2014\\_033](https://EconPapers.repec.org/RePEc:hhs:lucirc:2014_033).
10. Guzal-Dec, D., Zwolinska-Ligaj, M. (2017a). The Role of Local Action Groups in the Process of Multifunctional Development of a Peripheral Region. A Case Study of the Region of Lublin, Poland. *Wies i Rolnictwo* 3 (176), doi: 10.7366/wir032017/05.



11. Guzal-Dec, D., Zwolinska-Ligaj, M. (2017b, January). Local Action Groups as New Organisations in Rural Development. An Example of the Lublin Region (Poland). In Economic Science for Rural Development Conference Proceedings (No. 44), 58-68.
12. Innovation Systems and the Periphery, FINAL REPORT, Nordic Innovation Centre, January 2005, <https://www.rha.is/static/files/Rannsoknir/2005/ISP-final-report2.pdf>
13. Muller, E. (1999). There Is No Territorial Fatality!(Or How Innovation Interactions Between KIBS and SMEs May Modify the Development Patterns of Peripheral Regions) (No. R3/1999). Arbeitspapiere Unternehmen und Region.
14. North, D., Smallbone, D. (2000). Innovative Activity in SMEs and Rural Economic Development: Some Evidence From England. *European Planning Studies*, 8(1), 87-106.
15. Oslo Manual. Guidelines for Collecting and Interpreting Innovation Data, OECD/Eurostat, Paris 2005.
16. Ploszaj, A. (2012). Instytucje wsparcia biznesu i promowania innowacji w wojewodztwie lubelskim (Institutions Supporting Business and Promoting Innovation in the Lublin Voivodeship).
17. Rodríguez - Pose, A. (1999). Innovation Prone and Innovation Averse Societies: Economic Performance in Europe. *Growth and change*, 30(1), 75-105.
18. Smallbone, D., North, D., Kalantaridis, C. (1999). Adapting To Peripherality: a Study of Small Rural Manufacturing Firms in Northern England. *Entrepreneurship & Regional Development*, 11(2), 109-127.
19. Todtling, F., Lehner, P., Kaufmann, A. (2009). Do Different Types of Innovation Rely on Specific Kinds of Knowledge Interactions? *Technovation*, 29(1), 59-71.
20. Varis, M., Littunen, H. (2012). SMEs and Their Peripheral Innovation Environment: Reflections From a Finnish Case. *European Planning Studies*, 20(4), 547-582.
21. Virkkala, S. (2007). Innovation and Networking in Peripheral Areas – a Case Study of Emergence and Change in Rural Manufacturing, *European Planning Studies*, 15(4), 511–529.
22. Zwolinska-Ligaj, M. A., Adamowicz, M. (2017, January). The Activity of Local Self-Governments In the Area of Creating Local Innovation (Based On the Example of Lublin counties, Poland). In Economic Science for Rural Development Conference Proceedings (No. 44), 226-235.

## **PRODUCTION AND CO-OPERATION IN AGRICULTURE**

## REGIONAL HONEYS IN POLAND IN 2010-2015

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**Abstract:** The situation of producers of five Polish regional honeys certified with the Protected Designation of Origin and the Protected Geographical Indication logos is shown. The specifics of production, distribution, prices and prospects for their presence on the Polish market is presented. Besides, attention is drawn to the structure of net prices (producers) and retail prices of such regional honeys, i.e. the Kurpie honey, the heather honey from Bory Dolnoslaskie forests, the Podkarpacki honeydew honey, the honey from Sejny county, and the Drahim honey. The study is a continuation of research initiated within the framework of research project N N112 05 72 34 of the Ministry of Science and Higher Education and N N112 374540 of the National Science Centre. Regional honeys with PDO and PGI quality markings are a new phenomenon on the Polish market. For producers, they are a challenge in the production certification process according to the specification, thanks to which the PDO or PGI logo can be used on the honey packaging. Their sale mainly takes place within short distribution chains and demand exceeds supply. Consumers see a high-quality product in regional honey, and thus position it higher in relation to other honeys, which is why the interest is growing.

**Key words:** regional honeys, PDO, PGI, production, prices

**JEL code:** Q11

### Introduction

With Poland's accession to the EU in 2004, both institutional and social actions were intensified with the aim to make Polish producers register their quality traditional and regional products as the Protected Designation of Origin (PDO), the Protected Geographical Indication (PGI) and the Traditional Speciality Guaranteed (TSG). Among all the 1341 food products registered by the European Commission, 680 are listed as PGI, 607 as PDO and 54 as TSG. By 2015 Poland registered 37 products (19 as PGI, 9 as PDO, and 9 as TSG), which gave our country the 6th position in the ranking before Italy (284), France (229), Spain (192), Portugal (134), Greece (103), Germany (86) and the UK (59) [European Commission, Agriculture and Rural Development 2016]. The most popular categories of foods subject to quality registration systems include: fruit, vegetables and fresh or processed cereals (369 products), cheeses (233), processed meat products (177), fresh meat (and offal) (151), oils and fats (butter, margarine, oils, etc.) (128), bread, cake, biscuits and other bakery products (72), and other products listed in Annex I to the Treaty (59). Another category comprises 45 so called other categories of products of animal origin (eggs, honey, various milk products except butter etc.). It includes 32 honeys (24 with PDO and 8 with PGI designations), of which 5 originate from each of the following Member States: Poland, France, Spain, 9 are from Portugal, 4 from Italy and 3 from Slovenia. A very popular category includes also fresh fish and sea fruit (45 products), beer (26), confectionery, bread and bakery products (13). The system protects also pastas, hey, fragrance oils, wool, carminic acid, flowers and plants. Having regard to a short 10-year period of building the Polish market for certified quality foods, since the time of registration of the first Polish quality regional product, a Podhale bryndza cheese (PDO), and the first honey (PGI certified heather honey from Lower Silesia Forests), it is worthwhile to discuss the historical, institutional, social, economic or cultural aspects related with those original Polish products, especially in the context of the initial stage developing market of those products in Poland. Considerable fragmentation and apiaries often run by amateurs are characteristic for the beekeeping in Poland. Honey is the main source of income for the beekeepers other bee products are produced in small amounts. Most of honey is sold directly to the consumer. The average consumption of honey per person still remains at a stable though low level of 0.5 to 1

kg per annum. The cheaper varieties and those harvested annually (eg. the multiflora and rape honeys) dominate in the structure of honey consumption in Poland, while the seasonally variable honey species (depending on flows) such as the heather and honeydew honey (eg. of coniferous honeydew ) are increasingly popular. Regardless of the form of sale, the heather and honeydew honey from coniferous honeydew are the most expensive in Poland while prices of the rape and multiflora honey are the lowest. The demand for the regional honeys has been steadily increasing over the years thanks to the long-term development of consumers' awareness by beekeepers who have educated the public about their products and built consumer confidence in the repeatedly guaranteed premium quality of their products. The direction of changes in consumer preferences allows a conclusion that niche products and direct sales of low-processed foods produced according to traditional recipes will create the chance for Polish producers to develop their businesses, especially small-scale activities.

### **Research results and discussion**

The objective of this article is to present the situation of regional honey on the Polish market, with particular regard to honey with the recognized EU geographical certification – the protected designation of origin and the protected geographical indication. The primary and secondary sources of information were used in the study, first came from the research conducted in 2012 and 2014 and February-April 2016 by all 5 associations of the certified beekeepers producing: Kurpiowski honey, heather honey from Bory Dolnośląskie forests, Podkarpackie honeydew honey, honey from the Sejny county, and Drahim honey, and the research carried out within the framework of N N112 374540 project financed by the National Science Centre. The statistical reports used in this study included the data of the Ministry of Agriculture and Rural Development, Rural Development Programme 2007-2013 and Agency for Restructuring and Modernization of Agriculture. In the analysis of the research problem the comparative and descriptive methods were used.

### **Regional honeys**

The consumers in Poland and in the other country pay more and more attention to the quality of food sold on the market [Zakowska-Biemans 2011, Kühne B. et. 2010, Popovics 2006, Verbeke, Roosen 2009]. The consumer ethnocentrism is observed and the organizations of producers actively promote the healthy food. Besides, the initiatives taken within the framework of public-legal-social partnerships (eg. Local Action Groups - LAGs) show the richness of the country's cultural heritage, including the culinary culture. Locally, especially in the rural areas, the social ties are revitalized not only by bringing the residents together (e.g. in such activities as rural housewives' circles, folk bands, beekeepers' circles), but also by enhancing alternative sources of income from available regional resources which includes the apiaries. The seasonal events cultivating traditions of the ancestors (e.g. the beekeeping demos) or showing, especially to the younger generations, the specifics of "ancient" occupations (such as cooper, blacksmith, saddler, beekeeper etc.), and also creating an opportunity to sell the locally produced regional specialties (including honey, wax candles, and the like) and handicrafts, that are popular not only among local residents demonstrate the long-term and multiple-direction support provided by the public institutions (central and local government agencies, chambers of agriculture, trade unions, agricultural advisory centres, cultural centres etc.). Taking into account the experience of European consumers gained from the shocking food safety scandals in the last decade only, also the Polish

consumer is more and more conscious in making purchase decisions. Increasingly, not only the economic factors (such as price or income), but also the non-economic ones such as quality of products, health benefits, natural composition, and components used in processing, reinforce their top position in the purchase determinant lists [Vecchio, Annunziata 2011, Pieniak, Verbeke, et 2008]. No wonder that a conscious buyer pays attention to labels, markings and inscriptions marking organic food, traditional mode of production, no preservatives used, no artificial colors used, of regional origin, certification etc.) [Fragata, Tiberio, Teixeira 2007, Vecchio, Annunziata 2011, Borowska 2010a, 2010b]. Also the regional honeys belong to natural products sought-after by Poles. Great in number and diversity the regional honeys give the consumers plenty to choose from. The number of 1524 products<sup>1</sup> registered before 12 March, 2016 in the List of Traditional Products kept under the auspices of the Minister of Agriculture and Rural Development from 2005 give evidence of the above statement. The List of Traditional Products comprises 62 honeys, among them five regional honeys that were granted the PGI certificate (heather honey from the Bory Dolnoslaskie forests, Kurpie honey, Drahim honey) and the PDO certificate (Podkarpacie honeydew honey and honey from the Sejny county) at the European Commission level [Borowska 2011]. Besides, other popular honey species are available on the market: nectar (multifloral) honey, quality (rape, acacia, lime, buckwheat, heather) and, although on a smaller scale, rarer honey species (dandelion, raspberry, starflower, goldenrod, phacelia honeys), nectar – honeydew honey and (deciduous or coniferous) honeydew honey. Most of them are sold directly to individual buyers in an "at the door" system i.e. in the apiaries or during local cultural events (such as product days, fairs, festivals, special events) as well as in places specially designed for trading (markets, fairs, bazaars) etc [Borowska 2009].

The short chains of supply are also preferred by the certified beekeepers producing five Polish regional honeys, including three with PGI and two with PDO logos. The end consumers of such honeys are mainly the local residents and loyal buyers who annually repeat purchases of the preferred varieties of honey among them. In addition to shopping by the individuals, more and more beekeepers note groups of buyers, i.e. tourists or organized groups ordering larger batches, also by telephone or, as in the case of Drahim honey where orders of for instance sets of honey varieties are made online [www.pasiekafujarskich.pl](http://www.pasiekafujarskich.pl). However, due to the current niche scale of regional honey production, the cooperation of sellers with retail units (such as healthy food stores, herbal stores, retail stores etc.) is sporadic. The sales of regional honey to stores or other entities (for instance public education units – schools, kindergartens, nurseries etc.) impose on a beekeeper an obligation to issue a VAT invoice, and therefore only a few beekeeping farms - mainly the commercial apiaries (in 2011-2014 there were 8-12 commercial apiaries among the certified beekeepers) decide to conduct such business activity (Table 1). The solution proposed by the Provincial Association of Beekeepers in Rzeszów, which cooperates with the interested certified beekeepers (1-3 until now) and distributes the Podkarpacki honeydew honey in the branded outlet, is an interesting initiative. Three beekeepers - members of the Association of Drahim Honey Producers worked out a competitive edge over other regional producers of regional honeys by developing modern channels of distribution through their online branded outlet. However, in particular from the point of view of prospective buyers of honeys with PDO and PGI logos who use modern tools of communication (telephone, Internet), there is a considerable hindrance, namely

<sup>1</sup> <http://www.minrol.gov.pl/Jakosc-zywnosci/Produkty-regionalne-i-tradycyjne/Listy-produktow-tradycyjnych>

the lack of identified and well-indicated places or contact data with current telephone numbers and addresses of all certified producers. Also, the producers themselves confirm that situation by pointing out that computers are not used in the apiaries run by beekeepers of older generation (over 65 and often more than 80 years old), though they are sometimes supported in using IT by family members. Own websites are developed mainly by the beekeeping farms run by the younger generation. Therefore, still the best way to buy such products is either in an apiary, or at seasonal fairs, trade fairs, beekeeper days or folklore events (such as the Kurpie Honey Harvest held from 1977, Dolnoslaski Honey and Wine Festival, Podkarpacki Honey Feast).

Table 1.

**Number of producers with quality certificates authorizing the marketing of honey registered as PDO, PGI in 2008-2015**

Honey:	Registration	2008	2009	2010	2011	2012	2013	2014	2015
<b>Miod wrzosowy z Borow Dolnoslaskich Honey from Lower Silesia Forests</b>	31/05/2008	2	2	2	4	6	5	5	1
<b>Miod kurpiowski - Kurpie honey</b>	13/07/2010			9	15	22	11	11	11
<b>Podkarpacki miod spadziowy Sub-Carpathian honeydew honey</b>	07/08/2010				7	0	14	14	1
<b>Miod drahimski - Drahim honey</b>	16/06/2011				5	5	5	5	5
<b>Miod z Sejnenszczyzny - The honey from Sejny</b>	30/01/2012					2	2	2	2

Source: GIJHARS 2016

It results from the previous studies of the author (in the years 2012-16) that the certified regional honeys (heather honey, Podkarpacki honeydew honey) are sold in the harvest season by the end of a calendar year at the latest. The demand for such honey exceeds the supply. Even in the favorable years of production (2008-2015) the previous year's stock did not remain in the apiaries. Moreover, due to unfavourable weather conditions and lack of honey flows in the examined period the shortages of the two honey species: heather honey from Bory Dolnoslaskie forests and Podkarpacki honeydew honey were noted. Despite the fact that in the regions where 5 regional honeys are produced only a few dozens of the several hundred beekeepers - producers of e.g. Kurpie honey, honey from the Sejny county to several thousand beekeepers - producers of e.g. Podkarpacki honeydew honey applied to undergo certification and verification of compliance of their production process with specifications. Depending on the year, up to 37 of all the beekeepers certified until now could use the PDO or PGI logos. Producers of the Kurpiowski and Podkarpacki honeys showed the greatest interest in marking their honeys with the EU certification logo in contrast to the beekeepers from the Sejny, Dolny Śląsk and Pomorze Zachodnie regions whose interest in the certification can be considered insignificant. The research covering the 2010-2016 period indicates that the certification challenge was taken by the beekeeper leaders, most interested and involved in the protection and registration of honey [Borowska 2010a]. It would seem that their attitude to pave the way in the administrative procedures of certification would inspire and encourage other beekeepers to certify their honeys, but such hopes proved to be futile. The reasons for that, both objective and subjective, were many. The first ones included the excessive formal documentation, time-consuming information recording requirements of the multi-level production control procedure, the requirement to submit several free samples for laboratory

examination, the meticulous identification of production volume and registration of customers, the relatively long waiting time for the reimbursement of costs of participation in the food quality systems under RDP 2007-2013 and, as emphasized by almost all beekeepers (92 %) except for the Drahim honey producers, lack of pricing bonuses in the case of premium quality honeys (with PDO or PGI logo) if compared with the uncertified varietal honeys offered on the local markets etc. As regards the subjective reasons, they include additional obligations arising from the declaration of certification, observant attitude of producers towards the certification and control system, inclination to take decisions on the basis of experience gained by other beekeepers, lack of time, small scale of production etc.

### Volume and value of production of certified regional honeys

For these several reasons in 2008-2015 the production of five certified regional honeys totalled only 322 018 kg available for sales (except for the Podkarpacki honeydew honey in 2012 and 2014 and the heather honey from Bory Dolnoslaskie forests in 2015) (Table 2). In 2015 the total value of declared production of all 4 harvested honeys (except for the heather honey from Bory Dolnoslaskie forests) was estimated at about 906 thousand PLN (net price) compared with about 680 thousand PLN in 2014 (except for the honeydew honey that lacked honey flows that year) at production volume lower by 45.5 %<sup>1</sup>. In the years 2011-2015, the Drahim honey accounted for even 83.3 % (i.e. 268 331 kg) of total production of all certified regional honeys, the Kurpie honey with 7.7 % share and 24 732 kg took the second position, further ranked the Podkarpacki honeydew honey (4.8 %) with 15 386 kg production volume, the heather honey from the Bory Dolnośląskie forests (2.2 %) - 7169 kg, and the honey from Sejny county with production volume of 6 400 kg (2 %).

Table 2.

#### Production of certified regional honeys in the years 2011-2015 (in kg)

Honey/years	2011	2012	2013	2014	2015
Honey from Lower Silesia Forests	955	2 874	1 170	40	0
Kurpie honey	945	9 722	8 150	5 169	80
Sub-Carpathian honeydew honey	4 350	0	9 786	0	1 250
Drahim honey	38 391	37 800	62 240	51 400	78 500
The honey from Sejny		1 500	1 100	500	3 300
<b>TOTAL</b>	<b>44 641</b>	<b>51 896</b>	<b>82 446</b>	<b>57 109</b>	<b>83 130</b>

Source: GJHARS 2016

Despite the fact that in 2015 honey production in Poland exceeded 22 058 t, compared to 12 836 t in 2014, this cannot, unfortunately be said as regards the PGI heather honey of Lower Silesia Forests, which was absent on the Polish market in 2015, and in 2014 only 40 kg was sold, or about a PDO certified Sub-Carpathian honeydew honey. In both cases, the weather was to blame, i.e. late, short and unproductive heather blooming time, and drought which resulted in honeydew deficit. Those bee-keepers (including those certified) who decided to transport their hives to heather lands for a few days incurred losses, not only due to expensive transport (the heather lands are located approx. 200 km away from apiaries), but first of all due to weakening of bee colonies and the need to feed them in winter. Due to the 2014 drought in the Sub-Carpathian region, which resulted in a production volume of merely 862 t (which accounted for 6.7 % of the

<sup>1</sup> RDP 2007-2013

domestic production as compared to the 2 651 t in 2015 – a volume increase by 206 %) 13 hitherto certified producers of the Sub-Carpathian PDO certified honeydew honey did not collect any honey at all. Only one bee-keeper declared that his production would by 16.11.2016 amount to 1 250 kg, but it remains a mystery until the end of the season whether this declaration will be fulfilled. It is worth to remember what happened in 2015 as regards the PGI certified kurpiowski polyfloral honey. According to GIJHARS database, 11 bee-keepers declared that in 2015 they collected only 80 kg of the PGI certified honey. However, such a low scale of production did not result from polyfloral honey deficit on the traditional area of its origin, i.e Kurpie region. The Kurpiowski honey may be marketed only as a polyfloral nectar honey with a possible addition of honeydew. It turned out that in 2015 the bee-keepers obtained record quantities of honey in Kurpie region, as it was the case in any other Polish region in 2015. However, due to a very high demand for honey from that region, the majority of the Kurpie bee-keepers sold their honey under a general brand instead of branding it as PGI.

### **Price of regional honey**

The variety of honey as well as distance of apiaries from honey flows (migratory hives - high costs of transport) and points of sale (metropolitan areas, markets in cities, places frequently visited by tourists, etc.) have significant impact on the price of honey. For years the multifloral and rape honeys as well as the regional honeys analysed here have been cheaper than the most expensive heather and coniferous honeydew honeys, and the honeys sold in cities (including the city marketplaces) or places frequented by tourists have been a few dozen percent more expensive than honeys sold in other places or the apiaries. Depending on the year, the prices of multifloral and rape honeys were the lowest. The comparison of prices of the Drahim honey varieties in the years 2013-2016 shows that 1 kg of the lime honey was by about 20-25 % and the heather by over 100 %-112 % more expensive than the multifloral honey or canola honey (Table 3).

In contrast, the gross price difference between the buckwheat honey and heather honey fell within the range of 70 %-75 %. In addition to the dependencies mentioned, certain regularity can be observed, namely that smallest unit packing, the higher price per 1 kg. The beekeepers seek solutions that would eliminate profit margins, especially charged by the intermediaries in business (e.g. the retailers), usually by using the direct sales system such as "face to face" or roadside sales, or try to minimize profit margins scale by cooperation with distributors who are reliable trading partners (i.e. those who pay liabilities in due time, effect payments, systematically order successive batches etc.). For example, 10 years ago the price of heather honey sourced from Lower Silesia Forests, due to its characteristic composition, was by PLN 3-8 (EUR 1-2) per 1 kg higher than the price of other heather honeys<sup>1</sup>. In the years of favourable weather (especially in 2012-2013), the price ranged from PLN 12 to even PLN 30 per kilo (i.e. EUR 2.8 – 7.2 /kg), especially if the product was marketed at international fair or in Warsaw. Honey producers from Sejny region did not experience such a big price range in terms of direct sales in the area of the honey production, i.e. Sejny and Suwałki powiat, although they admit that the price of a PDO labelled honey in a capital of a province would be approx. 20-25 % higher than in the production area, and in case of a big city (such as Warsaw) the price may be even 90-100 % higher than in the apiary. The price of the PGI Kurpiowski honey obtained in direct sales by producers in the local

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<sup>1</sup> List of Traditional Products OJ C 179/15, 1.8.2007, Council Regulation No. 510/2006 (EC) „Miód wrzosowy z Borów Dolnośląskich” No WE: PL/PGI/005/ 0449/18.02.2005 [Heather Honey from Lower Silesia Forest]



market between 2011 – 2015, increased on average by approx. 50 %, while the price range reached +/- 10 %. However, the producers' long-term price strategy assumes that the direct sales price be maintained at the level of PLN 25-30/kg, which guarantees a favourable price in relation to the high product quality.

Table 3.

**Average price of PDO and PGI certified honey in direct sales and purchasing power of an average monthly salary in Poland in relation to a price of certified honey in direct sales in 2011 and in 2015**

Honey	Average price of PDO and PGI certified honey in direct sales (PLN/kg)		Purchasing power of an average monthly salary in Poland in relation to a price of certified honey in direct sales (kg)	
	2011	2015	2011	2015
<b>Honey from Lower Silesia Forests (PGI)</b>	40	bd	85	bd
<b>Kurpie honey (PGI)</b>	20	40	170	97
<b>Sub-Carpathian honeydew honey (PDO)</b>	38	47,50	89	82
<b>The honey from Sejny (PDO)</b>	bp	33,5	bp	116
<b>Drahim honey (PGI) - rape</b>	30	35,4	-	-
<b>- multiflower</b>	30	35,4	113	110
<b>- lime</b>	-	47,6	113	110
<b>- buckwheat</b>	31	35,8	-	82
<b>- heather honey</b>	50	61,5	110	109

*bp- certified honey not produced bd – no honey available, no data available*

*Source: Own calculations based on GUS „Przeciętne miesięczne wynagrodzenie w gospodarce narodowej” <http://stat.gov.pl/obszary-tematyczne/rynek-pracy/pracujacy-zatrudnieni-wynagrodzenia-koszty-pracy/przecietne-miesieczne-wynagrodzenie-w-gospodarce-narodowej-w-latach-1950-2015,2,1.html> (06.06.2016)*

The Sub-Carpathian PDO honeydew honey, as other honeydew honeys, is relatively expensive due to its scarce production and big seasonal volatility. While selling the product directly with a PDO label in 2015, its producer cashed approx. PLN 45-47/ kg (EUR 11.3/kg). The honey could be bought for a similar retail price at a shop run by Provincial Association of Bee-Keepers. Honeydew honey without PDO label was approx. 25 % cheaper, i.e. its price was PLN 9-10/kg (EUR 2-2.5/kg). In addition, considering that honeydew honey supply was bigger in 2015 in comparison to previous years, which made its retail prices drop to the average of PLN 32.6/kg, the PDO certified honey was a less attractive product in terms of price for those purchasers who did not pay attention to a quality certificate or were not aware of what the certificate meant. Moreover, its retail price in 2015 grew by 11 % in comparison to 2013. Drahimski honey (PGI) brand is reserved for five different honeys, including: buckwheat, rapeseed, heather, lime and polyfloral honey. In 2015, they could be bought directly from an apiary or ordered through Internet, in which case the price was increased by the cost of delivery. The most expensive was the heather honey (PLN 61.5/kg – EUR 14.75 /kg). Rapeseed, buckwheat and polyfloral honeys cost PLN 35.5/kg (EUR 8.5), and lime honey cost 34 % more. During the 5 years under consideration, the prices of honeys increased by 15.5 % in case of buckwheat honey, 18 % in case of polyfloral and rapeseed and by 23 % in case of heather honey.

### **Distribution of regional honeys**

According to the data from bee-keepers' organizations, direct sale is the basic sales channel for honey in Poland. 79 % of the whole production is sold directly. Bee-keepers supply approx. 12 %

of their honey for industrial buying-in, and nearly 8.9 % goes to retail. In 2015, only 0.1 % of all the honey production in Poland was intended for industry [Semkiw 2015, Borowska 2011]. The sales structure of Polish PDO and PGI certified regional honeys in the period 2011-2015 points to a domination of direct distribution channels, with avoidance of wholesale buying-in and marginalization of agents who sell honey to final consumer. The most popular type of honey marketing is to do it directly from the apiary by the bee-keeper himself or his family members. Assuming direct sales as 100 %, as much as 70 % of Kurpiowski honey production, and 63 % of Drahimski honey production is purchased by consumers who visit apiaries. In case of Sub-Carpathian honeydew honey, it is approx. 55 %, and for honeys from Lower Silesia Forest and from Sejny it is 38 % and 34 %, respectively. In case of the latter, further 33 % is sold at local open-air markets and during public events (fairs, etc.). Also heather honey and honeydew honey find their purchasers in this way (31 % and 27 %, respectively). Another convenient option of direct contact with client is when bee-keepers participate in industrial fairs throughout Poland, which accounts for 4-6 % of the direct sales structure of 3 honeys (Drahimski, heather, Kurpiowski) and 18 % in case of honeydew honey, apart from the honey from the Sejny region.

### **Discussion and comments**

Taking into account the strengths and weaknesses of the current availability of the regional honeys with PDO and PGI certification on the Polish market, mainly the local markets, the low interest of the beekeepers in the certification takes the first place (Table 4). In the case of beekeepers running small apiaries, the costs of participation in the system and time-consuming procedure discourage them from taking the trouble of distinguishing their products on the market with a logotype. In their opinion, their honey, whether distinguished with PDO or PGI logo or not, will still be sold due its values and quality, especially to the long-term loyal customers, though not under a registered name. The persistent question about the future of certified honeys should, however, be considered. Should it be expected that as long as the marked products are not considered by consumers as distinctive compared with other conventional products of the same category (or other not quality certified honeys), and as long as the producers do not earn sufficient profit from their competitive advantage (whether stimulated or not by promotional and information campaigns), they will disappear from the market in a natural way? Given the growing beekeepers' awareness of identifiability and recognition through product, in contrast to their current anonymity on the market, such a pessimistic scenario probably should not be considered. Integrated activities taken by groups, especially of educational and marketing nature, are a chance for them. Although supporting the marketing with professional advice is worth considering, not everyone can afford it, the economic factor (stimulus), including the price achieved from the sale of honey, still constitutes the basis for making the production decisions. The current support offered under RDP 2007-2013 program to the producers of regional honeys who participate in the food quality systems included 16 beekeepers only. Within the 27 decisions on granting aid, the amounts from PLN 429 to PLN 3200 were paid, which is the maximum that a beneficiary could obtain annually in five successive years. In the opinion of the author, the amounts of aid are not sufficient to stimulate interest in such instrument of support or enhance interest in the certification of regional honeys produced in the regions anyway. Moreover, except for the Drahim honey, the additional costs and time of preparation and implementation of the product quality compliance procedure – i.e. the certification, do not translate as assumed into the higher price of honeys with PDO or PGI logos.

Table 4.

**Selected strengths and weaknesses of certified regional honeys in Poland**

Honey	Strengths	Weaknesses
<b>1</b>	Professional apiaries and commercial production; Development of product brand; Identifiability of product on the market; Availability through modern distribution channels (e-commerce)	Joint action through integration of ties of association members
<b>2</b>	Honey harvest and local beekeeping events; Consumers' interest in product, especially local consumers; Consumer education through direct contact with a beekeeper (direct sales ), Production potential	Supply lower than demand; Decreasing interest in product certification
<b>3</b>	Cooperation and exchange of experience among certified beekeepers; Recognition of product name	Certification of production by only a few leaders of the Dolnośląskie Association of Beekeepers; Continuity of annual production (lacking honey flow)
<b>4</b>	Sales of honey in an apiary; The first regionally bilateral product (Poland and Lithuania)	Too few certified producers (1); Marginal production volume; Low availability for consumers on the market; Promotion and marketing
<b>5</b>	Sales of product supported by the flagship store of the Provincial Association of Beekeepers in Rzeszów; Production potential	Honey harvested not every year; Promotion and marketing

*1-Drahim honey , 2- Kurpie honey, 3- Honey from Lower Silesia Forests, 4- The honey from Sejny, 5- Sub-Carpathian honeydew honey*

**Source: own calculations**

**Conclusions**

On the basis of author's own research and the analysis of data provided by GIJHARS, Agency for Restructuring and Modernization of Agriculture (ARiMA), the Institute of Pomology and Floriculture, Apiculture Division in Pulawy relating to five certified honeys with PDO, PGI European Union certification in Poland in the years 2008-2015 the following conclusions can be drawn

- 1) Direct distribution channels dominate in sales of all regional honeys.
- 2) All certified producers of regional honeys sell their products mainly in the apiaries.
- 3) Approximately 86.5 % of the beekeepers declare participation in local events (such as the beekeeper days, fairs, bazaars etc.) as well as sales at neighbouring markets. However, considering the developing character of the Drahim honeys business their producers do not exclude, and rather would welcome, an increasing role of indirect channels of sale, and especially elimination of other ways of sale, and would like to focus on the specialty health food stores, ecological herbal stores, and small local retail stores with development of the e-commerce activity.
- 4) The studies carried out among the associations of producers of the certified regional honeys in 2016 confirmed their continuing interest in participation in various local and regional cultural events (trade fairs, beekeepers' days, festivals etc.) which give them the opportunity to promote and sell their products as well as educate the consumers.
- 5) The niche character and small production volumes at present, especially of the three regional honeys (including the honey from Sejny county, the heather honey from Bory Dolnoslaskie forests and the Podkarpacki honeydew honey) make such honeys unavailable to a wider range of consumers. Moreover, in consequence of little interest on the part of the large group of the beekeepers in the certification of compliance of their production process with specifications their products cannot be upgraded against honeys of the same category or marked with PDO or PGI logo as products of repeatable high quality. Therefore, at this stage of building the regional and traditional food market in Poland, it is hard to call the certification a pro-development activity, with

a few exceptions namely the professional and non-amateur beekeepers focused at keeping commercial apiaries (the Drahim honey).

## Bibliography

1. Borowska A. 2009. *Distribution of traditional and regional food products in the European Union – experiences and an example for Poland*. [in:] Żywność regionalna i tradycyjna - aspekty surowcowe, technologiczne i ekonomiczne: materiały na międzynarodową konferencję naukowo-promocyjną. Uniwersytet Warmińsko-Mazurski, Olsztyn 25-26. 11. 2009, Olsztyn, pp. 27-29
2. Borowska A. 2010b. *The role of traditional and regional food products in rural development in Poland*. Socialiniai Tyrimai / Social Research 2010, nr 1 (18), pp. 40-52
3. Borowska A. 2011. *Condition and perspectives of development of the beekeeping in Poland with particular consideration of regional honeys*. Scientific Papers of SGGW in Warsaw. Problems of Agriculture of the World 2011, Volume 11 (26), book 4, pp. 37-47
4. European Commission, Agriculture and Rural Development  
<http://ec.europa.eu/agriculture/quality/door/list.html> (06.06.2016)
5. Fragata A., Tiberio M. L., Teixeira M. S. 2007. *Traditional products with protected designation of origin: policy and market situation in Portugal*. New Medit No. 2, pp. 4 – 12
6. Kühne B., Vanhonacker F., Gellynck X., Verbeke W. 2010. *Innovation in traditional food products in Europe: Do sector innovation activities match consumers' acceptance?* Food Quality and Preference 21/2010, p. 629 - 638
7. List of Traditional Products OJ C 179/15, 1.8.2007, Council Regulation No. 510/2006 (EC) „Miód Wrzosowy z Borów Dolnośląskich” Nr WE: PL/PGI/005/ [Heather Honey from Lower Silesia Forest]
8. Pieniak, Z., Verbeke, W., Scholderer, J., Brunso, K., Olsen, S. O. 2008. *Impact of consumers' health beliefs, health involvement and risk perception on fish consumption: A study in five European countries*. British Food Journal, 110(8-9), pp. 898-915,
9. Popovics A. 2006. *A review of traditional Hungarian products' reputation with a special focus on consumer behaviour*. Studies in Agricultural Economics No. 105, pp. 71 – 86,
10. Semkiw P. 2015. *The beekeeping sector in Poland in 2015*. Research Institute of Pomology and Floriculture, Division of Apiculture in Puławy pp. 5-15.
11. Vecchio R., Annunziata A. 2011. *The role of PDO/PGI labelling in Italian consumers' food choices*. Agricultural Economics Review, vol. 12, no. 2, pp. 80 – 98,
12. Verbeke W., Roosen J. 2009. *Market differentiation potential of country-of-origin, quality and traceability labelling*. The Estey Centre Journal of International Law and Trade Policy vol. 10 No. 1, pp. 20 – 35
13. Żakowska-Biemans S. Bezpieczeństwo żywności jako czynnik determinujący zachowania konsumentów na rynku żywności Probl. Hig. Epidem. 2011, 92(3), pp. 621-624,
14. Borowska A. 2010a. *Economic and non-economic conditions for traditional food production in Poland (Uwarunkowania ekonomiczne i pozaekonomiczne produkcji żywności wysokiej jakości w Polsce)*. Wydawnictwo SGGW, p. 48-54

## COMPETITIVENESS OF SPECIALIST VINEYARDS IN SELECTED EUROPEAN UNION COUNTRIES IN THE YEARS 2004-2015

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**Abstract.** The paper aims to assess the competitiveness and efficiency of European farms specializing in viticultural production. The analysis was conducted for selected European Union countries using data from the years 2004-2015. In the analysed period, there was a large diversity in the resources used by these farms. The largest wine farms in terms of area were from Bulgaria, France, Spain, Austria and the Czech Republic; and in terms of labour from Bulgaria, France, the Czech Republic, Romania and Germany; while in terms of capital respectively in France, Germany, Italy, the Czech Republic and Austria. In the studied countries, the resources of land and capital increased, while labour remained at unchanged level. By calculating the competitiveness index, it was found that the French and German farms were the most competitive. The lowest competitiveness was found for Bulgarian, Portuguese, Spanish and Croatian farms. Based on the research, it is argued that obtaining income parity on the level of remuneration of hired employees does not guarantee development opportunities for farms specializing in viticultural production in selected EU countries.

**Keys words:** vineyards, competitiveness of farms, FADN, Europe.

**JEL CODE:** Q12, D24

### Acknowledgements

This paper is based on the results of the project VITISMART (Toward a sustainable viticulture: Improved grapevine productivity and tolerance to abiotic and biotic stresses by combining resistant cultivars and beneficial microorganisms). The financing of this project by ERA-NET CO-FUND FACCE SURPLUS program through Polish National Centre for Research and Development (NCBiR) is acknowledged.

### Introduction

In agriculture, similarly as in other sectors of the economy, there are processes of specialization and concentration of production. This is evident in the increase in the share of farms specializing in specific directions of production and the increase in their area ((Sobierajewska and Zietara, 2017)). An important issue regarding the functioning of business entities is their competitiveness. Research on competitiveness is carried out at 6 levels: global (world), regional (groups of countries e.g. EU), macro (economies of countries), meso (sectors, industries), micro (enterprises) and micro-micro (individual entrepreneurs or consumers) (Gorynia 2009).

Competitiveness is a complex economic category regarding the interaction between economic entities, sectors, or national or even global economies. It is determined on the basis of market share and / or changes in productivity and efficiency (Kleinhanss, 2015). It should therefore be assumed that competitiveness is defined as the farm's ability to grow. If the income is higher than the costs of production factors, then the farm owners are able to compete and stay on the market. Otherwise, they will take action to changed management conditions or cease to conduct a given activity and use production factors in a different way (Kleinhanss, 2015).

In the wine sector, there are many studies that relate to the analysis of competitiveness but winemaking enterprises in Europe, not farms (i.e. see Balogh and Jámbor, 2017). However, there are no microeconomic studies explicitly related to the economics and competitiveness of farms specializing in viticultural production.

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## Methodology

The aim of the research was to determine the competitiveness and efficiency of farms specializing in viticulture in selected European Union countries in the years 2004-2014. The research covered farms specializing in viticulture production participating in the European Farm Accountancy Data Network (FADN) in selected countries. Accounting data of specialist vineyards from FADN were used as the study material. The viticulture farms - members of FAND system are classified in accordance with the Community Typology of Agricultural Holdings. Classification of farms is based on two criteria: business size and type of crops. Type of farm is determined by the share of Standard Output value of individual groups of farming operations in the total value of SO. Standard Output is defined as a 5-year average output from specified plant or animal production from 1 ha or 1 animal during the year, under average production conditions typical for specific region. In FADN's field of analysis, there are farmsteads that produce ca. 90 % Standard Output (SO) in specific region or country. Specialist vineyards were selected in accordance with grouping of general farm types for TF8 as type 3 Vineyards. The time range included data available in the FADN system for the years 2004-2015. All countries whose data was available in the FADN system were selected for the research. There were 14 countries, including: Bulgaria, Cyprus, the Czech Republic, Germany, Greece, Spain, France, Croatia, Hungary, Italy, Austria, Portugal, Romania and Slovenia.

The study presents the general characteristics of farms specialized in vinicultural production in selected EU countries, including land, labour and capital resources. Then, the income from the family farm was presented for these farms, and the competitiveness of farms growing vines and income parity was determined. Competitiveness of farms was estimated on the basis of the competitiveness index (Wk) elaborated by Werner Kleinhans (2015). Competitiveness index was defined as the ratio of farm income to the sum of estimated costs of using own production factors: own labour, land and capital. The costs of using own factors of production were estimated for: labour costs based on labour costs of hired employees, land costs based on rent of land and capital costs (excluding land) based on long-term government bond interest rates (risk-free). The value of the competitiveness index 'Wk1' means full coverage of the cost of production factors' own costs, while  $Wk < 1$  means the incomplete coverage of the costs. The competitiveness index above 2 indicates the full competitive ability of the farm. This is consistent with the views of Biswanger (2011), who stated that a company capable of development should reach twice the rate of interest on loans. The income parity was in turn calculated as the ratio of the income from the family farm to the full-time employed person (FWU, Family Work Unit - 2120 hrs own work in a year) and the average remuneration of waged labour on the farm. In the paper, there are used descriptive statistics methods, including the absolute and relative dynamics of changes through applying linear and exponential regression analysis. The research data were obtained from the European FADN data and European Central Bank.

## Characteristics of surveyed farms specializing in viticultural production

In the years 2004-2015 in the European countries, the average area of a farm specializing in viticulture was over 13.84 ha of utilized agricultural area (UAA) (Table 1). In the analysed period, the average area of viticultural farms increased from 13.31 ha to 14.16 ha of UAA, thus the average annual increase was about 0.6 %.

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Table 1

**Resources of specialist vineyards in selected EU countries in 2004-2015**

Speci- fica- tion	Country	2004- 2006	2007- 2009	2010- 2012	2013- 2015	Average 2004- 2015	Average annual change	
		absolute values						%
Area of agricultural land (ha)	(BGR) Bulgaria*	-	25.04	24.96	27.12	25.71	0.34	1.24
	(CYP) Cyprus*	4.75	3.90	3.72	3.67	4.01	-0.13	-2.92
	(CZE) Czech Republic	20.52	21.71	9.36	8.66	15.06	-1.39	-9.40
	(DEU) Germany	10.60	11.13	13.04	12.79	11.89	0.28	2.43
	(ELL) Greece	4.68	4.49	4.36	5.12	4.66	0.05	0.81
	(ESP) Spain	17.41	22.48	24.21	22.78	21.72	0.60	2.92
	(FRA) France	24.81	24.42	24.12	24.39	24.44	-0.05	-0.22
	(HRV) Croatia*	-	-	-	4.33	4.33	0.00	-0.11
	(HUN) Hungary	8.77	9.82	10.76	11.33	10.17	0.28	2.75
	(ITA) Italy	7.16	7.81	8.18	8.89	8.01	0.18	2.29
	(OST) Austria	23.24	17.77	14.03	12.72	16.94	-1.16	-6.54
	(POR) Portugal	8.96	9.75	10.38	10.75	9.96	0.21	2.10
	(ROU) Romania*	-	9.86	10.45	6.92	9.08	-0.37	-4.95
	(SVN) Slovenia*	4.66	5.06	4.32	4.19	4.54	-0.08	-1.75
(EU) European Union	13.31	14.05	13.85	14.16	13.84	0.08	0.57	
Total labour input (AWU)	(BGR) Bulgaria*	-	6.74	5.43	4.66	5.61	-0.32	-5.81
	(CYP) Cyprus*	0.96	0.81	1.27	1.30	1.09	0.05	4.27
	(CZE) Czech Republic	3.12	3.60	1.97	2.02	2.68	-0.14	-4.94
	(DEU) Germany	2.32	2.47	2.46	2.53	2.44	0.02	0.80
	(ELL) Greece	1.29	1.27	1.11	0.95	1.16	-0.04	-3.36
	(ESP) Spain	1.36	1.37	1.42	1.45	1.40	0.01	0.81
	(FRA) France	2.70	2.71	2.76	2.98	2.79	0.03	0.96
	(HRV) Croatia*	-	-	-	1.85	1.85	-0.09	-4.69
	(HUN) Hungary	1.97	1.78	2.01	2.27	2.01	0.04	1.83
	(ITA) Italy	1.26	1.29	1.26	1.21	1.25	-0.01	-0.64
	(OST) Austria	1.63	1.56	1.45	1.83	1.62	0.01	0.94
	(POR) Portugal	1.90	1.76	1.80	1.84	1.82	-0.01	-0.27
	(ROU) Romania*		3.14	2.43	2.14	2.57	-0.18	-5.59
	(SVN) Slovenia*	2.09	1.97	2.15	1.46	1.90	-0.07	-3.97
(EU) European Union	1.67	1.74	1.68	1.72	1.70	0.00	0.14	
(euro)	(BGR) Bulgaria*	-	268.86	310.30	308.87	296.01	8.88	2.94
	(CYP) Cyprus*	132.90	126.18	228.75	131.76	154.90	2.39	1.00
	(CZE) Czech Republic	249.12	310.37	229.38	469.83	314.67	18.17	5.13
	(DEU) Germany	474.74	514.36	536.37	582.29	526.94	11.33	2.15
	(ELL) Greece	91.03	99.31	91.30	103.93	96.39	1.18	0.96
	(ESP) Spain	176.22	216.06	218.26	226.88	209.36	5.25	2.59
	(FRA) France	501.10	548.28	588.72	619.26	564.34	13.27	2.36
	(HRV) Croatia*	-	-	-	237.56	237.56	-21.76	-8.87
	(HUN) Hungary	142.57	142.91	193.91	213.59	173.25	8.59	4.86
	(ITA) Italy	270.70	308.47	374.10	419.71	343.24	16.45	4.79
	(OST) Austria	296.17	307.76	292.03	325.84	305.45	2.69	0.91
	(POR) Portugal	101.17	112.58	153.78	185.22	138.19	9.75	7.04
	(ROU) Romania*	-	184.73	104.91	109.61	133.09	-9.08	-8.97
	(SVN) Slovenia*	185.34	182.10	210.51	241.56	206.65	8.12	3.85
(EU) European Union	282.96	314.93	354.03	382.90	333.70	11.21	3.37	

\* data for Slovenia since 2005, for Bulgaria and Romania since 2007 and Croatia since 2013

Source: authors' study based on FADN data

In the analysed period, the largest UAA was characterized by Bulgarian (25.7 ha), French (24.4 ha), Spanish (21.7 ha), Austrian (16.9 ha) and Czech (15.1 ha) farms. In turn, the smallest area of

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agricultural land was characterized by Cypriot (4 ha), Croatian (4.3 ha), Slovenian (4.5 ha) and Greek (4.7 ha) farms. In 2004-2015, in relative terms, the increase in the area of farms specializing in viticulture was recorded in Spanish (annual average of 2.9 %), Hungarian (2.8 %), German (2.4 %) and Italian (2.3 %), Portuguese (2.1 %) and Bulgarian (1.2 %) farms. In the remaining countries was observed decrease in the area of farms. The largest relative decrease was recorded in Czech farms (annual average - 9.4 %), Austrian (-6.5 %), Romanian (- 5.0 %) and Cypriot (- 3 %).

In the years 2004-2015, in European farms specializing in viticulture, work expenditures on average were on the same level, and amounted to about 1.7 of Annual Working Unit (AWU). The largest labour resources were in farms from Bulgaria (5.6 AWU), France (2.8 AWU), Czech (2.7 AWU), Romania (2.6 AWU) and Germany (2.4 AWU). In turn, the smallest work resources were characterized by Cypriot (1.09 AWU), Greek (1.16 AWU), Italian (1.25 AWU) and Spanish (1.4 AWU) farms. In the analysed period, in relative terms, the largest increase in labour expenditure per farm was recorded in Cypriot (annual average of 4.3 %), Hungarian (1.8 %), French and Austrian (0.9 %) and Spanish and German (0.8 %) farms. The largest decrease in relative terms was recorded in Bulgarian farms (annual average - 5.8 %), Romanian (- 5.6 %), Czech (- 4.9 %) and Slovenian (- 4 %).

In the years 2004-2015, on average, in the EU Member States, in farms specializing in viticulture, there was an increase in the value of total assets from approx. 282.96 k Euro to approx. 382.90 k Euro, i.e. average annually by approx. 3.37 % (nominal value). In the analysed period, in the majority of farms, there was an increase in the value of total assets, except for Romanian and Croatian farms. In relative terms, the largest increase in the value of total assets was recorded in Portuguese farms (on average by 7.04 %), Czech (by 5.13 %), Hungarian (by 4.86 %) and Italian (by 4.79 %). In absolute terms, the largest increase in total assets was recorded in Czech farms (annual average of 18.17 Euro), Italian (by 16.45 k Euro), French (13.27 k Euro) and German (by 11.33 k Euro). A decrease in the value of assets was observed in Croatian and Romanian farms. In relative terms, for these farms the decline was on average 8.9 %. In the analysed period, the largest farms specializing in viticulture in terms of total property value were observed in France (on average around 555.34 k Euro), Germany (526.94 k Euro), Italy (343.24 k Euro), the Czech Republic (314.67 k Euro) and Austria (305.45 k Euro). The smallest farms were recorded in Greece (on average 96.39 k Euro), Romania (133.09 k Euro), Portugal (138.19 k Euro) and Cyprus (154.90 k Euro).

### **Farm income of surveyed farms specializing in viticultural production**

In the FADN farm accountancy system, income from a family farm is a fee for the involvement of own production factors (land, labour and capital for the farm's operational activity and a risk fee for the farm operator). In the analyzed countries, the income from farms specializing in viticultural production increased from 21.97 k Euro to 24.72 k Euro, i.e., on average, by 3.03 % per annum. In the analysed period, the largest increase in income observed on Portuguese farms (on average about 6.60 %), Spanish (5 %), Italian (3.5 %), French (3.4 %) and German (2.7 %). In relative terms, the largest decrease in income was observed on Croatian (- 9.9 %), Slovenian (- 7.2 %), Greek (- 6.1 %) and Czech (- 2.9 %) farms. In the analysed period, the highest income from farms specializing in viticulture was obtained in French farms (on average, approx. 51.5 k Euro), German (41.1 k Euro), Austrian (22.4 k Euro) and Italian (20.2 k Euro). The smallest incomes on farms

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were in Bulgarian farms (average annual 860 Euro), Cypriot (4.6 k Euro) and Croatian (about 4.8 k Euro). In some years, for some countries, there was a loss of income from the farm.

Table 2

**Farm Net Income of specialist vineyards in selected EU countries  
 in 2004-2015**

Specification	Country	2004-2006	2007-2009	2010-2012	2013-2015	Average 2004-2015	Average annual change	
		absolute values						%
Farm Net Income	(BGR) Bulgaria*	-	-1.44	-1.36	5.37	0.86	1.23	x
	(CYP) Cyprus*	2.68	5.99	6.91	2.83	4.60	0.15	x
	(CZE) Czech Republic	16.75	22.02	14.39	17.18	17.59	-0.32	-2.88
	(DEU) Germany	38.39	41.05	42.64	50.42	43.12	1.21	2.74
	(ELL) Greece	16.03	14.86	11.93	9.17	13.00	-0.75	-6.05
	(ESP) Spain	13.34	15.32	18.63	20.64	16.98	0.81	4.96
	(FRA) France	44.88	45.02	54.54	61.58	51.50	1.86	3.36
	(HRV) Croatia*	-	-	-	4.77	4.77	-0.54	-9.87
	(HUN) Hungary	7.48	7.05	10.90	12.20	9.40	0.56	x
	(ITA) Italy	17.25	18.99	19.95	24.63	20.20	0.74	3.52
	(OST) Austria	22.66	23.29	23.86	19.91	22.43	-0.28	-1.44
	(POR) Portugal	8.63	9.22	13.98	14.87	11.67	0.73	6.60
	(ROU) Romania*	-	5.54	8.20	10.54	8.09	1.36	x
	(SVN) Slovenia*	8.43	15.94	11.79	6.26	10.80	-0.68	-7.16
	(EU) European Union	21.97	22.52	25.24	29.17	24.72	0.78	3.03

Source: authors' study based on FADN data

**Competitiveness of surveyed farms specializing in viticultural production**

It was found that the competitiveness index of analysed European farms specializing in viticultural production did not reach the level above 2. In the analysed period, the competitiveness index above 1 was only on French (on average 1.17) and German (1.04) farms. In other countries, the competitiveness index was below 1 (table 3).

The lowest competitiveness index characterized Bulgarian (0.12), Portuguese (0.16), Croatian (0.30), Cypriot (0.34) and Hungarian (0.32) farms. A negative competitiveness index was recorded in those years and in the countries where farms obtained a loss of activity. In the years 2004-2015, the increase in the competitiveness index was recorded on Spanish farms (annual average of 8.49 %), Italian (6.06 %), Greek (4.35 %), Portuguese (by 3.65 %) and French (by 1.71 %). The level of competitiveness index in German farms practically has the same level in the analyzed period (on average 1.04).

In the analysed period, the decline in the competitiveness index was recorded in Czech farms (annual average - 9.30 %), Austrian (- 6.53 %) and Slovenian (- 2.15 %). It was found that here were large fluctuations in the level of the competitiveness index in European farms specializing in viticultural production. The largest coefficient of variation of the competitiveness index was in Bulgarian (368.26 %) and Cypriot (101.16 %) farms. The smallest coefficient of variation of the competitiveness index was observed on German (12.23 %), Slovenian (13.99 %) and French (18.09 %) farms.

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Table 3

**Income parity and competitiveness of specialist vineyards in selected EU countries in the years 2004-2015**

Specification	Country	Years					Average annual change	
		2004-2006	2007-2009	2010-2012	2013-2015	Average 2004-2015		
		absolute values						
Competitiveness of farms (multiplicity)	(BGR) Bulgaria	-	0.09	-0.02	0.30	0.12	0.03	x
	(CYP) Cyprus	0.24	0.48	0.52	0.11	0.34	0.00	x
	(CZE) Czech Republic	1.06	1.03	0.52	0.64	0.81	-0.07	-9.30
	(DEU) Germany	1.05	1.01	1.07	1.02	1.04	0.00	-0.26
	(ELL) Greece	0.59	0.58	0.56	0.92	0.66	0.03	4.35
	(ESP) Spain	0.17	0.17	0.27	0.35	0.24	0.02	8.49
	(FRA) France	1.11	1.05	1.24	1.30	1.17	0.02	1.71
	(HRV) Croatia	-	-	-	0.30	0.30	0.00	-0.11
	(HUN) Hungary	0.29	0.23	0.36	0.40	0.32	0.01	-
	(ITA) Italy	0.42	0.41	0.47	0.74	0.51	0.03	6.06
	(OST) Austria	0.81	0.78	0.71	0.44	0.69	-0.04	-6.53
	(POR) Portugal	0.13	0.14	0.19	0.18	0.16	0.00	3.65
	(ROU) Romania	-	0.36	0.47	0.33	0.39	0.02	x
	(SVN) Slovenia	0.28	0.82	0.59	0.37	0.53	-0.02	-2.15
	(EU) European Union	0.57	0.57	0.61	0.69	0.61	0.01	1.84
Income parity (%)	(BGR) Bulgaria	-	78.67	25.71	45.05	49.81	-5.72	x
	(CYP) Cyprus	36.50	85.93	81.22	55.39	64.76	3.62	x
	(CZE) Czech Republic	205.27	169.60	83.75	119.55	144.54	-12.30	-9.63
	(DEU) Germany	157.55	156.21	154.08	154.01	155.46	-0.83	-0.51
	(ELL) Greece	184.78	161.62	167.53	182.89	174.21	-0.17	-0.09
	(ESP) Spain	98.80	102.84	108.37	117.43	106.86	1.80	1.86
	(FRA) France	128.45	117.85	136.69	138.74	130.43	1.39	0.87
	(HRV) Croatia	-	-	-	45.64	45.64	1.44	2.76
	(HUN) Hungary	50.17	158.72	175.25	266.89	162.76	21.50	x
	(ITA) Italy	99.02	104.74	109.61	137.57	112.74	3.88	3.28
	(OST) Austria	136.84	138.77	124.92	70.35	117.72	-7.47	-7.39
	(POR) Portugal	104.80	99.05	133.51	137.29	118.66	3.97	3.52
	(ROU) Romania	-	155.43	52.49	375.81	194.58	54.39	x
	(SVN) Slovenia	56.18	113.85	74.14	49.89	75.09	-4.19	-5.55
(EU) European Union	104.39	120.86	121.33	127.98	118.64	2.08	1.80	

\* data for Slovenia since 2005, for Bulgaria and Romania since 2007 and Croatia since 2013

Source: authors' study based on FADN data

In the analysed period the highest indicator of income parity in specialist vineyards in selected EU countries was observed in farms from Romania (194.58 %), Greece (174.2 %), Hungary (162.76 %), Germany (155.46 %), Czech (144.54 %) and France (130.43). The smallest rate of income parity index was found in Croatian (45.64 %), Bulgarian (49.81 %), Cypriot (64.76 %) and Slovenian (75.09 %) farms. In the analysed period, the highest increase in income parity was observed in Portuguese farms (on average by 3.52 %), Italian (by 3.28 %) and Croatian (by 2.76 %). On the other hand, the largest decrease in parity was recorded on Czech farms (on average annually by -9.63 %), Austrian (- 7.39 %) and Slovenian (- 5.55 %).

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## Conclusions

The wine sector plays an important role in the national economies of many countries, especially in areas with favourable conditions for viticultural production. In the years 2004-2015, there was a slight increase in the area of arable land in European specialist vineyard farms, and there was no change in labour resources too. An increase in the value of total property was observed. In the analysed period, a large variation in the level and dynamics of income could be observed. Accordingly, the competitiveness index slightly increased and reached the level of 0.69. In the analysed years, the competitiveness index in none of the countries reached the level of 2 and above. This means that farms specializing in viticulture in EU countries have very limited developmental abilities. On the basis of the analysis of the income parity of the surveyed farms, it should be stated that the income from the farm at the parity level does not determine the competitive ability of the farm too. This is largely due to the large variation and relatively low level of wage labour costs. Therefore, it is argued that the income parity does not guarantee achieving competitive capabilities of European specialist vineyard farms.

## Bibliography

1. Balogh J., Jambor A., 2017: "The Global Competitiveness of European Wine Producers", *British Food Journal*, Vol. 119 Issue: 9, pp. 2076-2088, <https://doi.org/10.1108/BFJ-12-2016-0609>
2. Biswanger H.Ch., 2011: „Spirala wzrostu, pieniądz, energia i kreatywność w dynamice procesów rynkowych”, ZYSK I S-KA, Poznań.
3. Goraj L., Bocian M., Osuch D., Smolik A., 2015: „Parametry techniczno-ekonomiczne według grup gospodarstw rolnych uczestniczących w polskim FADN w latach 2008-2014”, *IERiGZ-PIB*, Warszawa.
4. Kleinhans W., 2015: „Konkurencyjność głównych typów gospodarstw rolniczych w Niemczech”, *Zagadnienia Ekonomiki Rolnej*, nr 1, pp. 25-41.
5. Sobierajewska J., Ziętara W., 2017: „Konkurencyjność polskich gospodarstw ogrodniczych”. *Roczniki Ekonomii Rolnictwa i Rozwoju Obszarów Wiejskich* 104(3), pp. 21-32.

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## THE ECONOMIC IMPACT OF CRISIS ON MILK MARKET IN SELECTED DAIRY FARMS IN EUROPE

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**Abstract.** The article is devoted to the discussion of changes that took place on farms specialized in milk production in the period before and after the milk market reform in Europe. 124 farms were selected for the study, all having participated in the analysis of milk production costs in the European Dairy Farmers (EDF) from 2012 to 2016. The work examined selected changes in the organization of production and economic effects on farms. The results indicate a clear increase in production, resulting both from the increase in the size of cow herds, and from the improvement of milk productivity in all groups of farms. The largest differences between groups in the costs incurred in milk production were in alternative costs and depreciation. The unfavourable price situation on the market in 2016 meant that the total costs of milk production were lower than milk prices in only 12 % of the analysed farms.

**Key words:** total costs, agricultural income, break-even in milk production.

**JEL code:** D24

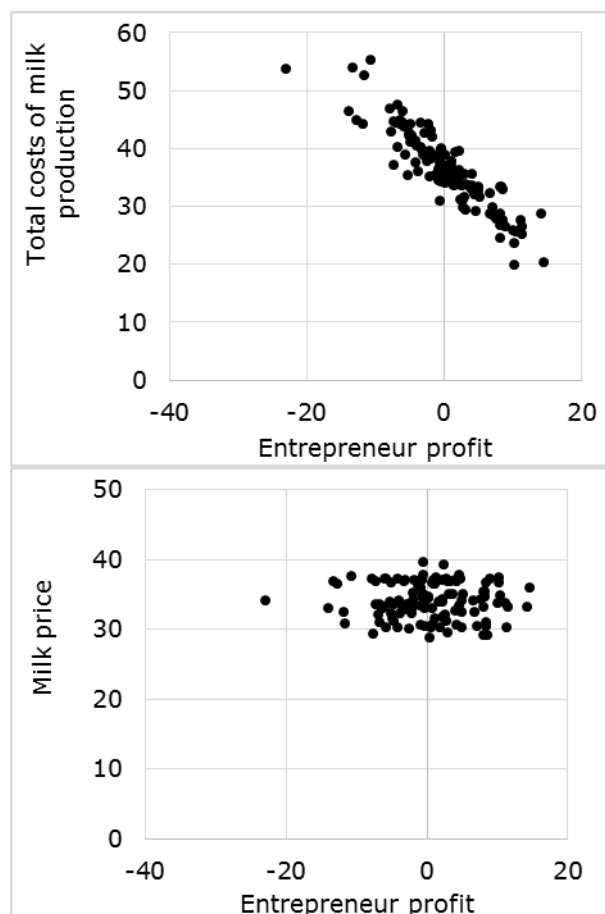
### Introduction

The survival of farms on the market requires constant adaptation of their activities to the changing environment. Most often, to meet the market's challenges, farms deepen their specialization or diversify their activities (Bowler I., 1992, McNamara K. et al., 2005; Meerta, H. et al., 2005; Krammer M. et al., 2012). Such activities lead to the concentration of production and are manifested in increasing the volume of produce on farms (Brodzinska K., 2016). An example of progressing concentration processes is the Polish milk market. Data from the Polish Central Statistical Office (GUS) show that in 2016, compared to 2010, the number of farms raising cows decreased by 42 % (from 453.000 to 266.000), at the same time milk production increased nearly 8 % (with a smaller cow population by almost 11 %). The final effect of implemented farm strategies is influenced by many factors that may weaken or strengthen concentration activities. A large group of determinants affecting farms' behaviour are legal regulations on the milk market. Their diversity on the EU market, among others, in the level of support for milk production in individual Member States increases the inequality of competition conditions (Grochowska R., 2017). An example of this could be the governmental national programmes (e.g. in Germany) and financial incentives from the dairy processing sector that encourage farmers to reduce the amount of milk production. They have led to a slowdown of production growth in 18 from 28 countries in the EU, including a production drop in 12 countries (Hemme T. et al., 2017). Despite many studies on the impact of the abolition of milk quotas on production levels and prices of milk, it is extremely difficult to determine precisely these effects. Forecasts and real extent of the impact of regulatory changes remain very divergent (Short Term Outlook ..., 2014; EU Milk Market Observatory, 2017). The influence of these factors was additionally imposed by the global situation related to the introduction of an embargo in trade with Russia and an increase of production in countries belonging to the group of the largest milk producers (India, Pakistan, the United States etc.), which effectively limited the possibility of selling milk surplus on the global market. As a consequence of the impact of many factors, the average price of milk on farms on the world market in 2015 was lower by approximately 34 % compared to 2014 (Hemme T. et al., 2016). As a result, the economic situation of farms, which depends on the price and the costs of producing the product, deteriorated.

From the long-term development perspective of the farms, the advantage over market competitors should have its source in the specific configuration of the resources used in the production process but should not be the result of a short-term increase or decrease in prices on the market. Achieved competitive advantage is particularly important in periods of difficult market conditions. Considering the crisis in the European milk market in 2015-2016, the aim of the work was to determine the evolution of income in dairy farms and to present the basic directions of changes on farms that differ in the level of milk production profitability.

### Research methodology and material

The empirical studies used the data on farms participating in the analysis of milk production costs by the European Dairy Farmers (EDF). 124 farms were selected for the analysis, which provided data each year during the period of 2012-2016 and in which milk production was conventional. The population was divided into quartile groups due to increasing total costs of milk production incurred in 2012. The data indicate (Figure 1), that there is a full negative dependence between the total costs of milk production and the income from management obtained on farms (Pearson's correlation coefficient - 0.91). At the same time, no connection was observed between milk prices achieved on farms and the level of income taking into account the total milk production costs (Pearson correlation coefficient 0.07).



Source: author's calculations based on EDF data 2013

Fig. 1. Connections between total milk production costs and prices and the amount of management income on farms in 2012 (euro/100 kg ECM)

This paper presents average results for the whole group of farms and for two extreme quartile groups: q1 with the lowest and q4 with the highest total milk production costs. The groups were of

permanent character, which means that the farms classified as quartile in 2012 remained such throughout the analysis period.

The analysed groups of farms, apart from production costs, differed in the production potential and in the use of production factors in production process (Table 1). The farms from the q1 group were characterized by a greater amount of milk produced, which resulted mainly from a larger average herd of cows. The average milk yield of cows was lower than in the whole population by almost 0.5 t ECM per cow per year. The average share of the forage area rented and labour input per cow was similar in the extreme quartile groups. An important parameter differentiating farms was the average value of capital per cow. On average, capital expenditures in the q4 group were about 2.2 times higher than in the q1 group.

Table 1

**Basic parameters of the analysed farms in 2012**

No	Parameters	Unit of measure	Groups of farms		
			q1	øEDF	q4
1.	Number of farms	unit	31	124	31
2.	Total costs of milk production	euro/100 kg ECM*	28.1	36.3	38.54
3.	Size of cows herd	no/farm	275	216	174
4.	Milk yield	kg ECM/cow	8404	8884	9129
5.	Milk production	t ECM/year	2473	1967	1607
6.	Stocking rate	LU/1 ha forage area	1.71	1.77	1.45
7.	Share of forage area rented	%	57.6	53.2	60.6
8.	Labor input	h/cow	44.6	44.1	47.7
9.	Capital input	1000 euro/LU	4323	6351	9404

\* ECM (Energy Corrected Milk) means milk with adjusted energy content: 3.3 % protein and 4.0 % fat.

Source: author's calculations based on EDF data 2013

The economic performance of farms was determined in accordance with the methodology used by EDF, which is slightly different from the FADN (Farm Accountancy Data Network) methodologies at the intermediate stages of agricultural income calculation. Direct costs of milk production ( $D_c$ ) in the EDF methodology include costs of animal purchase, costs related to raising heifer for sale, insemination, veterinary services and medicines, other direct costs in animal production and costs related to purchase of feed and production of own feed (seed material, fertilizers, plant protection products and other costs related to the production of feed) intended for animal feed in the milk production industry. The overheads costs and costs of production factors are determined in the same way as in FADN.

In order to assess the economic condition of family farms, management income (EP) was used, considering the alternative costs of own production factors: land, capital and labour. It was calculated in accordance with the formula:

$$EP = FI - OppC \quad (1).$$

Where:

EP – entrepreneurs profit;

FI - agricultural income;

OppC - opportunity costs of own production factors: land, capital and labour.

Farm income in milk production was calculated according to the formula:

$$FI = R - D_c - O_c - Dep - Pf_c \quad (2).$$

Where:

*FFI* - family farm income;

*R* - revenues (sales of milk, cattle in the milk production industry and other revenues, e.g. subsidies related to milk production, VAT balance, etc.);

*D<sub>c</sub>* - direct costs in the milk production industry;

*O<sub>c</sub>* - overheads costs in the milk production industry;

*Dep* - depreciation of: machinery, equipment and buildings involved in milk production;

*Pf<sub>c</sub>* - costs of production factors (land rent, capital costs, including interest and hired labour costs involved in milk production).

Valuation of the use of one's own factors in production is very important in the case of comparisons of production and economic results of farms that differ in the structure of resource ownership (land, capital and labour). In the literature, approaches to the valuation of involved resources are slightly different (El Ostra H. et al. 1996; MacDonald J. et al. 2017; Goraj L. and Manko S., 2011; Skarzynska A., 2011). The costs of so-called lost benefits in this analysis were determined according to the same method in each individual country participating in the study. Opportunity costs of own land used in milk production were determined on the basis of land rent in the area of the farm's operation. The opportunity cost of capital (without land) was determined on the basis of interest on bank deposits with a maturity over 2 years for non-financial corporations. The alternative costs of the family labour force were estimated on the basis of the product of the annual workload of family members and remuneration rates (hourly rates were calculated on the basis of annual gross wages and salaries in the national economy without bonuses and rewards).

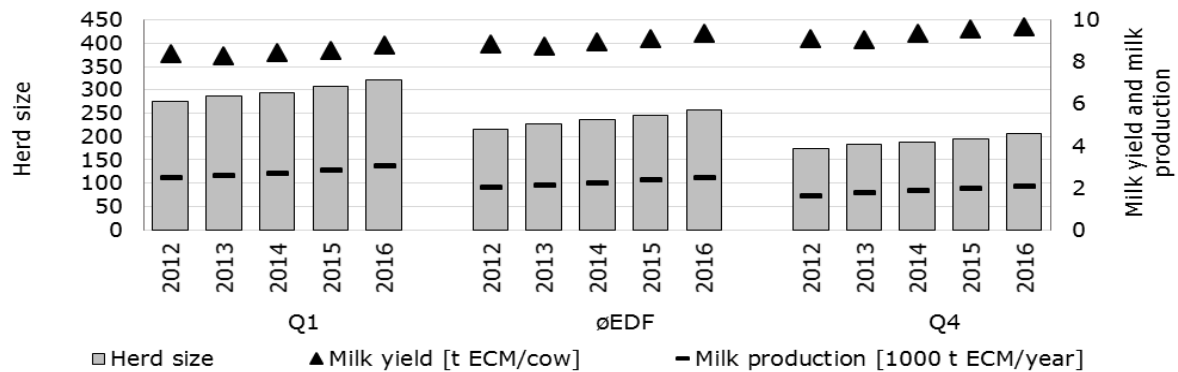
In determining the farm income and entrepreneurs profit in the milk production sector, only the costs, revenues and subcharges assigned to this production were taken into account. The research also determined the break-even points in milk production. They were set on two levels. The first break-even point was determined on the basis of the general costs (the sum of direct costs, overheads costs, external factors and depreciation). The second break-even point is determined by the total costs of milk production (excluding milk quota costs). The calculation of break-even points of milk production is based on the simplification assuming that the revenues obtained in the milk production sector, other than milk sales, have their source in non-core activities and their amount is equal to the production costs of the sold products. The break-even points in this case inform about the minimum milk price required to cover general costs or total costs.

## **Research results and discussion**

The production of milk on farms throughout the analysis period increased. On average, about 6 % more milk was produced each year in the whole population, which in consequence led to an increase in production by about ¼ in comparison to 2012 (Figure 2). This increase was mainly due to the increased number of cows in herds (in the whole population, the growth of an average herd was 19 %). The dynamics of increase in cow herd size was comparable between the extreme quartile groups (increase by 17 % in the q1 group and 19 % in the q4 group in 2016 as compared to 2012). However, the increase expressed in the number of cows in the herd was higher in the group q1 (46 cows), in which in 2016 an average herd had 321 cows and in the q4 group - 207 cows (an increase of 34). The increase in cow herd observed in the surveyed population confirms the results of other studies - the abolition of milk quotas in the EU will lead to an increase in the size of cow herds on farms, especially large ones (Groenvelda A. et al. 2011; Kempena M. et al. 2016 Zenga S. et al., 2016). The increase in the number of animals progressed systematically

throughout the analysis period and no abrupt increase was observed after the liquidation of milk quotas, as it was expected in other studies (Huettel S. et al., 2011, Louhichi K. et al., 2010).

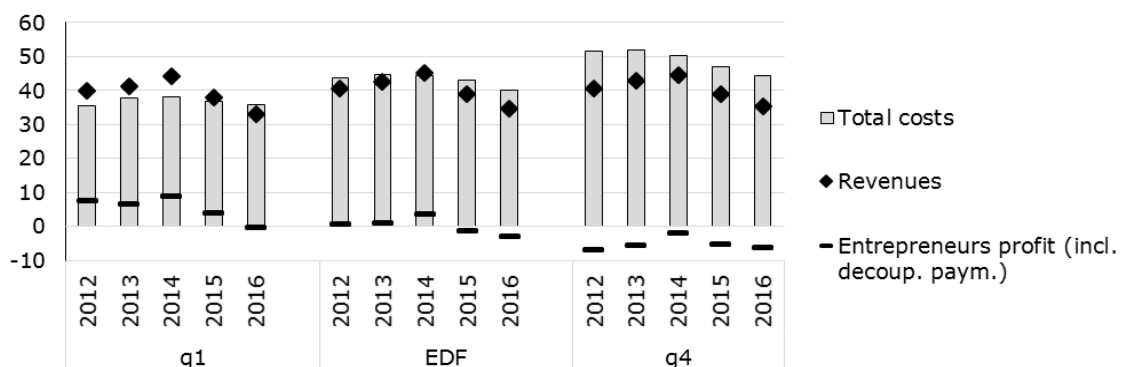
Milk yield increased by about 5 % until 2016 in the population. This increase was particularly visible in the last year of the analysis, in which it amounted to 2 % compared to 2015. Slightly higher increase of productivity of milk was observed in the q4 group, by about 6 %. As a result of changes in the size of the herd and milk productivity, the average milk production on farms in 2016 was nearly 2.5 thousand and the difference between the production of the q1 and q4 groups was nearly 1000 t ECM per year.



Source: author's calculations based on EDF data

Fig. 2. The average herd size, milk yield of milk and milk production in groups of farms in 2012-2016

Changes in production volume on farms were related to the impact of many market factors and the need to adapt to new legal conditions (e.g. the abolition of milk quotas in the EU). The declining income of farms from 2015 on resulted mainly from the decline in prices of milk and cattle. On average, milk sales accounted for no less than 85 % of the total revenue in the milk production sector. A similar level of income in separate groups of farms resulted from similar milk prices, which in the first quartile were on average 2 % lower and in the fourth quartile by about 1 % higher than the average prices in the EDF group. Total revenues varied analogously in groups - the differences were 1-2 euros per 100 kg of milk. The lowest total revenues in all groups of farms occurred in 2016, they ranged from 33 euros in the group q1 to 35 euros in the fourth quartile. The average decline in total revenues between 2014 and 2016 was 23 %.



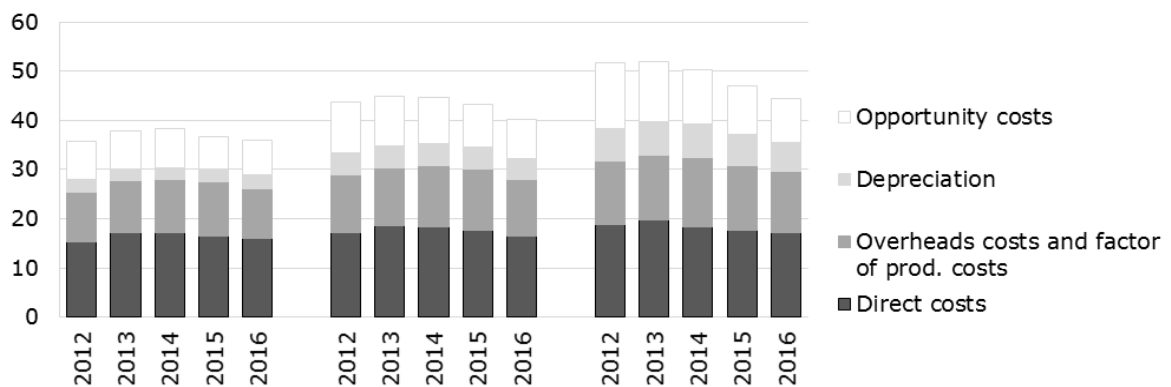
Source: author's calculations based on EDF data

Fig. 3. Revenues, total costs and entrepreneurs profit in milk production on farm groups in 2012-2016 (euro/100 kg ECM)

The evolution and level of total costs and their components was definitely more diversified than in the case of revenues in milk production (Figure 4). The average total costs of production in the milk production sector in 2016 in the whole population amounted to 40 euro and were lower by



8 % than in 2012. In the first quartile of the population, in 2016 these costs were lower than in the q4 group by over 9 euros. However, the difference in costs between these groups in comparison with 2012 decreased by 8 euros per 100 kg of ECM (in 2012 the difference to the disadvantage of the q4 group was 16 euros). The decrease resulted mainly from the reduction of direct costs, initiated in most farms in 2013, but was most visible in 2016. The farms mainly reduced the costs incurred for the purchase feed and production of own feed (e.g. fertilizer costs). Other costs of milk and feed production have also been reduced. The biggest differences in particular cost categories between groups were observed in depreciation and opportunity costs. It was connected with very large differences in capital expenditures, located mainly in machines and buildings involved in milk production. In 2016, in the q4 group, the sum of these two cost categories was 50 % higher than in the farms from the q1 group. The level of real costs (direct, overheads and production factors costs) in individual groups differed significantly less. The range of their value was 2.8 euros, in favour of the q1 group (lower real costs than average in the population).



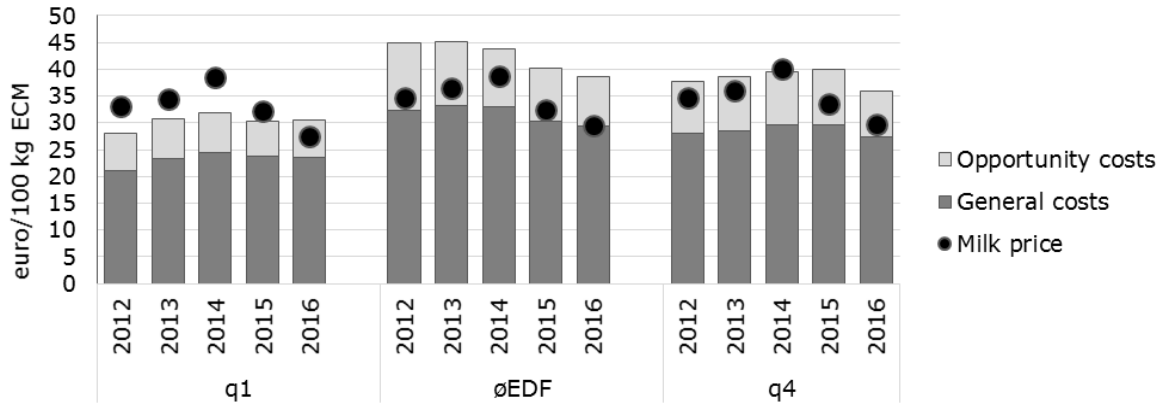
Source: author's calculations based on EDF data

Fig. 4. Development of the level of various cost categories in the milk production sector in the groups of farms in the years 2012-2016 (euro/100 kg ECM)

The income situation on farm groups was very diverse (Figure 3). The farms in 2016, i.e. at the time of the largest drop in revenues, were not able to cover the alternative costs of their own production factors. The income from management in all groups of farms was negative, which means that using their own production factors in an alternative way would allow them to avoid or reduce losses. In the q1 group, entrepreneurs profit was achieved by 2015, only in 2016 it reached negative values and amounted to -3 euros per 100 kilograms ECM (the losses per farm amounted to approximately 9,5 thousand euros and after taking into account subsidies the loss has decreased to the level of 2,000 euros). In the q4 group, the management losses were significantly higher. From the beginning of the analysis, management revenues were not obtained even after including non-production subsidies.

Taking into account only the costs of milk production in the analysis and their comparison with the obtained prices for the product give the opportunity to assess the profitability of milk production (Figure 5). In the analysed period, the first break-even point was reached in all groups. This means that direct costs, overheads costs, external factors and depreciation (in Figure 5 termed as general costs) related to milk production were covered by the milk price obtained on farms. At the same time, the difference between the price of milk and the total costs of its production did not allow them to cover the costs of using their own production factors in most farms and for most of the years. Such a situation occurred in all groups of farms in 2016. Out of the entire population, only in 15 farms the second break-even point was reached (with 7 farms

from the first quartile group). The loss ranged from about 3 euros in the group q1, to about 9 euros in the q4 group for every 100 kg of ECM. Farms from the first population quartile maintained their advantage in terms of total milk production costs. Compared to the q4 group, these costs were lower by more than ¼ (26 %), which, considering the prices of milk at similar levels, allowed those entities to achieve the highest profitability in 2012-2015 and the smallest loss in 2016.



Source: author's calculations based on EDF data

Fig. 5. Break-even point in groups of farms in 2012-2016

## Conclusions

- 1) The studies carried out indicate that 25 % of farms from the sample, with the lowest total costs of milk production, were characterized by far bigger herd size of cows with simultaneously lower milk yield in the sample. In the last five years, the analysed farms aimed at increasing production, both during the periods of growth and price decrease.
- 2) The increase in milk production with quite unstable level of milk prices translated into the profitability of its production. In the context of this profitability, the costs of milk production played a key role. Such a claim results from the lack of a clear differentiation in the level of prices between groups of analysed farms. In the formation of costs in all groups, there is a tendency to reduce them, especially in the situation of a deep price drop in 2016. The results clearly show that the differences in the level of costs incurred decreased, especially in the area of direct costs.
- 3) Based on general costs, it can be concluded that milk production in 2012-2016 was profitable (except for 2016 in the q4 group). However, in the vast majority of farms, the farm income did not reach the level sufficient to cover opportunity costs in milk production, especially in 2016. It should be emphasized that the group of farms with the lowest total production costs maintained its advantage in profitability over farms from other groups, the gap in the level of costs between the groups was reduced.

## Bibliography

1. Bowler, I. (1992). Sustainable Agriculture as an Alternative Path of Farm Business Development. In: Bowler, I., Bryant, C., Nellis, M. (Eds.) "Contemporary Rural Systems in Transition". CAB International, Wallingford, pp. 237-253.
2. Brodzinska, K. (2016). Problemy funkcjonowania i rozwoju rodzinnych gospodarstw mlecznych w Polsce na tle uwarunkowan swiatowych (Problems with Function and Development of Family Dairy Farms in Poland Against the Background of World Conditions). Problemy Rolnictwa Swiatowego, Volume 16, Issue 3, pp. 29-38.
3. El-Osta, H., Ahearn, M. (1996). Estimating the Opportunity Cost of Unpaid Farm Labor for U.S. Farm Operators. United States Dep. of Agriculture, Economic Research Service, Technical Bulletins, no 1848, pp. 2. Retrieved: <http://ageconsearch.umn.edu/record/156784>. Access: 15.12.2017.
4. EU Milk Market Observatory (2017). Directorate General for Agriculture and Rural Development, Brussels, pp. 1. Retrieved: [https://ec.europa.eu/agriculture/market-observatory/milk\\_en](https://ec.europa.eu/agriculture/market-observatory/milk_en). Access: 20.12.2017.

5. Goraj, L., Manko, S. (2011). Model szacowania pełnych kosztów działalności gospodarstw rolnych (Model for Estimating Total Costs of Agricultural Holdings Activity). *Zagadnienia Ekonomiki Rolnej*, Volume 3, pp. 28-58.
6. Grochowska, R. (2017). Niespójność działań interwencyjnych na unijnym rynku mleka (Incoherence of Intervention Measures on the EU Dairy Market). *Problemy Rolnictwa Światowego*, Volume 17, Issue 3, pp. 93-100.
7. Groeneveld, A., Peerlings, J., Bakker, M., Heijman, W. (2016). The Effect of Milk Quota Abolishment on Farm Intensity: Shifts and Stability. *Wageningen Journal of Life Sciences*, Volume 77, pp. 25-37.
8. Meerta, H., Van Huylenbroeck, G., Vernimenc, T., Bourgeois, M., Van Hecke, M. (2005). Farm Household Survival Strategies and Diversification on Marginal Farms. *Journal of Rural Studies*, Volume 21, pp. 81-97.
9. Hemme, T. (2016). IFCN Dairy Report 2016. International Farm Comparison Network, Kiel, p. 68.
10. Hemme, T. (2017). IFCN Dairy Report 2017. International Farm Comparison Network, Kiel, p. 17.
11. Huettel, S., Jongeneel, R. (2011). How Has the EU Milk Quota Affected Patterns of Herd-size Change? *European Review of Agricultural Economics*, Vol. 38, pp. 497-527.
12. Kempena, M., Witzke, P., Dominguez, I., Jansson, T., Sckokai, P. (2011). Economic and Environmental Impacts of Milk Quota Reform in Europe. *Journal of Policy Modelling*, Volume 33, pp. 29-52.
13. Krammer, M., Larcher, M., Vogel, S., Lautsch, E. (2012). The Pattern of Austrian Dairy Farm Household Strategies. *German Journal of Agriculture Economics*, Volume 61, Issue 2, pp. 96-113.
14. Louhichi, K., Kanellopoulos, A., Janssen, S., Flichman, G., Blanco, M., Hengsdijk, H., Hecke, T., Berentsen, P., Lansink, A., Ittersum, M. (2010). FSSIM: a Bio-Economic Farm Model for Simulating the Response of EU Farming Systems to Agricultural and Environmental Policies. *Agricultural Systems*, Volume 103, pp. 585-597.
15. MacDonald, J., O'Donoghue, E., McBride, W., Nehring, R., Sandretto, C., Mosheim, R. (2007). Profits, Costs, and the Changing Structure of Dairy Farming. *Economic Research Service*, Volume 47, pp. 8, 14. Retrieved: <http://ageconsearch.umn.edu/record/6704/files/er070047.pdf>. Access: 15.12.2017.
16. McNamara, K., Weiss, C. (2005). Farm Household Income and On-and-off Farm Diversification. *Journal of Agricultural and Applied Economics*, Volume 37, pp. 37-49.
17. Short Term Outlook for the EU Arable Crops, Meat and Dairy Markets in 2014 and 2015 (2014). Directorate General for Agriculture and Rural Development, Brussels, pp. 16.
18. Skarzynska, A. (2011). Koszty ekonomiczne produkcji mleka - metodyczne ujęcie rachunku oraz wyniki badań w 2009 roku (Economic Costs of Milk Production - Methodological Approach to the Calculation and Research Results in 2009). *Zagadnienia Ekonomiki Rolnej*, Volume 3, pp. 143-161.
19. Zenga, S., Goulda, B., Lapple, D., Thorne, F. (2016). EU Milk Quota Elimination: Has the Productivity of Irish Dairy Farms Been Impacted? Paper prepared for presentation at the 90th Annual Conference of the Agricultural Economics Society, University of Warwick, England, pp. 11. Retrieved: [http://ageconsearch.umn.edu/record/261218/files/Abstracts\\_17\\_07\\_26\\_15\\_51\\_08\\_48\\_172\\_16\\_20\\_110\\_0.pdf](http://ageconsearch.umn.edu/record/261218/files/Abstracts_17_07_26_15_51_08_48_172_16_20_110_0.pdf). Access: 15.12.2017.

## INVESTMENTS IN AGRICULTURAL HOLDINGS IN THE EU (10) COUNTRIES BY THE PRISM OF THE MICHAL KALECKI'S BUSINESS CYCLE THEORY

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**Abstract.** The main objective of the article is to evaluate investment processes in agriculture in the EU countries (10) in 2004-2013 from the perspective of M. Kalecki's investments business cycle theory. Panel regression was used for model estimation. One has stated that investments in agricultural holdings can be considered from the perspective of the investment theory of the business cycle of M. Kalecki in the case of a group of the EU countries (10). This means that increasing investments in one year leads to an increase in production resources in the next period, which reduces the demand for investment. It was noted that the demand effect of investment is relatively stronger than supply one. This phenomenon results, among others, from the fact that there are investments in agriculture that do not translate into production effects or the creation of further ones (e.g. related to ensuring the well-being of the environment under cross-compliance). After 2020, it would be advisable to include to a greater extent, in the support instruments of the CAP the creation of public goods, which weaken the effect of the supply effect of the investment.

**Key words:** agricultural holding, investments, the Michal Kalecki's business cycle theory.

**JEL code:** E11, E32, Q12

### Introduction

The economic situation of agricultural holdings depends to a large extent on investment processes. Their scope, as well as character, determines the directions of development of this sector. Covering of agriculture with the instruments of the Common Agriculture Policy (CAP) of the new member states gave a significant impulse to the development processes of agricultural holdings due to the increase in financial support. Assuming that investments in agriculture initiate growth processes in sectors generating investment goods for this sector through the investment multiplier mechanism, the issue of their evaluation essentially goes beyond agriculture.

The investments in agriculture have been dynamised after integration with the EU, but this mainly concerned investments in the mechanization (purchase of tractors, means of transport), with low activity in the area of construction investments (Grzelak A., 2014). It resulted from the current needs of farmers as well as the direction of using investment support (mainly the purchase of farm equipment with machinery, equipment and tools for agricultural production). The dominance of this type of investment was associated with a less risky and easier way to obtain and account for investment funds from the EU funds for the purchase of machinery and equipment (Poczta W., Czubak W., 2007). These phenomena also had a relationship in Poland, as well as in other countries of the Central and Eastern Europe, with a downward trend in pig farming and resignation from animal production in smaller farms. Agriculture in the EU countries, especially since the budget perspective 2007-2013, has increased the importance of non-productive investments due to the fulfilment of cross-compliance and, in the next financial perspective, by increasing the role of environmental considerations (e.g. biodiversity, bioenergy). As a result, the increase in the value of fixed assets is less pro-productive and income-generating. On the other hand, therefore, farms are more pro-environmental, creating public goods (Smedzik-Ambrozy K., Guth M., 2016).

The research in the field of investment in agriculture has a rich tradition in the literature and concerns on many issues related to this. Among other things, it is indicated that the costs of raising capital are one of the most important factors determining the investment possibilities of

agricultural holdings (Barry et al., 2000). In turn Swinnen and Gow (1999) emphasize that, the use of external sources of finance is facilitated on larger farms. This favours in the development of these farms as well as the modernization of the fixed assets, thus allowing the use of leverage effects. At the same time, larger farms tend to have a stronger tendency to risk hence debt and investment activity are relatively higher there. The experience of French and British farms (Benjamin C., Filmister E., 2002) shows that investments are sensitive to changes in cash flows as well as to the functioning of capital markets, including the level of credit collateral. In other studies (Winters et al. 2009), attention was paid to the relationship of investment and capital, indicating that they depend on agricultural support instruments. Their research, groups of 15 developing countries from different continents of the world, shows that the value of assets and accumulation in agricultural holdings is the result of state intervention policy. While in research of agriculture in the countries of the Central and Eastern Europe Christensen, Lacroix (1997) critically referred to support for investment in loan interventionism. This is especially about a redistribution of income for more economically strong producers. In turn, (Wu et al., 2014) draw attention to demographic issues, indicating that older farm owners have lower risk acceptance and therefore are more conservative in undertaking investment projects.

The main aim of the article is to evaluate investment processes in agriculture in the EU countries (10) in 2004-2013 from the perspective of M. Kalecki's investments business cycle theory. This allowed for analysis in the context of both the demand and supply side of the investment effect in agricultural holdings. It is also about recognizing whether the investment sphere of farms is so strong that it forms the basis for repeated cyclical fluctuations. So the main task of the research is to estimate the demand and supply effect of the investment in agricultural holdings using the Kalecki's model. The article uses the results of agricultural holdings that keep accounts in line with the principles of the EU FADN. The point is that this data is microeconomic and refers to the average agricultural holding farm in the field of observation of the FADN system. Thus, they are a representative of the economic and production situation of thousands of farms in a given country, which produce at least 90 % of the value of standard agricultural output (SO)<sup>1</sup>. The spatial range of the research concerns the agricultural holdings from the EU countries (10), so those countries that are new members since at least 2004. This enabled the creation of a group of homogeneous units (countries) as to the duration of EU CAP instruments. In order to limit the influence of fluctuations of the tested parameters on the results of the estimated model, time series were adjusted using a 3 periods moving average.

Panel regression was used for model estimation, which is a type of two-level modelling (space, time) with fixed coefficients and random 'within' and/or 'between' effects (Wooldridge J., 2002). This method uses variables observed in at least two dimensions, e.g. temporal-spatial. Hence, the behaviour of each observed unit is influenced by individual factors, resulting solely from its peculiarities, as well as by other factors, affecting the activities of all objects in the same way.

The diagnostic test of the Breusch-Pagan and Hausman panel was chosen for the method selection (Hausman J., Taylor W., 1981). Choosing a model with random effects as the most appropriate means that individual effects are fixed over time but cannot be attributed to individual countries. It can therefore be assumed that agricultural holdings in the EU countries undergo similar external pressures that cannot be unequivocally attributed to a specific location (country).

<sup>1</sup> Standard output (SO) is the average of 5 years of production value of a specific agricultural activity (plant or animal) from 1 ha or from 1 animal per 1 year, in the region's average production conditions. .

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This is due to two reasons. The first refers to the very specifics of agricultural holdings as a business entities and their peculiar resources, including land in particular. The second is related to subjecting these entities to the impact of the EU common agricultural policy, which significantly influences the obtained results (Kulyk P., 2013). The role of this first aspect is determined by the fact that regardless of the situation of the holdings, including the length of coverage of the CAP, we obtained the effect of not linking with the given location. Such an effect should be expected when we take into account the impact of this policy, which in various respects (primarily time) shaped the conditioning of agricultural holdings in the EU Member States. The article uses a model with random effects.

### **Selected elements of the business cycle theory by Michal Kalecki**

The theory of the business cycle of M. Kalecki (1933) was formulated as a function of investment (1)

$$I_{t+1} = aS_t + b\Delta I_t - m\Delta K_t \quad (1)$$

where:

$I_{t+1}$  -next year investments (t+1)

$S_t$  --entrepreneurship funds available for accumulation (depreciation, undivided corporate profits, savings)

$\Delta I_t$  -change in investment expenditure

$\Delta K_t$  -change in production capacity in the national economy due to the difference between gross investment and loss of production resources withdrawn from production ( $U^1$ ), thus  $\Delta K_t = I_t - U_t$ .

a, b, m-parameters of the linear function

t-years in the business cycle

This theory is based on the contradiction between the demand and the supply context of investment. The demand dimension is that investments (I) create increased demand for investment products. These investments in subsequent periods are embodied in capital resources, thereby increasing production capacity (supply dimension). In this way, `today's` investments inhibit `tomorrow` due to increasing production capacity. On the other hand, when the level of investments is lower than the average amount of capital consumption, capital stock decreases ( $\Delta K_t < 0$ ), which in turn stimulates investment demand due to the need to achieve at least simple reproduction of assets. Hence, the mechanism of cyclical fluctuations in the economy follows, according to this theory, the interaction between investments and their differentiating nature. While the investment alternatives as well as the own funds available for the accumulation affect positively the further investments of enterprises, the changes of the capital stock - negatively (equation 1). Many investment projects cannot be realized simply because they require a significant increase in external resources (Kalecki M., 1935). In the case of agriculture, this applies especially to smaller farms.

In this paper, the model was implemented for changes occurring in the farms and explanation of investment activity. Relative repeatability of phenomena in agriculture may indicate the existence of a permanent mechanism for the occurrence of repetitive changes. The article identifies the

<sup>1</sup> It is assumed in this model that U is shaped at the same level in all phases of the cycle.

antagonistic and contradictory nature of the market mechanism as one of the cause of cyclical fluctuations of investments. Crisis phenomena will only appear when increased production hits the demand barrier, which results in a decrease in profitability of investments, shrinking investment processes.

Contemporary views of Kalecki's model refer to the issues related to the capital structure used to finance investments, including the reduction of the role of internal finances in the real sector of the economy, influencing its cyclical fluctuations (Hein E., van Treeck T., 2010). In the case of agriculture, this concerns budget transfers and credits, often sustained by the first source. One of the important factors is also the occurrence of rising costs of adaptation of capacity changes to external requirements (Asada T., 2006; Schoder C., 2011). Moreover, in the Kalecki's model, the assumption is made that investments bring about productive effects by increasing the production apparatus. In the meantime, it is possible to find situations where investments are not of a production nature. In the case of agriculture, it may concern investments related to the provision of higher quality standards, environmental regulations in agricultural production, animal welfare or ergonomics. Also there may be doubts about the translation of this macroeconomic theory to microeconomic, or more meso-economic level. If we assume that the aggregated data reflects the behaviour of economic operators that are the resultant of individual units or sectors, then this should not be an obstacle. All the more so, it is possible to formulate conclusions about the peculiarities of investment behaviour, in this case - farms. In the literature of the subject, such references can be found, albeit for other sectors. For example, Fazzari and Mott (1987) used this model to study the determinants of industrial investment in the USA. Thus, it is possible to use this model for sectoral analysis. Irrespective of the imperfections indicated the Kalecki's model is thought to be a useful tool for country analysis (Blecker R., 2002). In the light of the above arguments, we believe that M. Kalecki's theory, despite the passage of many years since its inception, is still valid, which results from its universalism. This is a mechanism for the emergence of repeated investment fluctuations as a consequence of the contradiction between the demand and supply side of the investment.

In our case, the Kalecki's model takes the following form (2) after modifications:

$$I_{t+1} = \beta_0 + \beta_1 S_t + \beta_2 \Delta I_t - \beta_3 \Delta K_t \quad (2)$$

where:

$I_{t+1}$  - investments less the purchase value of land (based on the land area balance multiplied by the value of land in the current year)

$S_t$  - the economic surplus obtained after the payment of the employment factor in the previous year (farm income increased by depreciation and reduced by calculated costs of self-employment)

$\Delta I_t$  - difference in investment level (excluding investment in land) between the current year and the previous one

$\Delta K_t$  - difference in fixed assets value (excluding land) =  $I_t - U_t$  ( $I_t$  excluding land)

The modification of the model (mainly related to the exclusion of land values from investments and fixed assets) takes account of the specificity of agricultural production and, in particular, the economic account of farms where we are dealing with a high level of self-employment. The exclusion of the land factor is due to its peculiarity. The point is that its value is also linked to the amount of subsidies received in this case from the EU's common agricultural policy, to the development of other segments of the economy, including rural urbanization. Moreover, the value

of land was often speculative, as evidenced by the significant increase in its value in some countries (e.g. in Poland), (Krupowicz et al., 2015). Significantly exceeding both the level of inflation and the increase in its productivity. There are also disruptions related to capitalization of area payments in the price of agricultural land (Ciaian P., Kanacs D., 2012; Van Herck K., Vranken L., 2013).

The variable S, i.e. entrepreneurs' funds available for the purpose of accumulation (equations 1 and 2), is estimated as the difference between the farm's surplus (sum of agricultural income and depreciation) and the payment for farmer's own family work. On the other hand, the self-employed rate was estimated on the basis of the hourly workload and the wage rates employed on the farm. This approach makes it possible to determine the potential surplus subtracting the opportunity cost of own family labour from farm income) at the level of the farm that is available for use for accumulation, i.e. the purchase of fixed assets. In order to limit the influence of fluctuations of the tested parameters on the results of the estimated model, time series were adjusted using a 3 periods moving average. Verification of models accepted the compatibility of the analysed variables with the theory of economics. It is worth emphasizing that the main idea of the study is to verify the analysed theory and not to use it for prognostic purposes. We used the Gretl program to estimate the models.

## Research results and discussion

The conducted research, through the panel analysis, showed that the direction of impact of the independent variables adopted for estimation (Tab.1) is compatible with the theoretical assumptions included in the Kalecki's model. Model with random effects for all groups of farms was applied to estimate the parameters of the model for 10 newly integrated countries in 2004. This choice was dictated on the one hand by the low value of the Breusch-Pagan test, which indicated the use of the panel method and on the other hand, the value of the Hausman test exceeded the assumed level of 0.05.

Table 1

### Random effects estimation (GLS), with 90 observations, included 10 cross-sectional units, time series for dependent variable (Y): $I_{t+1}$ for farms

No	Variables	coefficient	Standard error	t-Student	Value p
1.	const	6418.29	1868.21	3.436	0.0006***
2.	St	0.6835	0.0694	9.853	6.66e-023***
3.	$\Delta It$	0.7836	0.4120	1.902	0.0572*
4.	$\Delta Ft$	-0.1266	0.0396	-3.195	0.0014***
<b>'Between' variance</b>		<b>1.003e+008</b>	<b>'Within' variance</b>		2.07e+008
<b>Breusch-Pagan test Null hypothesis: Error variance in unit = 0</b>					
<b>Asymptotic test statistics: Chi-square(1) = 0.0190998 with value p = 0.0662</b>					
<b>Hausman test Null hypothesis: UMNK (GLS) estimator is consistent</b>					
<b>Asymptotic test statistics: Chi-square(3) = 5.67379 with value p = 0.1286</b>					

\*, \*\*, \*\*\* statistically significant at 10 %, 5 % and 1 % levels respectively

Source: authors' study based on FADN data

Using a model with random effects means that individual effects are fixed over time but can't be attributed to individual countries. It also indicates the homogeneity of conditions in this group of countries. This could be related to the increase in investment activity in agriculture in the new Member states after integration with the EU (Zidkova et al., 2011; Grzelak A., 2013) as a consequence of increased support for this sector. The fact of determining (in the sense of the



quality of the model, see table 1) of the universal model seems particularly important. It covers all examined EU countries (10) despite of the existing disproportions between the considered countries, including in particular structural differences (average size of the farm or the importance of labour and capital). The significance of random factors demonstrated in the model also results from the existence of strong support from subsidies from the common agricultural policy (CAP) of the EU. This model has not been taken into account because the scope using subsidies for investment purposes depends on the marginal propensity to invest (and this from a phase of the business cycle) as well as the type of support. Also, support affects both investment financing and asset growth (capitalization), as well as investment costs (an increase of land prices (Dwyer J., 2012). Hence the direction of relationships is uneven and difficult to capture in the model. The `between` variance value is less compare to `within`, suggesting that the models better explain differences within countries than between countries. This is compatible with the assumption made for random effects. The model has a high level of significance for the S and  $\Delta F$  variables, which is also indicated by the high values of t-Student (Table 1). The demand effect of investments, in agricultural holdings in the studied countries expressed through the impact of the variable  $\Delta I_t$ , was stronger than the supply effect ( $\Delta Ft$ ). This is visible at the coefficients (0.78 and 0.13) (Table 1). This may result from the relative dispersion of bargaining power of farms and hence limited competitive impact. It was observed that any increase in investments minus the value of land purchase increased investments (decreased by the value of land purchase). On the other hand, the change in the value of fixed assets (excluding land) had a negative impact on the level of investments in the following year. At the same time, this variable assumed the highest value of the coefficient (0.78) (similarly to the independent variable S). It was one of the mechanisms determining investment in farms in this studied group of countries. These results may indicate the inertia of investment processes. This inertia can also be associated with the gradual activation of the payments in the subsequent programs of the CAP. On the other hand, investment processes in next periods affect the value of the obtained economic surplus, which in the case of unfavourable economic conditions may be reduced as a result of this process. The point is that expenditures are incurred, but increased production capacities with a fall in prices of agricultural products deteriorate the result of the all agricultural sector. This is due to the low elasticity of food demand. A similar dependence can be seen in the growth of the economic surplus of farms, which translates into an increase in investments in the current year. In this case, it is the expected change and shows, that the improvement of economic conditions favours investment processes related to agricultural production (there is no reallocation of capital for other uses).

## Conclusions

- 1) The analysis carried out on the panel data confirm that investments in agricultural holdings can be considered from the perspective of investment theory of the business cycle of M. Kalecki in the case of a group of the EU countries (10). This means that increasing investments in one year leads to an increase in production resources in the next, which reduces the demand for investment. As a consequence, this may lead to the creation of a cyclic variation mechanism. However, it should be remembered that this is only one of the developmental mechanisms of farms besides those connected with the impact of the business outlook situation.
- 2) It was noted that the demand effect of investment is relatively stronger than supply. This may be related to the fact that agriculture through the support system (CAP), as well as the peculiarities

of this sector (production dispersion, relative atomization of agricultural producers, seasonality of production, a creation of public goods) has weakened internal market stimuli. Also, this phenomenon results from the fact that there are investments in agriculture that do not translate into production effects or the creation of further ones (e.g. related to ensuring the well-being of the environment under cross-compliance).

3) The research results, obtained in the work, may also be a premise for the directions of the evolution of the EU CAP. After 2020 it would be advisable to include to a greater extent, in the support instruments of the CAP the creation of public goods, which weaken the effect of the supply effect of the investment. At a next stage, it would be necessary to verify the completed studies at the level of regions, which would increase the number of observations as well as the level of significance.

## Bibliography

1. Asada, T. (2006). Stabilization Policy in a Keynes–Goodwin Model with Debt Accumulation. *Structural Change and Economic Dynamics*, Vol. 17, pp 466–485.
2. Barry, P., Bierlen, R., Sotomayor, N. (2000). Financial Structure of Farm Businesses Under Imperfect Capital Markets. *American Journal of Agricultural Economics*, No 82 (4), pp. 920-933.
3. Benjamin, C., Phimister, E. (2002). Does Capital Market Structure Affect Farm Investment ? A Comparison Using French and British Farm-level Panel Data. *American Journal of Agricultural Economics*, Vol 84. No 4, pp. 1115-1129.
4. Blecker, R. (2002). Distribution. Demand and Growth in Neo-Kaleckian Macro-models. In M. Setterfield. (Eds.), *The Economics of Demand-led Growth: Challenging the Supply-Side Vision of the Long Run*. Edward Elgar Publishing, pp. 129-152.
5. Christensen, G., Lacroix, R. (1997). *Competitiveness and Employment. A Framework for Rural Development in Poland*. World Bank Discussion paper. 383. Washington DC.
6. Ciaian, P., Kancs, D. (2012). The Capitalization of Area Payments into Farmland Rents: Micro Evidence from the new EU Member States. *Canadian Journal of Agricultural Economics*. Special Issue, Vol. 60, pp. 517-540.
7. Dwyer, J. (2012). The Relativistic Feedback Discharge Model of Terrestrial Gamma Ray Flashes. *Journal of Geophysical Research*, No 117, Issue A2, pp. 1-25.
8. Fazzari, S., Mott, T. (1987). The Investment Theories of Kalecki and Keynes: an Empirical Study of Firm Data. 1970-1982. *Journal of Post Keynesian Economics*, Vol IX, No. 2, pp. 171-187.
9. Grzelak, A. (2014). Ocena Procesow Reprodukcyjnego Majatku Gospodarstw Rolnych Prowadzacych Rachunkowosc Rolna (FADN) (Evaluation of the Reproduction Processes of the Fixed Assets of Farms Engaged in Agricultural Accountancy (FADN)). *Zagadnienie Ekonomiki Rolnej*, No 2, pp. 45-64.
10. Grzelak, A. (2013). The Investment Activity of Agriculture in Poland Following the Integration with the EU. *Scientific Works. Agricultural University Plovdiv*, Vol. LVII, pp. 55-62.
11. Hausman, J., Taylor, W. (1981). Panel Data and Unobservable Individual Effects. *Econometrica*, Vol. 49.
12. Hein, E., van Treeck, T. (2010). `Financialisation` in Post-Keynesian Models of Distribution and Growth: a Systematic Review. In M. Setterfield. (Eds.), *Handbook of Alternative Theories of Economic Growth*. Edward Elgar Publishing, pp. 277–292.
13. Kalecki, M. (1933). *Proba Teorii Koniunktury* (The Attempt of Theory of Business Outlook). PWE, Warszawa.
14. Kalecki, M. (1935). A Macrodynamical Theory of Business Cycle. *Econometrica*, Vol. 3, No.3.
15. Kulyk, P. (2013). *Finansowe Wsparcie Rolnictwa w Krajach o Różnym Poziomiu Rozwoju Gospodarczego* (Financial Support for Agriculture in Countries with Different Levels of Economic Development). Wyd. Uniwersytet Ekonomiczny w Poznaniu, Poznan.
16. Krupowicz, W., Bielska, A., Budzynski, T. (2015). The Effects of Defective Spatial Structure on the Agricultural Property Market. *Folia Oeconomica Stetinensia*, 15(1), p. 174.
17. Poczta, W., Czubak, W. (2007). Bariery Pozyskiwania Srodkow UE na Cele Inwestycyjne przez Gospodarstwa Rolne (The Barriers of Obtaining the EU Funds for Investment Purposes by Agricultural Holdings). In *Identyfikacja i Ocena Barrier Administracyjnych Realizacji Programow Rozwoju Obszarow Wiejskich* (Identification and Assessment of Administrative Barriers to the Implementation of Rural Development Programs). IERiGZ – PIB Program Wieloletni 2005-2009, No 66.
18. Schoder, C. (2011). Kaleckian vs. Marxian Specifications of the Investment Function: Some Empirical Evidence for the USA. MPRA Paper No. 29584: 1-24. Available at [https://mpra.ub.uni-muenchen.de/29584/2/MPRA\\_paper\\_29584.pdf](https://mpra.ub.uni-muenchen.de/29584/2/MPRA_paper_29584.pdf).
19. Smedzik-Ambrozy, K., Guth, M. (2016). Public Goods in the Common Agricultural Policy of European Union Countries. In B. Czyzewski (Eds.), *Political Rents of European Farmers in The Sustainable Development Paradigm*. Warszawa. PWN, pp. 131-140.

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20. Swinnen J., Gow, H. (1999). Agricultural Credit Problems and Policies During the Transition to a Market Economy in Central and Eastern Europe. *Food Policy*, Vol. 24.
21. Winters, P., Benjamin, D., Gero, C., Covarrubias, K., Quinones, E., Zezza, A., Azzarri, C., Stamoulis, K. (2009). Assets, Activities and Rural Income Generation: Evidence from a Multicountry Analysis. *World Development*. Vol 37, No 9, pp. 435–1452.
22. Wooldridge, J. (2002). *Econometric Analysis of Cross Section and Panel Data*. London. MIT press.
23. Wu, F., Guan, Z., Myers, R. (2014). Farm Capital Structure Choice: Theory and an Empirical Test. *Agricultural Finance Review*, Vol. 74, Iss 1, pp. 115 – 132.
24. Zidkova D., Rezbova H., Rosochatecka E. (2011). Analysis of Development of Investments in the Agricultural Sector of the Czech Republic. *Agris on-line Papers in Economics and Informatics*, Vol. 3, Iss 1, pp. 33-42.

## GRAPH THEORY AND AGROBUSINESS

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**Abstract.** Nowadays the decision making process within changing condition is a crucial issue in success of the company. A practical tool for decision support is the graphical model reflecting the decision problem of its structure, to formulate and to obtain the exact mathematical solution in the form of precise assessment. The aim of the paper is to present characteristics of the role of this theory in agribusiness enterprises and its impact on the agricultural sector. In the research paper, the descriptive and comparative methods were used. The paper presents general overview of the importance of the graph theory and nets. The authors underline that it is a crucial issue for many areas of science. Scientific interest in networks has a long tradition and is associated with the emergence of graph theory in mathematics. Another area of research for graphs and networks is social network analysis. The transfer of network theory to the field of logistics is related to the companies striving to develop supply, production and distribution, and to increase the effects of cooperation between companies. Regardless of organizational and legal conditions, enterprises become participants in so-called logistics networks. In order to explain the concept of logistic network, the authors have used - graph theory. The authors' research has shown the application of the theory in agribusiness.

**Key words:** graphs and nets, agricultural sector, business.

**JEL code:** A12, G14, R40

### Introduction

To ensure the success of the company by making rational decisions in constantly changing conditions, there are set high requirements for the persons responsible for the management. The management process, irrespective of its subject epitomized is associated with the decision-making process, and in the effective management of the taken decisions must be optimal. Graphs and networks as a tool for decision support are the graphical model reflecting the decision problem of its structure, to formulate and to obtain the exact mathematical solution in the form of precise assessment. Field of knowledge based on the theory of graphs and networks is a significant chapter of the operations research (Wojciechowski J Pienkosz K., 2013).

The use of information system based on the theory of graphs in the organization has to increase its competitiveness. Information plays a crucial role in all markets. It gives many advantages: increased production of shortening the delivery time to increase sales. Logistics systems in agribusiness are defined as systems participating in the time-spatial transformation of material goods, while the processes taking place in them is logistics. Logistical processes are associated with both the flow of materials and information from the providers of factors of production to their users, together with disposal, resulting in a process of waste. Logistical process should be understood as an ordered chain of all operations involved in the broad movement of different material (Parlinska, M., 2008).

The problem of bilateral associations with the use of the language of graph theory and an indication of possible applications in the area of search and match of job seekers and employers was also the area of scientific research (Kozioł-Kaczorek D., Pietrych L., 2016).

The aim of the paper is to present the importance of the graph theory and nets in agricultural economic sector. The in the research, descriptive and comparative methods as well graph theory were implemented. Information and data were taken from literature papers, investigations and calculations made by authors.

Authors have tried to answer the following research questions.

1) What is the basis for shaping supply chains?

- 2) What is the role of graph theory?
- 3) How the graph theory can be implemented in agriculture sector?

There are many practical real-life logistics' problems, for example: mail delivery, garbage collection, salt gritting on icy roads during the winter, street cleaning in the cities and villages and many others. To achieve the intended goal, selected assumptions of graph theory and their use in logistics of the agribusiness sector were presented.

### Definitions and basic concepts used in the research

Graph theory as a division of mathematics concerned with the study of their properties is an important mathematical tool used in many different areas, such as computer science, calculus, economics, management, sociology or logistics in agriculture. Creating algorithms for designating certain properties of graphs is one of the important areas for action. These algorithms are used to solve many practical tasks (Wilson R., 2012; Bronsztejn I.N. et al.,2013).

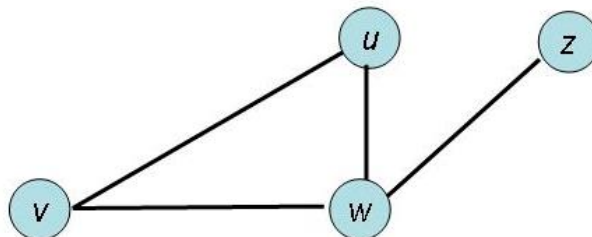
A simple graph  $G$  defines the two ordered sets:  $G = (V; E)$ , where  $V$  is any non-empty finite set whose elements are called vertices (or nodes), while  $E$  is a subset of the set of all 2-element collections whose elements belong to  $V$  called edges.

Collection of  $V$  is called a collection of vertices, a set  $E$  of edges of the graph  $G$ . We say that the edge of the  $\{E\}$  connects vertices  $v$  and  $w$ , we mark it a symbol of  $vw$ . The elements of the set of vertices  $V$  and edges  $E$  in graphs are located logically, or form a relationship  $(R)$ . Formal mathematical writing may be the following  $V \neq \emptyset, E \subseteq V$ . For graphs, when we will be talking about  $V$ , it will mean a finite collection of points forming the vertices of the graph.

Notation  $V = \{v_1, v_2, \dots, v_n\}$ , and  $(E)$  is a set of connections between these points.

Let will be chosen the set  $E = \{a_1, a_2, a_3, \dots, a_n\}$ , where the existence of  $(a_{ij})$  means the existence of edge between node  $v_i$  with the  $v_j$ .

For example, the figure represents a simple graph  $G$ , the set of vertices  $V(G)$  is a set of  $\{u, v, w, z\}$  and the set of edges  $E(G)$  consists of the edges,  $uv, uw, vw$  and  $wz$ .



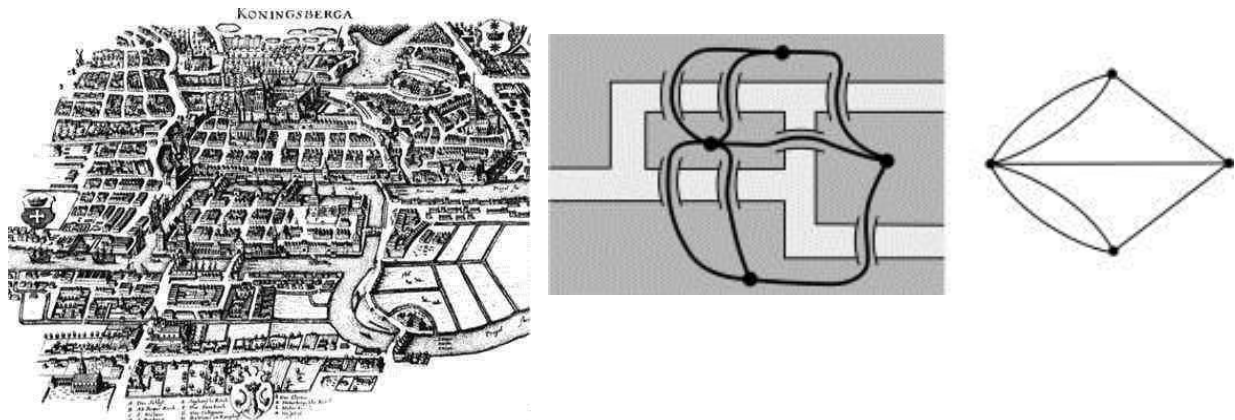
Source: author's calculation

Fig. 1. A simple graph  $G$  with vertex set  $V(G)$  and edge  $E(G)$

There are many definitions in the theory of graphs, but for this paper there are presented only some chosen from them.

- 1) The edge  $(i, j)$  is called a combination of  $v_i, v_j$  with regard to orientation (from  $v_i$  to  $v_j$ ). The degree of the vertex is the number of edges whose end is the given vertex.
- 2) A road is a route where no vertex occurs more than once.
- 3) The loop is an edge whose beginning and end is the same vertex. Graphs with cycles and loops are called cyclic graphs, where cycles and loops do not occur, they are called acyclic graphs.
- 4) Graphs are called oriented (or directed), where there is a relationship  $(R)$  and the connections between nodes are directed and the order of occurrence in time individual vertices is specified.

5) The graphs are not-oriented, when the connection between the vertices exist without taking into account the orientation.



Source: <https://divisbyzero.files.wordpress.com/2008/09/konigsbergdrawing.jpg> (access 18.01.2018)

Fig. 2. **The seven bridges of Königsberg**

The first problem was the question posed by Leonard Euler: "Is it possible to go from any part of the city Königsberg (now Kaliningrad) through each of the bridges exactly once, and return to the starting point, without flowing the river?" The Euler's answer was: "no". Leonhard Euler (born 15.04.1707 r. in Basel, Switzerland, died 18.09.1783 in St. Petersburg, Russia) was a mathematician, physicist and astronomer, one of the founders of modern mathematics including graph theory. When studying this problem, Euler came to the ingenious idea to mark separate parts of the city with vertices and the bridges as the connections between them. That was how he constructed a graph with four vertices and seven connections, as we can see on the Figure 2. Solution to the problem of the seven bridges is regarded as the first theorem of graph theory.

There exists a similar problem discovered in early 1960s by the Chinese mathematician, Kwan Mei-Ko, and after him is called Chinese Postman Problem. The problem that the Chinese Postman faces is: he wants to travel along every road in a city in order to deliver letters, with the least possible distance. The question is how to find a shortest closed walk of the graph in which each edge is passing at least once, rather than exactly once. The solution in graph theory is an Euler cycle in a connected, weighted graph and is called the Chinese Postman problem, also called Postman Tour or Route Inspection Problem (Kramberger, T., Zerovnik, J., 2007).

### **Practical applications and solutions**

Graph theory as a part of mathematics concerned with the study of their properties is an important mathematical tool used in many different areas, such as computer science, calculus, economics, management, sociology or logistic in business (Rungis Ruohonen K.,2013). Creating algorithms for designating certain properties of graphs is one of the important areas for action. These algorithms are used to solve many practical tasks. Graph theory is also present in widely understood economic applications. A wide field for applications of graph theory is, among others, logistics in agribusiness. In the area of logistic applications, the analysis of goods' flows in supply chains can be distinguished (Scholz-Reiter et al., 2011).

A common practical application in this field is also the search for the shortest possible route between wholesale markets, stores, agricultural fields and others places connected by roads. Data structures based on graphs are also used in the analysis of the network of dependencies of entities operating on various types of markets. In this approach, the axis of the issue is to identify interactions between individual market participants, which should lead to a better understanding of

the specificity and functioning of the analysed market segment (Jackson, 2010). Presentation of the flow of information between specific organizational units may allow for the disclosure of an informally existing organizational structure, the role of which may be more significant in relation to the official structure (Cordella A., 2006).

The management seems to be an interesting analysis of the interaction in the company's organizational structure (Konig, Battiston, 2009).

Graph as a set of points (called vertices or nodes) connected by edges (or arcs) can be a representation of cities, villages, wholesale markets, stores, agricultural fields and others places connected by roads. It is necessary to use graphs with specific properties, e.g. those in which the route passing through each edge or by each vertex exactly once, and ending at the point of exit, there are called graphs Euler's and Hamilton's. The structure of the graph we can provide by means of certain matrices associated with the graph. We distinguish between the so-called matrix connections and incidence matrix.

If the graph contains  $n$  edges, matrix (neighbourhood) is the matrix of square  $n \times n$  and contains the elements 0 and 1:

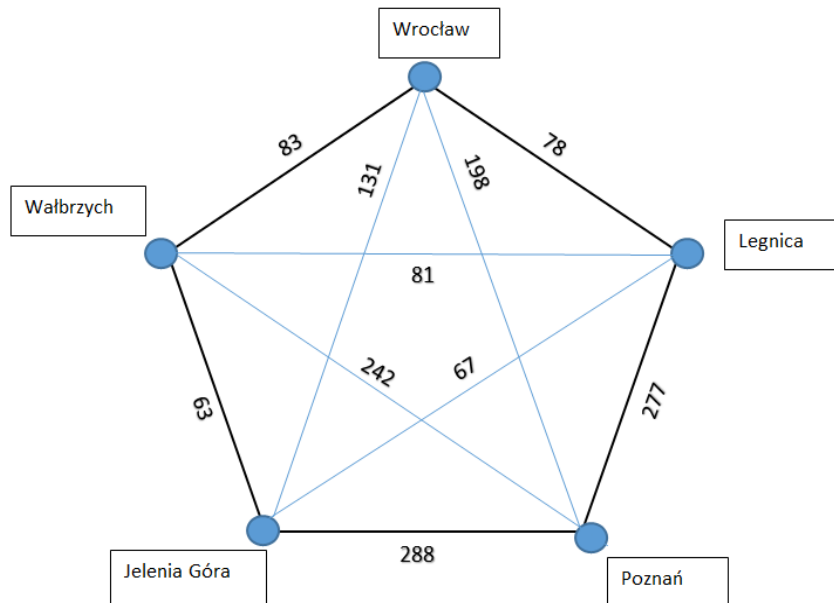
- 1-when there is an edge  $(i, j)$ , and
- 0-when the edge  $(i, j)$  is not present.

The authors have decided to present in the paper two real practical cases of application the graph theory in logistic of agricultural sector:

- 1) choice of the shortest way of delivery agricultural products from the Wholesale Market to some shops in the cities;
- 2) county snow removal plan X-on the rural areas, what is connected with collection the milk from contracted farms.

The Figure 3 shows the first case with the task to find the shortest way between certain cities. There is a special task for salesmen delivering, for example agricultural products from certain place. This case was focused on the delivering of some fruits and vegetables from Agri-food wholesale market "Targpiast" in Wroclaw. Cross-regional, agro-food wholesale market "Targpiast" was founded in 1990. Its basic function is to support businesses in Wroclaw, Lower Silesia and the neighbouring regions in terms of their supply of food - especially fresh vegetables and fruits. The Wholesale market supplies food, fruit and vegetable stores, retail chains, local bazaars and marketplaces, catering companies, restaurants and other catering facilities. The location of this wholesale market "Targpiast" is near the downtown of Wroclaw. City Wroclaw bypasses facilitate the accessibility of the market, without disturbing the communication rhythm of the city.

In the Figure 3, each pair of cities is connected by edges, so one can say that this is the full Euler's graph. The cities were assigned individual vertices, then the authors used description: 1. Wroclaw, 2. Walbrzych, 3. Legnica, 4. Poznan, 5. Jelenia Gora.



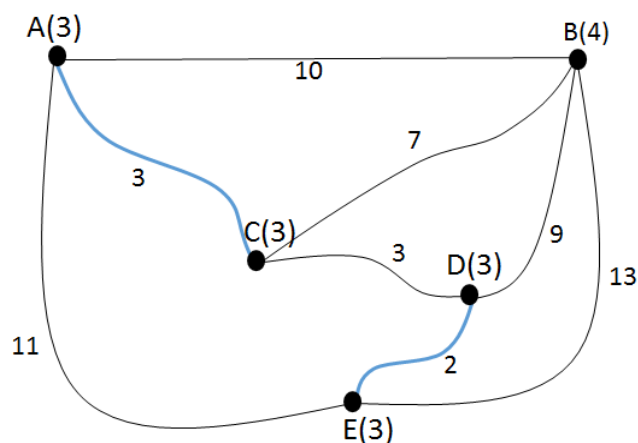
Source: authors' calculation

Fig. 3. **Graf-weight (weight = distance in km) in which the vertices are cities**

By carrying out the steps of the algorithm, on the base of a matrix describing the graph, we received: such order [4.1] [2.5] [3.4] [1.2] [5.3], and after arrangement: [1.2] [2.5] [5.,3] [3.,4] [4.1].

That is: Wrocław – Wałbrzych, Wałbrzych – Jelenia Góra, Jelenia Góra – Legnica, Legnica – Poznan, Poznan – Wrocław. The shortest route is 598 km. A traveling salesman has to beat the following route: from Wrocław via – Wałbrzych – Jelenia Góra – Legnica – Poznan – and back to Wrocław.

The second case is: how to minimize the number of kilometres of snow blower's travel using the principle of "Chinese Postman". On the next graph we observe next real problem: county's snow removal plan in the rural areas, which is crucial also for collection of milk from farms.



Source: authors' calculation

Fig. 4. **Graph of the snow removal plan**

According the procedure, it is necessary to make the next steps for finding solution.

Step 1: It is necessary to verify whether the graph is consistent, that is, if for every pair of vertices there is a path that connects them. The above graph is consistent.

Step 2: We are searching for in the graph all vertices of odd degree. These vertices are: A, C, D, E.



Step 3: Assign pairs of vertices. AC, CD, DE, AE, and AD and CE are added (they do not exist on the graph).

Step 4: Create combinations of vertices and connections we set the shortest path connecting all found the vertices at odd degrees. AC, DE  $3,3 = 6$ . Select these edges, because they have the smallest sum of edge weights: AE, CD;  $11,3 = 14$  and AD, EC;  $6, 5 = 11$ .

Step 5: The edges of the marked on the graph in blue „double” in the graph, it will be the return path.

Step 6: It is necessary to go through graph: A E B A C B D E D C A.

Step 7: We add up the length of roads:

$$11 + 13 + 10 + 3 + 7 + 9 + 2 + 2 + 3 + 3 = 63 \text{ km.}$$

Solutions obtained through the graph theory are very helpful to the organisers of different events, actions connected with routes, for those who are resolving logistical problems also for agriculture sector.

## Conclusions

Rationalization of logistic processes can be one of the ways to increase the competitiveness and efficiency of agribusiness enterprises. It results in the appropriate organization of supply and distribution, taking into account the preservation of the appropriate quality of fresh products and effective inventory management. In the same time, with the growing scale of agribusiness enterprises, the role of logistics management in purchasing raw materials, their quality and the flow of information in the supply chain of fresh products is growing.

One of the instruments which can help to rationalize logistic process in agricultural sector is application of theory of graphs. In the paper, authors have described the connection of real-life logistics problems and graph theory. One can see the heterogeneity between the systems of organisation but furthermore the complexity of finding a simple solution information for a stakeholder.

Graphs and networks as decision support tools are a graphical model reflecting the decision problem with its structure, quantifiable and enabling to obtain an accurate mathematical solution in the form of a precise assessment. One of practical cases of an application of the Chinese Postman Problem is planning of milk collection in the rural areas routing. In order to save the cost on the fuel for milk tank, company can model the stops the vertex and the road as the edge in the tank route, then using the graph theory to obtain the optimal route that can meet the target group using the minimum of fuel but crossing every road once.

There are many practical real-life logistics problems, for example: milk delivery, agricultural products delivery to wholesale markets, school bus routing in the rural areas and many others. Optimizing the time and costs of delivering of agricultural products with graph theory is an important element of logistics management.

## Bibliography

1. Bronszejn I.N., Siemiendajew K.A., Musiol G., Muhlig, (2013). Nowoczesne kompendium matematyki (the modern Compendium of mathematics), Wydawnictwo Naukowe PWN, Warszawa.
2. Cordella A. (2006). Transaction Costs and Information Systems: does IT add up?. Journal of information technology, 21 (3). pp. 195-202.
3. <https://divisbyzero.files.wordpress.com/2008/09/konigsbergdrawing.jpg> Access: 18.01.2018
4. Jackson M. (2010), An Overview of Social Networks and Economic Applications, pp 3-9. Retrieved: <http://web.stanford.edu/~jacksonm/socialnetecon-chapter.pdf> Access: 06.12.2017

5. Koziol-Kaczorek D., Pietrych L (2016). Grafy a teoria stabilnych alokacji (Graphs and theory of stable allocation), *Ekonometria*, nr 3 (53), pp. 102-114
6. Kramberger, T., Zerovnik, J., (2007). Priority Constrained Chinese Postman Problem: Logistics and Sustainable Transport, 1(1) 2017, pp. 15.
7. Konig M., Battiston S. (2009). From Graph Theory to Models of Economic Networks. A Tutorial [in:] A. Naimzada, S. Stefani, A. Torriero (eds.), *Networks, Topology and Dynamics*, Springer, Berlin-Heidelberg
8. Parlinska, M. (2008). Rola informacji w gospodarce rynkowej na podstawie wybranych rynkow rolnych (The role of information in the market economy on the base of chosen agricultural wholesale markets). *Wydawnictwo SGGW, Warszawa*. p. 117-120.
9. Rungis Ruohonen K., (2013). Graph Theory, Tampere University of Technology, Retrieved: [http://math.tut.fi/~ruohonen/GT\\_English.pdf](http://math.tut.fi/~ruohonen/GT_English.pdf) Access: 15.01.2018.
10. Scholz-Reiter B., Wirth F., Dashkovskiy S., Makuschewitz T., Schonlein M., Kosmykov M. (2011), Structure-Preserving Model Reduction of Large Scale Logistics Networks, "The European Physical Journal B", volume 84.
11. Wilson R. (2012), *Wprowadzenie do teorii grafów*, (The introduction to graph theory) *Wydawnictwo Naukowe PWN, Warszawa*.
12. Wojciechowski J., Pienkosz K. (2013), *Grafy i sieci*, (Graphs and nets) *Wydawnictwo Naukowe PWN*

## REGIONAL DIFFERENCES IN AGRICULTURAL PRODUCTION POTENTIAL IN THE EUROPEAN UNION MEMBER STATES

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**Abstract.** The article discusses differences in agricultural production potential and resource productivity (land, labour and capital) in the European Union countries. The aim of study was to evaluate regional differences in the productive potential of the EU agri-food sector. The analysis was conducted based on EUROSTAT data for 2013. In the first part of the study, selected parameters describing the productive potential of the agri-food sector in the EU countries were identified based on an analysis of statistical data. Then data were analysed with the use of selective descriptive statistics, including the arithmetic mean, median, minimum value, maximum value, as well as measures of statistical dispersion – range and coefficient of variation (CV). The results revealed considerable disproportions in productive potential of agriculture across the EU, which can be attributed to the characteristic features of the evaluated countries. The greatest variations were noted in land productivity, whereas the differences in capital and labour productivity were far less pronounced. The countries that joined the EU in 2004 and 2007 differed considerably from the EU-15 Member States in land, labour and capital productivity.

**Key words:** production capacity, productive potential, agriculture, differences, EU

**JEL code:** J43, O18, R1, Q12

### Introduction

The agri-food sector is one the largest sectors of the economy which caters to the basic life needs of the human population (Sambotin D., Toader C. S., Ioana M. I., 2013). Agriculture, food processing, commerce and distribution play pivotal roles in the food supply chain around the world. The agri-food sector is unique in that the demand for food is limited and the rate of increase in resource productivity is higher than the rate of increase in demand. The development of the agri-food sector is driven mainly by profit maximization (Kremen C., Iles A., Bacon C., 2012; Cassman K.G., 2016) and consumer demand associated with utility maximization (Chavas J.P., 2017). Legal regulations and state support also play an important role in agricultural development. The growing volume of international trade in food and agricultural products testifies to the dynamic development of the agri-food sector (Borawski P., Beldycka-Borawska A., 2016). However, recent years have demonstrated that sustainability is as important as profit maximization in agricultural practice (Borawski P., Pawlewicz A., 2006; Brodzinska K., 2008).

The agricultural sector in the European Union has undergone considerable changes in recent years. The above resulted mainly from the stimulating influence of Common Agricultural Policy payments on the competitiveness of the EU agricultural sector as well as growing levels of economic interdependence in the EU. Globalization and improved access to foreign markets have enabled the European agri-food sector to compete with global food producers. Despite institutional support, Europe's agri-food producers have to maximize their productivity to maintain their competitive edge. In simple terms, competitiveness can be defined as the ability to gain supremacy over market rivals striving for the same goals (Ajitabh A., Momaya K.S., 2003). Companies have to build their productive potential in order to effectively compete with rivals and acquire a competitive advantage on the market (Feurer R., Chaharbaghi K., 1994). Production capacity determines a company's competitive edge in the agri-food sector. Productivity is one of the factors that are taken into account in assessments of market performance (Zepeda L., 2001). Productivity can be defined as the maximum output that can be generated and supplied by a company using the

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available land, labour and capital. A company's productivity is assessed based on the effectiveness of resource use. In the resource-based theory, productive resources are regarded as the basic determinant of competitive advantage (Grant R.M., 1991). Therefore, the aim of this study was to evaluate regional differences in the productive potential of the EU agri-food sector.

In the first part of the study, selected parameters describing the productive potential of the agri-food sector in the EU countries were identified based on an analysis of statistical data. Production capacity was determined in view of the basic productive resources (land, labour and capital), absolute values (measures), relative values (indicators) and their correlations based on the following indicators: global production per 1 ha of agricultural area, global production per employee, global production per 1 € of gross fixed assets, gross fixed assets per 1 ha of agricultural area, agricultural area per employee, and gross fixed assets per employee. The analysis was conducted based on Eurostat data. Not all countries could be compared due to the lack of the relevant data (information about gross fixed assets was not available for Spain and Cyprus). A vertical analysis was performed on a comprehensive set of data for 2013.

Data were analysed with the use of selective descriptive statistics, including the arithmetic mean, median, minimum value, maximum value, as well as measures of statistical dispersion – range and coefficient of variation (CV).

## **Research results and discussion**

In agriculture, productive potential is evaluated based on productive resources: land, labour and capital. The relevant data for the EU Member States are presented in Table 1. The values of the coefficients of variation point to highly significant differences in the share of productive resources in agricultural outputs between the analysed countries. The greatest variations were observed in the number of farm employees (CV over 140 %). Similar results were reported by Golebiewska (2013). In 2013, Poland (nearly 2 million) and Romania (over 1.5 million) were characterized by one of the highest levels of employment in the agri-food sector. By comparison, the value of this parameter was more than 50 % lower in Italy (about 816 thousand), France (724 690) and Germany (522 730). The lowest employment in the agri-food sector was noted in Latvia (82 090), Slovenia (82 450), Czech Republic (105 080) and Austria (111 160). It is worth noting that these disproportions are considerably smaller when the average numbers of farmworkers are compared (CV about 54 %). The highest average number of workers per farm was noted in the Czech Republic (4 employees). The discussed parameter was nearly 50 % lower in the Netherlands (2.3), Slovakia (2.2) and Germany (1.8). The lowest average employment per farm was recorded in Romania (0.4), Malta (0.5), Greece (0.7), Austria (0.8) and Italy (0.8).

Capital is also a key resource that influences workforce productivity, agricultural productivity and competitiveness. An analysis of gross fixed assets in the EU agri-food sector revealed significant disproportions (CV over 133 %). Capital investments were highest in France (12 934.7 million €), Germany (9 547.0 million €), Italy (9 225.2 million €) and lowest in Malta (14.9 million €), Luxembourg (210.8 million €), Slovenia (237.6 million €) and Estonia (287.3 million €).

Highly significant variations were also noted in the average gross value of fixed assets in agriculture (CV 118.10 %). This parameter was highest in Luxembourg (101 336.5 €) and the Netherlands (70 598.7 €), and it was 50 % lower in the Czech Republic (54 364.2 €) and United Kingdom (45 783.6 €). The average gross value of fixed assets was relatively low in Romania (597.5 €), Greece (1 446.6 €), Malta (1 595.1 €) and Hungary (1 861.1 €). These results point to

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low levels of investment in agricultural production, in particular in countries with a high proportion of small farms in the agri-food sector (Byerlee D., De Janvry A., Sadoulet E., 2009).

Land is the most important productive resource in agriculture. In 2013, considerable variations in utilized agricultural area were noted across the EU (CV over 117 %). This parameter was highest in France (27 739 430 ha), the United Kingdom (17 326 990 ha), Germany (16 699 580 ha) and Poland (14 409 870 ha). Utilized agricultural area exceeded 10 million ha in Romania. The evaluated parameter was lowest in Malta (10 880 ha), Luxembourg (131 040 ha), Slovenia (485 760 ha) and Estonia (957 510 ha).

Smaller but statistically significant variations were observed in average utilized agricultural area (CV 89,4 %). The largest farms were situated in the United Kingdom (average utilized agricultural area of 63.1 ha per farm), Sweden (51.2 ha), Denmark (49.3 ha) and Estonia (43.4 ha). Slovenian farms were characterized by relatively small average utilized agricultural area (5.9 ha). A similar situation was in Poland (7.5 ha), Romania (8.4 ha) and Croatia (8.8 ha). It should be noted that the above results are influenced by the number of farms and utilized agricultural area. Microeconomic and macroeconomic factors, such as the size of the country, population, export potential and quality of agricultural land, also play an important role. Low average farm area and relatively high employment in a farm limit the accumulation of capital and investments in agricultural production (Wicka A., 2012).

The analysis produced some interesting results<sup>1</sup>. The majority of EU-15 countries were characterized by a predominance of large farms with fewer workers and high levels of investment in fixed assets. In contrast, countries that joined the EU in 2004 and 2007, such as Poland and Romania, and countries with small utilized agricultural area, such as Malta and Luxembourg, had a higher number of small farms with higher employment and low levels of investment in fixed assets.

Agricultural competitiveness is largely determined by farmers' ability to maximize their resource productivity and overall productivity. Productive potential is a quantitative measure of the relationship between agricultural inputs and outputs. Agricultural outputs were measured based on global production values for every analysed productive resource (Table 2). In 2013, significant regional differences were observed in global agricultural production in the EU (CV around 150 %). It should be noted that the absolute gross value of fixed assets is highly correlated with farm area. The gross value of fixed assets was highest in countries with the highest utilized agricultural area, mostly the EU-15 countries, including Italy (33 024.4 million €), France (26 381.3 million €), Germany (21 993.8 million €), United Kingdom (10 835.4 million €), the Netherlands (10 194.1 million €). In the group of countries that joined the EU in 2004 and 2007, the evaluated parameter was high in Poland (9 398.1 million €) and Romania (7 621.3 million €), which could be attributed to large agricultural area and a high number of farms.

The gross value of fixed assets was lowest in Malta (56.2 million €), Luxembourg (103.2 million €), Latvia (254.8 million €), Estonia (332,8 million €), Slovenia (407.5 million €) and Slovakia (597.6 million €). Lower values of the analysed parameter were observed in countries characterized by a smaller number of farms and small agricultural area, mostly countries that joined the EU in 2004 and 2007.

<sup>1</sup> Vertical and horizontal analyses will be carried out in future research.

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Table 1

**Basic data relating to agricultural production potential  
 in the EU Member States in 2013**

Specification	NoF number	UAA ha	AUAA ha	E number	AEpF number	GVofA mln €	AGVoFA €
Belgium	37760	1307900	34.6	56730	1.5	1149.7	30447.6
Bulgaria	254410	4650940	18.3	320230	1.3	532.8	2094.1
Czech Republic	26250	3491470	133.0	105080	4.0	1427.1	54364.2
Denmark	38280	2619340	68.4	53170	1.4	1438.3	37574.2
Germany	285030	16699580	58.6	522730	1.8	9547.0	33494.7
Estonia	19190	957510	49.9	22060	1.2	287.3	14971.3
Ireland	139600	4959450	35.5	163690	1.2	799.9	5730.2
Greece	709500	4856780	6.9	463860	0.7	1026.4	1446.6
France	472210	27739430	58.7	724690	1.5	12934.7	27391.8
Croatia	157440	1571200	10.0	175050	1.1	387.4	2460.4
Italy	1010330	12098890	12.0	816920	0.8	9225.2	9130.9
Latvia	81800	1877720	23.0	82090	1.0	394.5	4823.1
Lithuania	171800	2861250	16.7	144770	0.8	682.9	3975.0
Luxembourg	2080	131040	63.0	3530	1.7	210.8	101336.5
Hungary	491330	4656520	9.5	433700	0.9	914.4	1861.1
Malta	9360	10880	1.2	4450	0.5	14.9	1595.1
Netherlands	67480	1847570	27.4	153310	2.3	4764.0	70598.7
Austria	140430	2726890	19.4	111160	0.8	2351.0	16741.4
Poland	1429010	14409870	10.1	1918550	1.3	4196.3	2936.5
Portugal	264420	3641590	13.8	323470	1.2	883.5	3341.2
Romania	3629660	13055850	3.6	1552630	0.4	2168.9	597.5
Slovenia	72380	485760	6.7	82450	1.1	237.7	3283.4
Slovakia	23570	1901610	80.7	50600	2.2	404.1	17145.5
Finland	54400	2282400	42.0	57550	1.1	1594.0	29301.5
Sweden	67150	3035920	45.2	59320	0.9	1707.0	25420.6
United Kingdom	183040	17326990	94.7	274520	1.5	8380.2	45783.7
<b>Descriptive statistics</b>							
arithmetic mean	378381	5815551.9	36.3	333704.2	1.3	2602.3	21071.0
median	140015	2948585.0	25.2	149040.0	1.2	1088.0	12051.1
minimum value	2080	10880.0	1.2	3530.0	0.4	14.9	597.5
maximum value	3629660	27739430.0	133.0	1918550.0	4.0	12934.7	101336.5
standard deviation	744419.6	6821986.6	32.4	469150.1	0.7	3486.2	24883.9
variance	5.54E+11	4.65E+13	1.05E+03	2.20E+11	5.09E-01	1.22E+07	6.19E+08
coefficient of variation	196.7	117.3	89.4	140.6	54.4	133.0	118.1

MoF – number of farms; UAA – utilized agricultural area; AUAA – average utilized agricultural area; E- employment; AEpF – average employment per farm; GVofA – gross value of fixed assets; AGVoFA – average gross value of fixed assets

Source: authors' calculations based on Eurostat Database (<http://ec.europa.eu/eurostat/data/database>)

The productive potential of the EU countries can be more reliably compared based on relative values. The average gross value of fixed assets per farm was also characterized by significant regional variation (CV over 110 %). High values of the above parameter were noted in Western Europe, including in the Netherlands (average 151 068.8 €), Germany (77 163.1 €), Denmark (73 154.6 €), Belgium (60 726.2 €), the United Kingdom (59 197.0 €) and France (55 867.7 €). The average gross value of fixed assets per farm was lowest in Romania (2 099.7 €). The analysed

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parameter was also very low in Poland (6 576.6 €) and Latvia (3 114.6 €), Slovenia (5 629.5 €), Hungary (5 908.1) and Malta (6 007.5 €).

Table 2

**Productivity of agricultural resources in the EU Member States in 2013**

Specification	GPIA million €	AVoGP €	GPp1haoUAA €	GPpE €	GPp1€oGFA €
Belgium	2293.0	60726.2	1753.2	40419.9	2.0
Bulgaria	1694.4	6660.0	364.3	5291.1	3.2
Czech Republic	1426.6	54344.8	408.6	13575.9	1.0
Denmark	2800.4	73154.7	1069.1	52668.1	2.0
Germany	21993.8	77163.1	1317.0	42074.7	2.3
Estonia	332.8	17341.8	347.6	15085.7	1.2
Ireland	2001.4	14336.8	403.6	12226.9	2.5
Greece	4964.2	6996.7	1022.1	10701.8	4.8
France	26381.3	55867.7	951.0	36403.6	2.0
Croatia	1006.5	6392.6	640.7	5749.5	2.6
Italy	33024.4	32686.8	2729.5	40425.6	3.6
Latvia	254.8	3114.6	135.7	3103.5	0.7
Lithuania	1057.8	6157.2	369.7	7306.8	1.6
Luxembourg	103.2	49629.8	787.8	29243.6	0.5
Hungary	2902.8	5908.1	623.4	6693.2	3.2
Malta	56.2	6007.5	5168.2	12636.0	3.8
Netherlands	10194.1	151068.8	5517.6	66493.5	2.1
Austria	2736.0	19482.8	1003.3	24612.9	1.2
Poland	9398.1	6576.6	652.2	4898.5	2.2
Portugal	2538.9	9601.7	697.2	7848.9	2.9
Romania	7621.3	2099.7	583.8	4908.6	3.5
Slovenia	407.5	5629.5	838.8	4941.9	1.7
Slovakia	597.6	25355.5	314.3	11810.9	1.5
Finland	1277.0	23475.0	559.5	22190.1	0.8
Sweden	1625.5	24206.4	535.4	27401.6	1.0
United Kingdom	10835.4	59197.0	625.4	39470.4	1.3
arithmetic mean	5751.0	30891.6	1131.5	21084.0	2.1
median	2147.2	18412.3	646.4	13105.9	2.0
minimum value	56.2	2099.7	135.7	3103.5	0.5
maximum value	33024.4	151068.8	5517.6	66493.5	4.8
standard deviation	8612.2	34178.4	1348.0	17368.0	1.1
variance	7.42E+07	1.17E+09	1.82E+06	3.02E+08	1.2
coefficient of variation	149.8	110.6	119.1	82.4	51.9

GPIA – global production in agriculture, AVoGP – average value of global production; GPp1haoUAA – global production per 1 ha of agricultural area; GPpE – global production per employee; GPp1€oGFA – global production per 1 € of gross fixed assets  
 Source: authors' calculations based on Eurostat Database (<http://ec.europa.eu/eurostat/data/database>)

Resource productivity was evaluated based on the calculated indicators of productivity. Productivity is the main driver of growth in agriculture (Ball V.E., Bureau J.C., Nehring R., Somwaru A., 1997). Higher productivity decreases costs, increases the supply of cheaper goods and services, stimulates market growth and increases consumers' purchasing power (Golebiewska B., 2013).

An analysis of resource productivity revealed the greatest differences in land productivity. In this category, the coefficient of variation exceeded 119 %, and it was nearly 40 % higher in

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comparison with labour productivity (CV 82.4 %) and more than twice higher in comparison with capital productivity (CV 51.9 %). The Netherlands (5 517.6 €), Malta (5 168.2 €) and Italy (2 729.5 €) were the EU's leaders in terms of effective land use. The lowest land productivity was observed in Latvia (135.7 €), Slovakia (314.3 €), Estonia (347.6 €), Bulgaria (364.3 €) and Lithuania (369.7 €).

The analysed countries also differed significantly in labour productivity in the agri-food sector. The highest values of the above parameter were noted in the Netherlands (66 493.5 €), Denmark (52 668.1 €), Germany (42 074.9 €), Italy (40 425.6 €) and Belgium (40 419.9 €). In the group of countries that joined the EU in 2004 and 2007, including Latvia (3 103.5 €), Poland (4 898.5 €), Romania (4 908.6 €) and Slovenia (4 941.9 €), labour productivity was up to 20-fold lower. Those variations can be attributed mainly to differences in farm size and employment, and, to a lesser extent, to the absolute measures of agricultural outputs in the analysed countries.

The smallest but considerable differences were observed in the productivity of capital engaged in agricultural production. An investment of 1 € in fixed assets generated the greatest benefits in Greece (4.8 €), Malta (3.8 €), Italy (3.6 €), Romania (3.5 €) and led to the smallest increase in agricultural production in Luxembourg (0.5 €), Latvia (0.7 €), Finland (0.8 €), Sweden (1.0 €). It should be noted that low agricultural productivity is associated with diminishing marginal productivity of capital (Thirtle C., Lin Lin L., Holding J., Jenkins L., Piesse J. 2004).

### **Conclusions, proposals, recommendations**

- The results of the presented analysis point to significant regional differences in the productive potential of agriculture in the EU Member States. Those discrepancies can be attributed to variations in geographic and natural conditions, type of agricultural production, fragmentation of agricultural land, population and economic development. Agricultural competitiveness is largely determined by farmers' ability to maximize resource productivity and the overall productivity of agricultural systems.
- The greatest disproportions were noted in land productivity, whereas the differences observed in capital and labour productivity were less pronounced. This indicates that worker productivity and investments in fixed assets are the key determinants of productive potential as well as competitiveness in the agri-food sector.
- The presented analysis produced interesting results. The most satisfactory values of the evaluated indicators were observed in the EU-15 countries which are characterized by the highest productive potential of agriculture (France, Germany, Italy). The analysed variables and the lowest productive potential were noted in the countries that joined the EU in 2004 and 2007 (Romania, Poland, Latvia, Slovenia, Hungary). These observations indicate that greater support should be channelled to the new Member States to eliminate disproportions in the EU agri-food sector. However, effective restructuring programs should also be implemented in those countries to improve their competitiveness. Such measures would contribute to a decrease in the number of farms and, consequently, to an increase in average farm area. These transformation processes would ultimately increase labour and capital productivity in agriculture.

### **Bibliography**

1. Ajitabh, A., Momaya, K. S. (2003). Competitiveness of Firms: Review of Theory, Frameworks and Models. *Singapore Management Review*, Volume 26. No. 1. pp. 45-61.

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<sup>2</sup>Corresponding author. Tel.: +4889 523 49 42; E-mail address: katarzyna.pawlewicz@uwm.edu.pl



2. Ball, V. E., Bureau, J. C., Nehring, R., Somwaru, A. (1997). Agricultural Productivity Revisited. *American Journal of Agricultural Economics*, No. 79(4). pp. 1045-1063.
3. Borawski, P., Beldycka-Borawska, A. (2016). Polski handel zagraniczny artykułami rolno-spożywczymi i jego prognoza (Polish international trade of agri food products and its prognosis). *Zeszyty Naukowe Szkoły Głównej Gospodarstwa Wiejskiego w Warszawie. Problemy Rolnictwa Światowego*. No. 16(XXXI), Volume 1. pp. 48-59.
4. Borawski, P., Pawlewicz, A. (2006). Efektywność ekonomiczna indywidualnych gospodarstw rolnych w aspekcie zrównoważonego rozwoju obszarów wiejskich na przykładzie województwa warmińsko-mazurskiego (Economic efficiency of individual farms in rural areas sustainable development aspect on the example of Warmia and Mazury Province). *Zeszyty Naukowe Akademii Rolniczej we Wrocławiu*. No. 540. pp. 91-97.
5. Brodzinska, K. (2008). Conditions of Agri-environmental Programme Implementation in Poland. *Economic Science for Rural Development*. No. 16. pp. 27-32.
6. Byerlee, D., De Janvry, A., Sadoulet, E. (2009). Agriculture for Development: Toward a New Paradigm. *Annual Review of Resource Economics*, No. 1(1). pp. 15-31.
7. Cassman, K. G. (2016). Long-term Trajectories: Crop Yields, Farmland, and Irrigated Agriculture. *Economics Reviews, Special Issue*, pp. 21-46.
8. Chavas, J.P. (2017). On Food Security and the Economic Valuation of Food. *Food Policy*. Volume 69. pp 58-67
9. Feurer, R., Chaharbaghi, K. (1994). Defining Competitiveness: a Holistic Approach. *Management Decision*, No. 32(2). pp. 49-58.
10. Golebiewska, B. (2013). Trends of Changes in Resources and Work Performance in Polish Agriculture in Comparison with the Selected EU countries. *Economic Science for Rural Development*. No. 30 pp. 99-103.
11. Grant, R. M. (1991). The Resource-based Theory of Competitive Advantage: Implications for Strategy Formulation. *California management review*, No. 33(3). pp. 114-135.
12. Kremen, C., Iles, A., Bacon, C. (2012). Diversified Farming Systems: an Agroecological, Systems-based Alternative to Modern Industrial Agriculture. *Ecology and Society*. No. 17(4): art. 44. pp. 1-19.
13. Sambotin, D., Toader, C. S., Ioana, M. I. (2013). Development and Potential of Agriculture in the Western Part of Romania. *Economic Science for Rural Development*. No. 30. pp. 87-90.
14. Thirtle, C., Lin Lin, L., Holding, J., Jenkins, L., Piesse, J. (2004). Explaining the Decline in UK Agricultural Productivity Growth. *Journal of Agricultural Economics*, No. 55(2). pp. 343-366.
15. Wicka, A. (2012). Polish Agriculture against Selected States of the European Union. *Economic Science for Rural Development*, No. 29. pp. 140-147.
16. Zepeda, L. (2001). Agricultural Investment, Production Capacity and Productivity. in: *Agricultural Investment and Productivity in Developing Countries*. Edited by Lydia Zepeda. *FAO Economic and Social Development Paper*, No. 148, pp. 3-20.

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## POSSIBILITIES TO IDENTIFY ORGANIC SOILS IN THE AGRICULTURAL AREA IN LATVIA

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**Abstract.** Organic soils are the soils being rich in organic matter; they comprise part of the utilised agricultural area (UAA) and are a significant source of greenhouse gas (GHG) emissions from agriculture in Latvia. In Latvia, annual precipitation is greater than evaporation, which creates favourable conditions for the formation of soils rich in organic matter. Therefore, the overall **aim of the present research** is to examine possibilities to identify organic soils in the agricultural area in Latvia. To achieve the aim, the following specific **research tasks are** defined: 1) to analyse the agricultural land area in Latvia; 2) to describe the possibilities to identify organic soils in the agricultural area in Latvia and to examine the organic soil area in Latvia. The research found that the UAA, according to various information sources, was different, which made the identification of the organic soil area problematic. Information on soils in Latvia is not collected according to Intergovernmental Panel on Climate Change (IPCC) standards and definitions, therefore the present research classified organic soils according to the latest list of soils in Latvia and IPCC criteria. An analysis of the soil map of Latvia and the available data of the Rural Support Service's Geographic Information System showed that the organic soil area in Latvia was in the range from 148 069 ha to 345 844 ha.

**Key words:** utilised agricultural land, organic soils.

**JEL code:** O13; Q15; Q18.

### Introduction

Organic soils are the soils being rich in organic matter – plant and animal residues at various stages of decay, organism cells and tissues as well as organism synthesis substances. The IPCC (2006; 2013) explains that a soil is considered to be organic if it meets Criteria 1 and 2 or 1 and 3, which are described below: 1) Criterion 1: the soil layer rich in organic substances is at least 10 cm thickness, the content of organic carbon in a 20 cm topsoil layer is, on average, at least 12 %; 2) Criterion 2: if the soil has never been saturated with water for more than a few days and the content of organic carbon in the topsoil layer rich in organic substances is at least 20 % (content of organic substances is at least 35 %); 3) Criterion 3: if the soil is periodically saturated with water: a) the content of organic carbon in the soil layer rich in organic substances is at least 12 % and the soil has no clay particles; b) the content of organic carbon in the soil layer rich in organic substances is at least 18 % and the content of clay particles in the soil is at least 60 %; c) according to a linear regression equation, the content of clay particles in the soil is in the range of 0-60 %.

In addition to the above-mentioned criteria, an organic soil, unlike mineral soils, is characterised by: 1) lower density and porosity; 2) soil hydraulic conductivity (i.e. the amount of water that can infiltrate into the soil) depends of the degree of decomposition of organic substances; 3) greater capacity for exchange of cations; 4) plant nutrients are bound up in an unavailable organic form to plants.

Organic soils usually form in areas where the decomposition of organic substances is hindered by low air temperatures (boreal climate) or long-lasting humidity (wet climate), as wet soils are short of oxygen that is necessary for the decomposition of organic substances; for this reason, the organic substances accumulate. The spread of organic soils in the world is well characterised by global organic carbon stocks and quantities showing that the key areas in the world where organic soils are available are boreal (temperate) climate and tropical wet climate zones (Grave R.A. et al.,

2018; Zhang Y., Hadden D., Grelle A., 2017; Batjes N.H., 2016; Peigne J., Viana J.Fr., Payeta V., Saby N.P.A., 2018).

In the agricultural context in Europe, organic soils account for an insignificant proportion of the total utilised agricultural area, yet they are a very significant source of greenhouse gas (GHG) emissions (Hadden D., Grelle A., 2017). Latvia is situated in the temperate climate zone, and organic soils formed here mostly in the soils with a high moisture level, e.g. in wetlands of various types: bogs, wet and overflowing meadows and forests, as well as in valleys and lowlands with a high groundwater level.

If converting wetlands and other wet areas that have a thick organic matter layer into agricultural land, carbon dioxide (CO<sub>2</sub>) and nitrous oxide (N<sub>2</sub>O) emissions increase owing to increased soil mineralisation, while methane (CH<sub>4</sub>) emissions decrease, compared with natural wetlands where no soil drainage and tillage are done (Maljanen et al., 2010; Oleszczuk et al., 2008). Furthermore, unlike mineral soil, organic soils are a permanent source of CO<sub>2</sub> emissions, as organic decomposition processes occur in the soils (Maljanen et al., 2010). This process can significantly affect global carbon (C) stocks if it occurs on a large scale (Kochy et al., 2015; Lenerts A., Popluga D., 2016; Lenerts, A., Berzins, G., Popluga, D. (2016).

In Latvia, annual precipitation exceeds annual evaporation on average by 250 mm and more, which creates favourable conditions for the formation of soils rich in organic matter. A.Karklins (2016a) points out that in Latvia, such soils most often form under too wet conditions – water inflow to a particular area is smaller than water outflow from the area (evaporation, natural drainage); for this reason, the decomposition and mineralisation of plant residues is incomplete, and the soils accumulate partly humified organic matter. Under the climatic conditions in Latvia, such soils form in areas that have (or had) a naturally high groundwater level, the areas periodically overflow or the subsoil layer is quite impermeable to water. Therefore, the overall **aim of the present research** is to examine possibilities to identify organic soils in the agricultural area in Latvia. To achieve the aim, the following specific **research tasks are defined**: 1) to analyse the agricultural land area in Latvia; 2) to describe the possibilities to identify organic soils in the agricultural area in Latvia and to examine the organic soil area in Latvia.

**Methodology and data.** Analysis, synthesis, the logical construction method, the induction and deduction methods were employed to execute the research tasks. Scientific literature review was used as well. The present research used the results of a research project conducted in 2017 "Assessment of the Contribution of Organic Soils to Agriculture in Latvia – an Assessment of Multifactor Effects for Effective Land Use Solutions" regarding the organic soil area in Latvia (Latvia University..., 2017). To analyse the utilised agricultural area, the present research used information provided by the following national institutions: the State Land Service (SLS), the Central Statistical Bureau (CSB) and the Rural Support Service (RSS). The research also used the data collected by the RSS's Geographic Information System and the digital version of a large-scale soil map (1:10000) to identify the possible area of organic soils.

## Research results and discussion

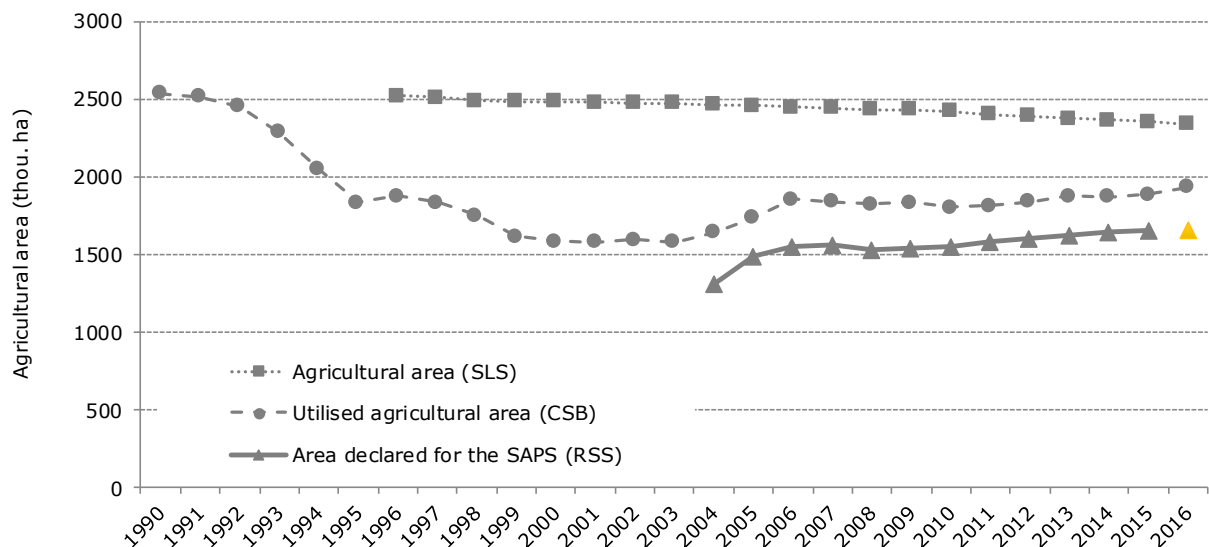
### 1. Agricultural land area in Latvia

Various sources of information provide different data on the agricultural land area in Latvia. This could be explained, to a great extent, by differences in the definitions used.

The SLS (2013) provides information on the UAA in accordance with Regulation of the Cabinet of the Republic of Latvia No. 562 "Regulations regarding the Procedure of Classification of Land Uses and Criteria for the Identification thereof" (2007). According to the SLS, the term "agricultural area" refers to the following land uses (classified according to the physical characteristics of land): arable land, orchards, meadows and pastures. These are the data of administrative nature on land uses. Land uses are identified based mainly on the information acquired when performing a cadastral land survey. However, land units are not surveyed every year, therefore the data on land uses could be un-updated in some situations. This information could not be accurately geographically represented, as it relates to land units that might have various land uses (e.g. a land unit is comprised of both a forest and an agricultural field). The land of various uses is measured by area and is not associated with geographical coordinates.

The CSB provides data on the use of agricultural land or the utilised agricultural area (UAA). The data are acquired from surveys on the use of agricultural land. The CSB data are not represented in a system of geographical coordinates and could not be shown geographically at the level of fields.

Information on agricultural land is also collected and aggregated by the RSS. This institution administers support payments in agriculture and aggregates information on the agricultural area declared for the payments. The area declared for support payments could be accurately identified geographically, as information on any field – coordinates of the field and crops grown in the field – is available. Figure 1 shows changes in the utilised agricultural area, according to the SLS, the CSB and the RSS.



Source: authors' calculations based on SLS, 2013, SLS, s.a., CSB, s.a., RSS, s.a.a (area reported before 2016, the area declared in 2016)

Fig. 1. Utilised agricultural area in Latvia in the period 1990-2016, according to various information sources

Over the past 20 years, according to the SLS, the agricultural area decreased from 2.5 mln. ha in 1996 to 2.336 mln. ha as of 1 January 2017.

According to the CSB, the UAA has both considerably increased and decreased in the period since 1990. A significant decrease in the UAA occurred in the period 1990-1999 when the UAA decreased from 2.53 mln. ha to approximately 1.6 mln. ha. After Latvia joined the EU, the UAA increased to 1.86 mln. ha in 2006. In the period 2006-2015, no change in the UAA was reported, yet in 2016 it increased again, reaching 1.93 mln. ha.

According to the RSS, the area approved for the Single Area Payment Scheme (SAPS) has risen every year (except 2008) since 2004. The area approved for the SAPS in 2015 totalled 1.66 mln. ha. An area of the same size was declared for the SAPS in 2016 as well. Among the above-mentioned sources of information, only the RSS provides field coordinates. However, it is not enough to have the geographical coordinates of fields declared for the SAPS to comprehensively examine the organic soil area used in agriculture, as some area undeclared for the SAPS is also exploited in agricultural production. Furthermore, the organic soil area undeclared for the SAPS has to be also taken into account, as this area also produces GHG emissions.

For this reason, an examination of locations of all agricultural areas was performed. The identification of UAA geographical coordinates used the 2005 data of the RSS's Geographical Information System regarding the agricultural parcels that were classified by the RSS in 2005 as agricultural. The agricultural parcels were drawn from first-cycle blank-and-white orthophotographs (1994-1999) and second-cycle colour orthophotographs (2003-2005). The area of agricultural parcels identified in this way in 2005 totalled 2 343 587 ha and was comparable to the UAA reported by the SLS in 2015 – 2 352 615 ha (an average of the areas reported by the SLS on 1 January 2015 (2366118 ha) and 1 January 2016 (2352615 ha)), with a difference of only 9 028 ha or 0.38 %. This approach allows identifying the UAA spatially.

The RSS annually carries out a survey of agricultural parcels in accordance with Cabinet Regulation No. 635 "Procedures for Surveying and Identifying the Unfarmed Utilised Agricultural Area and Providing Information thereon" (2010), and the survey data allow dividing the identified UAA into categories – the area declared for the SAPS, the farmed area, the unfarmed area (overgrown with shrubs) or the overgrown area (with trees). The identification of the unutilised agricultural area is an important matter, as it was found that approximately 88 thou. ha were actually overgrown and more than 207 thou. ha were an unfarmed area (overgrown with shrubs). Besides, about 260 thou. ha were maintained in good agricultural condition but were not declared for the SAPS (authors' calculations based on RSS, s.a.b).

## **2. Identification of organic soils in Latvia**

The identification of organic soils is important, as this information is used to compute GHG emissions in Latvia (National inventory..., 2017). These computations have to be performed using the IPCC guidelines (2013), including employing the IPCC definition of organic soils. To date in Latvia, information on soils has not been collected according to IPCC-defined soil texture classes, which are derived from a soil classification based on the World Reference Base for Soil Resources terminology, using a sequential approach based on necessary coarse criteria (Batjes, 2009). In Latvia, the largest information array on soils was formed during the Soviet period according to that period's soil classification (Tehniskie noradījumi..., 1987). That classification (improved and made more accurate) is still used today as well (Latvijas augsnu noteicejs, 2009). According to that classification, two soil classes – semi-hydromorphic and hydromorphic – and their several subtypes, fully or partially, could be considered to be consistent with the IPCC organic soil classes.

According to research studies by A.Karklins (2016b), the formation of hydromorphic soils was affected by aboveground or shallow underground waters over a long period, with the capillary layer reaching topsoil. Any kind of boggy soils with a peat layer of at least 30 cm thickness are called hydromorphic soils. Accordingly, any kind of hydromorphic soils in Latvia may be categorised as

organic soils. Such soils could be present in fields, yet they usually form is small areas in valleys between hills, with no water outflow, and in ancient flood-lands.

Semi-hydromorphic soils or seasonally wet soils are present in areas with temporary and stagnant surface waters or medium deep groundwater, including in valleys and plains with poor water outflow, where soil density prevents the water from soaking into deeper soils layers. Only part of semi-hydromorphic soils in Latvia may be potentially categorised (besides, only in part) as organic (hereinafter in the text the ORG subtypes of semi-hydromorphic soils, which theoretically could be organic, from the soil list approved in 1987 are designated as ORG subtypes), and they are: mucky-humus sod-gley soils, mucky-humus sod-podzol-gley soils and alluvial bog soils. Table 1 shows the soil classification of Latvia and soil designations correspond to those of the 1987 soil classification (Tehniskie noradījumi ..., 1987). Table 1 also shows whether the 1987 soil classification corresponds with the newest list of soils present in Latvia (Latvijas augsnu noteicejs, 2009), identifying those soil subtypes in the new classification system that meet the IPCC organic soil criteria.

Table 1

**Correspondence of 1987 soil classification items to the newest list of soils present in Latvia and the IPCC criteria**

Class	Soil subtype names according to the 1987 soil list	Soil subtype names according to the 2008 soil list	IPCC organic soil
Hydro-morphic soils	Lowland bog peat soils (Tz)	Lowland bog mucky peat soil	Yes
		Lowland bog mucky-humus soil	Yes
	Lowland bog peat-gley soils (Tzg)	Lowland bog mucky peat-gley soil	Yes
		Lowland bog mucky-humus gley soil	Yes
	Transition bog peat soils (Tp)	Transition bog mucky-humus soil	Yes
		Typical transition bog peat soil	Yes
	Transition bog peat-gley soils (Tpg)	Transition bog mucky-humus gley soil	Yes
		Transition bog peat-gley soil	Yes
Raised bog peat soils (Ta)	Typical raised bog peat soil	Yes	
Raised bog peat-gley soils (Tag)	Raised bog peat-gley soil	Yes	
ORG subtypes of semi-hydro-morphic soils	Mucky-humus sod-gley soils (VGT)	Mucky-humus gley soil	No
		Peaty gley soil	Yes
	Mucky-humus sod-podzol-gley soils (PGT)	Mucky-humus podzol-gley soil	No
		Peaty podzol-gley soil	Yes
	Alluvial bog soils (AT)	Alluvial mucky gley soil	No
Alluvial peaty soil		Yes	

Source: authors' construction based on Karklins, 2016b; Latvijas augsnu noteicejs, 2009; Tehniskie noradījumi..., 1987.

The information available in Latvia on soil types does not allow identifying the organic soil area accurately. However, this information allows identifying the range of possible areas or a minimum and a maximum area between which the real organic soil area falls (Fig. 2), using the following equation:

$$OS_{area} = X + Y \quad (1);$$

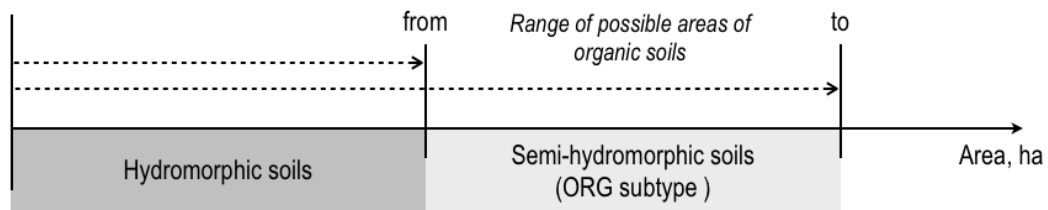
Where:

$OS_{area}$  is the organic soil area,

X is the hydromorphic soil area,

Y is the area with ORG subtype of semi-hydromorphic soils.

If the hydromorphic soil area is assumed to be X and the ORG subtype of semi-hydromorphic soils is soil area is assumed to be Y, the real organic soil area has to be in the range from X to X+Y.



Source: authors' construction

Fig. 2. Range of possible organic soil areas

Table 2 shows the characteristics of subtype soils that correspond to those of hydromorphic and ORG subtype of semi-hydromorphic soils, which could be useful for distinguishing the ORG subtype soils from other subtype soils. The most important characteristics were as follows: organic matter (OV) content, peat horizon thickness, soil acidity or alkalinity (pH) in the arable layer, depth of carbonates and glezation process.

Table 2

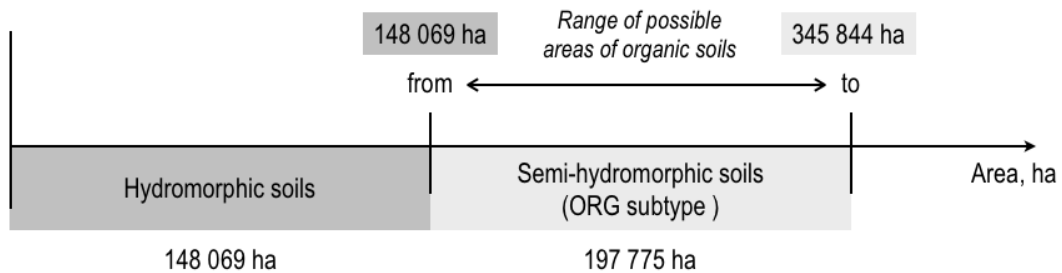
**Soil subtype characteristics attributable to organic soils**

Soil subtype names according to the 1987 soil list	Designation	OV, %	Peat horizon thickness, cm	Arable layer pH	Carbonates, cm	Glezation
Lowland bog peat soils	Tz	≥ 50	≥ 50	≤ 5.5	n.d.**	Subsoil
Lowland bog peat-gley soils	Tzg	≥ 50	30-50	≤ 5.5	n.d.	Subsoil
Transition bog peat soils	Tp	≥ 50	≥ 50	≤ 5.5	n.d.	Subsoil
Transition bog peat-gley soils	Tpg	≥ 50	30-50	≤ 5.5	n.d.	Subsoil
Raised bog peat soils	Ta	≥ 50	≥ 50	≤ 5.5	n.d.	Subsoil
Raised bog peat-gley soils	Tag	≥ 50	30-50	≤ 5.5	n.d.	Subsoil
Mucky-humus sod-gley soils	VGT	20-50	≤ 30	≥ 6.5	≤ 60	Entire layer
Mucky-humus sod-podzol-gley soils	PGT	20-50	≤ 30	≤ 5.5	≥ 100	Entire layer
Alluvial bog soils	AT	≥ 50	≤ 30	≥ 6.0	n.d.	Entire layer

\*In natural condition if not limed; \*\*n.d. – the 1987 methodology does not specify this characteristic, yet it has to be taken into consideration if modernising the soil classification

Source: authors' construction based on Karklins A., 2016b.

However, it has to be taken into consideration that the characteristics of soils (Table 2) were determined several decades ago and the soil subtypes distinguished in that period might not meet the modern criteria. As pointed out by Karklins (2016a), almost any soil rich in organic matter that was present in the utilised agricultural area was drained. A great deal of the soils were periodically tilled, limed and fertilised. All the mentioned factors contributed to the mineralisation of organic matter. Consequently, the content of organic carbon in soil and the layer of organic matter decreased. The last factor in particular could be a reason why former mucky-humus soils and peat soils that originally had a sufficiently thick layer of organic matter to be considered organic ones do not meet the criteria now. For this reason, explaining the area of organic soils based on aligning the national soil taxonomies gives only an approximate picture. A.Karklins also points out that the data have to be verified on the ground, especially in places the soil data for which were relatively older and where the agricultural area was intensively farmed, i.e. fields in particular.



Source: authors' calculations

Fig. 3. Estimate of the range of possible organic soil areas in Latvia

An analysis of the soil map of Latvia and the RSS's Geographical Information System data (Latvia University..., 2017) reveals that the area of organic soils in Latvia, according to historical data, was in the range from 148 069 ha to 345 844 ha (Fig.3). This is 7-250 % more than presently assumed in the national inventory report of Latvia at 138 123 ha (National inventory.... 2017).

### Conclusions, proposals, recommendations

- 1) Organic soils comprise an insignificant proportion of the total utilised agricultural area. A relatively high content of organic matter is characteristic of organic soils, and they are a very significant source of GHG emissions; for this reason, the organic soils have to be analysed in detail. In Latvia, there are favourable conditions for the formation of soils rich in organic matter.
- 2) The utilised agricultural area of Latvia, according to various information sources, is different. The SLS reported on an area of 2.336 mln. ha at the beginning of 2017, the CSB stated that the UAA was 1.93 mln. ha, while the area declared for the SAPS with the RSS totalled 1.66 mln. ha. The different areas make the identification of an organic soil area problematic in Latvia.
- 3) An examination of the national classification of organic soils as well as an analysis of the soil map of Latvia and the RSS's Geographical Information System data revealed that the organic soil area in Latvia, according to historical data, was in the range from 148 069 ha to 345 844 ha. It accounted for 6.3-14.8 % of the UAA reported by the SLS, 7.7-17.9 % of the UAA reported by the CSB and 8.9-20.8 % of the UAA declared for the SAPS; this area exceeded that specified in the national inventory report of Latvia by 7-250 %. For this reason, further research studies are necessary to accurately determine the organic soil area in Latvia.

### Acknowledgements

The research was promoted with the support of the project of the Ministry of Agriculture of the Republic of Latvia "Assessment of the Contribution of Organic Soils to Agriculture in Latvia – an Assessment of Multifactor Effects for Effective Land Use Solutions", Agreement No. ZM/2017/8\_ERAf.

### Bibliography

1. Batjes, N.H. (2009). IPCC Default Soil Classes Derived from the Harmonized World Soil Data Base. Retrieved: [https://www.researchgate.net/profile/Niels\\_Batjes/publication/41149694\\_IPCC\\_default\\_soil\\_classes\\_derived\\_from\\_the\\_Harmonized\\_World\\_Soil\\_Data\\_Base\\_Ver\\_10\\_Carbon\\_Benefits\\_Project\\_CBP\\_and\\_ISR\\_IC\\_-\\_World\\_Soil\\_Information/links/546213780cf2c1a63c02921b/IPCC-default-soil-classes-derived-from-the-Harmonized-World-Soil-Data-Base-Ver-10-Carbon-Benefits-Project-CBP-and-ISR-World-Soil-Information.pdf](https://www.researchgate.net/profile/Niels_Batjes/publication/41149694_IPCC_default_soil_classes_derived_from_the_Harmonized_World_Soil_Data_Base_Ver_10_Carbon_Benefits_Project_CBP_and_ISR_IC_-_World_Soil_Information/links/546213780cf2c1a63c02921b/IPCC-default-soil-classes-derived-from-the-Harmonized-World-Soil-Data-Base-Ver-10-Carbon-Benefits-Project-CBP-and-ISR-World-Soil-Information.pdf) Access: 03.01.2018.
2. Batjes, N.H. (2016). Harmonized Soil Property Values for Broad-scale Modelling (WISE30sec) with Estimates of Global Soil Carbon Stocks. *Geoderma*. 269. pp. 61-68.
3. Central Statistical Bureau (CSB) (s.a.). LAG0010. *Lauksaimniecība izmantojamās zemes izmantosana (tukst. hektaru) (Use of Agricultural Area (thsd hectares))*.



- Retrieved: [http://data.csb.gov.lv/pxweb/lv/lauks/lauks\\_\\_ikgad\\_\\_03Augk/LAG0010.px/?rxid=9ba31d7e-9394-45f8-bc16-3251fe29f23f](http://data.csb.gov.lv/pxweb/lv/lauks/lauks__ikgad__03Augk/LAG0010.px/?rxid=9ba31d7e-9394-45f8-bc16-3251fe29f23f) Access: 15.12.2017.
4. Grave, R.A., da Silveira, R.N., Cassol, P.C., da Silva, M.L.B., Mezzari, M.P., Aita, C., Wuaden, C.R. (2018) Determining the Effects of Tillage and Nitrogen Sources on Soil N<sub>2</sub>O Emission. *Soil and Tillage Research*. Volume 175. January 2018. pp. 1-12.
  5. Hadden, D., Grelle, A. (2017). The Impact of Cultivation on CO<sub>2</sub> and CH<sub>4</sub> Fluxes over Organic Soils in Sweden. *Agricultural and Forest Meteorology*. Volume 243. pp. 1-8.
  6. IPCC (2006). IPCC Guidelines for National Greenhouse Gas Inventories. *Agriculture, Forestry and Other Land Use*. Volume 4. Retrieved: <http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html> Access: 07.12.2017.
  7. IPCC (2013). *Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*. Retrieved: <http://www.mitigationpartnership.net/ipcc-2013-supplement-2006-ipcc-guidelines-national-greenhouse-gas-inventories-wetlands> Access: 05.12.2017.
  8. Karklins, A. (2016a). Histosols Latvijas augsnu klasifikācijas kontekstā. *Līdzsvarota lauksaimniecība. Zinatniski praktiskas konferences raksti (Histosols in the Context of Latvian Soil Classification. Balanced Agriculture. Scientific and Practical Conference Proceedings)*. pp. 45-49.
  9. Karklins, A. (2016b). Organiskas augsnes SEG emisiju apreķina kontekstā. *Līdzsvarota lauksaimniecība. Zinatniski praktiskas konferences raksti (Organic Soils in the Context of Greenhouse Gas Inventory. Balanced Agriculture. Scientific and Practical Conference Proceedings)*. pp. 40-44.
  10. Kochy, M., Hiederer, R., Freibauer, A. (2015). Global Distribution of Soil Organic Carbon – Part 1: Masses and Frequency Distributions of SOC Stocks for the Tropics, Permafrost Regions, Wetlands and the World. *Soil*. Volume 1. pp. 351-365.
  11. *National Inventory Report of Latvia 1990-2015* (2017). Retrieved: [http://unfccc.int/national\\_reports/annex\\_i\\_ghg\\_inventories/national\\_inventories\\_submissions/items/10116.php](http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/10116.php) Access: 27.12.2017.
  12. *Latvijas augsnu noteicejs* (2009) (Taxonomy of Latvian soils). Ed. A.Karklins. Jelgava: LLU. p. 240.
  13. Rural Support Service (RSS) (s.a.a). *Platību maksājumi (Area-based Payments)*. Retrieved: <http://www.lad.gov.lv/lv/statistika/platibu-maksajumi> Access: 19.12.2017.
  14. Lenerts, A., Popluga, D. (2015). Facilitate Calculations of GHG Emissions in Latvian Agriculture at Farm Level. In: *15th International Multidisciplinary Scientific Geoconference SGEM 2015 "Ecology, Economics, Education and Legislation" Conference Proceedings*, Vol. III, pp. 287-294.
  15. Lenerts, A., Berzins, G., Popluga, D. (2016). Nitrogen Fertilizer Use Efficiency and GHG Emissions in the Latvian Grain Sector. *15th International Scientific Conference "Engineering for Rural Development" Proceedings*, Volume 15, pp. 224-229.
  16. Rural Support Service (RSS) (s.a.b). *LIZ apsekošanas rezultāti novadu griezumā (Survey of the UAA Broken down by Municipality)*. Retrieved: [http://www.lad.gov.lv/files/zva\\_2015\\_gat\(2\).pdf](http://www.lad.gov.lv/files/zva_2015_gat(2).pdf) Access: 29.12.2017.
  17. Latvia University of Agriculture (LLU) (2017). Petiuma "Organisko augsnu devuma novertejums Latvijas lauksaimniecībā – daudzfaktoru ietekmes izvertejums efektīvas zemes izmantošanas risinājumu piedāvājuma" atskaite (Research report "Assessment of the Contribution of Organic Soils to Agriculture in Latvia – an Assessment of Multifactor Effects for Effective Land Use Solutions"). September 2017. p. 32.
  18. *Tehniskie norādījumi augsnes kartēšanas un saimniecību iekšējās zemes vertēšanas lauku darbiem Latvijas PSR* (1987). LPSR Valsts Zemes ierīcības projekta institūts Zemesprojekts. Apstiprināti ar direktora pavēli Nr. 17-V (*Technical Instructions on how to Map Soils and do Farmland Assessments in the Field in the Latvian SSR*. Latvian SSR State Land Amelioration Design Institute Zemesprojekts. Approved by Director Order No. 17-V). 20 April 1987. Riga.
  19. Maljanen, M., Sigurdsson, B.D., Gudmundsson, J., Oskarsson, H., Huttunen, J.T., Martikainen, P.J. (2010). Greenhouse Gas Balances of Managed Peatlands in the Nordic Countries - Present Knowledge and Gaps. *Biogeosciences*. Volume 7 (9). pp. 2711-2738.
  20. Cabinet of Ministers of the Republic of Latvia (2007). Noteikumi Nr.562 „Noteikumi par zemes lietošanas veidu klasifikācijas kartību un to noteikšanas kritērijiem” (Regulation No. 562 "Regulations regarding the Procedure of Classification of Land Uses and Criteria for the Identification thereof". Published by Latvijas Vestnesis, No. 137 (3713). 24.08.2007.
  21. Cabinet of Ministers of the Republic of Latvia (2010). Noteikumi Nr.635 "Kartība, kada apseko un nosaka neapstradatas lauksaimniecībā izmantojamās zemes platību un sniedz informāciju par to" (Regulation No. 635 "Procedures for Surveying and Identifying the Unfarmed Utilised Agricultural Area and Providing Information thereon"). Published by Latvijas Vestnesis, No. 119 (4311), 29.07.2010.
  22. Oleszczuk, R., Regina, K., Szajdak, L., Hoper, H., Maryganova, V. (2008). Impacts of Agricultural Utilization of Peat Soils on the Greenhouse Gas Balance. *Peatlands Climate Change*. The International Peat Society [SPACE]. pp. 70-97.
  23. Peignea, J., Viana, J.Fr., Payeta, V., Saby, N.P.A. (2018). Soil Fertility after 10 Years of Conservation Tillage in Organic Farming. *Soil and Tillage Research*. Volume 175. January 2018. pp. 194-204.
  24. State Land Service (SLS) (2013). *Nekustama īpašuma tirgus pārskats: Lauku zemes tirgus Latvija – galvenās tendences (Immovable Property Market Report: the Rural Land Market in Latvia – Key Trends)*. p. 3. Retrieved: [http://kadastralavertiba.lv/wp-content/uploads/2014/04/LIZ\\_parskats\\_18032014\\_kopa.pdf](http://kadastralavertiba.lv/wp-content/uploads/2014/04/LIZ_parskats_18032014_kopa.pdf) Access: 20.09.2017.

25. State Land Service (SLS) (s.a.). *Zemes parskati (Reports on Land)*. Retrieved: <http://www.vzd.gov.lv/lv/parskati-un-statistika/tematiskie-parskati/zemes-parskati> and unpublished information. Access: 20.12.2017.
26. Zhang, Y., Hartemink, A.E. (2017) Sampling Designs for Soil Organic Carbon Stock Assessment of Soil Profiles. *Geoderma*. Volume 307. 1 December 2017. pp. 220-230.

## PRODUCTION AND FOREIGN TRADE IN VEGETABLES IN POLAND

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**Abstract.** Vegetables are an important part of the diet, but their consumption is still too low. An increase in demand for these crops is expected. Poland has large resources of land and work in agriculture, which is inefficient. Growing vegetables is a competitive branch of Polish agriculture. Their share in the global crop production in Poland has been steadily increasing. The aim of the study was to analyse and evaluate changes in the production and foreign trade in vegetables in Poland. The analysis showed that the area of vegetable cultivation decreased in the period 2000-2016 by 26.3 %. Production decreased by 2 %. In the production structure, more expensive qualitative vegetables displace cheaper volumetric vegetables. The observed increase in Polish vegetable exports was halted by the Russian embargo. The largest recipient of Polish vegetables is Germany, the largest supplier - Spain. Since 2012, the export coverage ratio (TC) has been increasing only in the exchange of Poland with the new EU Member States. The intra-industry trade indicator showed a declining trend. The Polish trade in vegetables is dominated by vertical exchange with low-value products. Since 2015, the marginal share of high-quality products has been seen in trade. The share of horizontal exchange of vegetables is decreasing. Poland exports cheap vegetable products and imports more expensive. In recent years, the development of Polish vegetable sector has been stopped.

**Key words:** vegetables, Poland, production, intra-industry trade.

**JEL code:** Q11, Q17

### Introduction

Vegetables are a very important component of a healthy and varied diet. In addition to calories, they provide vitamins and minerals. The most valuable are C, A and E vitamins, from minerals - sodium, potassium, calcium and magnesium. Pro-health activities are attributed to phytochemicals present in vegetables (especially those with antioxidant effects), as well as fibre. A diet rich in vegetables reduces the risk of developing cardiovascular diseases and some cancers (Wang X. et al., 2014; Hjartaker A. et al., 2015; Slavin J. L. and Lloyd B., 2012).

The need for regular consumption of vegetables is increasingly promoted (Fisher J. O. and Dwyer J. T., 2016). Experts in the field of nutrition and prevention of chronic diseases for years recommend eating 400 grams of fruit and vegetables every day or five servings (FAO, 2015). In the European Union, 5 or more servings of fruit and vegetables are consumed daily by 14.3 % of the population, and 34.4 % do not eat them at all. This is a problem mainly for the new Member States. Over half of the respondents in Bulgaria and Romania did not eat any fruit or vegetables, in Poland – 33.2 % (Eurostat, 2017).

Considering two three-year periods, 2001-2003 and 2011-2013, it was noted that the average annual vegetable consumption in the world increased from 115.9 to 138.6 kg per capita, dropping in the EU from 119.0 to 112.1 kg per capita and in Poland from 121.8 to 119.0 kg per capita (FAOSTAT, 2018). However, the increase in the population in Poland caused that, according to the balances, the average annual consumption of vegetables in the years 2001-2003 amounted to 3.9 million tonnes, and in the years 2013-2015 it increased to 4.4 million tonnes. The degree of self-sufficiency of vegetables in these years increased slightly from 106.4 to 106.7 (*Rocznik rolnictwa...*, 2007, 2016).

The global demand for vegetables in Poland increased and the level of coverage of this demand by domestic production also increased slightly. There are, therefore, surplus vegetables that can be exported. Observing the greater awareness and tendency of the Polish society to eat healthy food,

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it can be assumed a further increase in the demand for vegetables, which will also increase their production.

The aim of the study is to analyse and evaluate changes in the production and foreign trade of vegetables in Poland. The study covered the sown area, production volume and its structure. Next, the coverage level of imports by export and the intensity of intra-industry trade with vegetables were analysed. It was decided to verify the hypothesis about the growing competitiveness of Polish vegetables on the European market.

## Material and methods

In the part of the publication devoted to the area of cultivation, production volumes and their structure, the data of FAOSTAT, Eurostat and the Central Statistical Office in Poland (CSO) were used. In the part concerning foreign trade, data from the International Trade Statistics database were used. The indexes of dynamics, structure, trade coverage and intensity of intra-industry trade (IIT) were calculated.

The trade coverage ratio - TC (1) is the ratio of the value of exports to the value of imports (Olszanska A., 2016). It shows the extent to which export receipts cover expenses incurred on the import of products from the same category.

$$TC = \frac{X}{M} \quad (1)$$

where:

X - volume / value of exports,

M - volume / value of imports.

The Grubel and Lloyd index was used (Grubel, H.G., Lloyd, P.J., 1975), being the most popular measure of the intensity of intra-industry trade (2), and its transformation proposed by Greenaway, Hine and Milner (1994), which shows the diversity of exchange streams horizontal (H) and vertical (V), (3):

$$GL = 1 - \frac{\sum_{j=1}^n |X_j^i - M_j^i|}{\sum_{j=1}^n (X_j^i + M_j^i)} \quad (2) \quad \longrightarrow \quad GL = 1 - \left( \frac{\sum_{j=1}^n |X_i^H - M_i^H| + \sum_{j=1}^n |X_i^{VL} - M_i^{VL}| + \sum_{j=1}^n |X_i^{VH} - M_i^{VH}|}{\sum_{j=1}^n (X_i + M_i)} \right) \quad (3)$$

where:

X - volume / value of exports,

M - volume / value of imports,

i - product,

j - country,

VH - vertical with higher quality,

VL - vertical with lower quality.

The GL index value ranges from 0 to 1. The value 1 means that there is only intra-industry trade, while 0 - that there is no such trade. Because intra-industry trade consists of various streams, in the empirical study, its division into horizontal and vertical exchange was taken into account (Sledziowska K., Czarny E., 2015). In the case of products of varying quality, it is important whether the given country exports higher quality products than imports, or the exported products are of a lower quality than those imported. In the first case, it concerns high-quality vertical trade (VH), and in the second - low-quality vertical exchange (VL). In horizontal trade (H), goods of identical quality are exchanged but they differ in non-quality features that are important

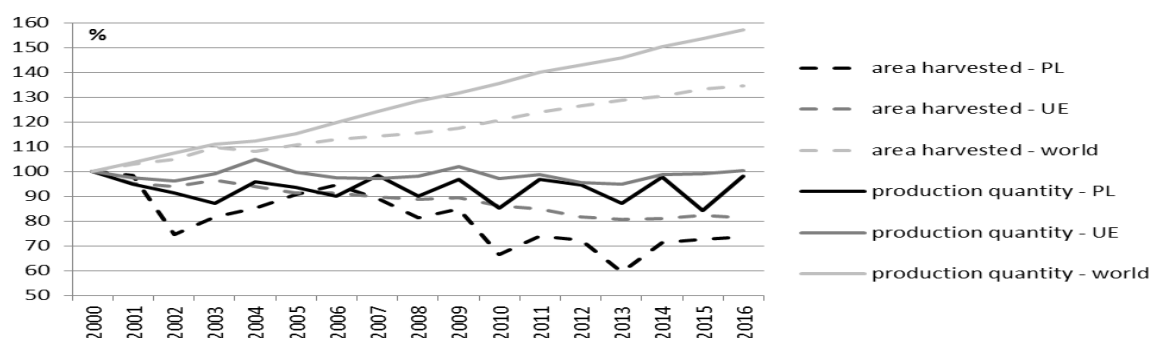
to the buyer. They are so-called visible features. In the case of vegetables, the horizontal exchange covers the ones that are not grown in a given climate, so they must be imported.

## Research results and discussion

### 1. Changes in the area, production and structure of vegetables grown in Poland

Poland has a large production potential in agriculture, related to land and labour resources. In 2014, the area of agricultural land in Poland was 14.6 mln ha, and the number of people professionally active in agriculture - 2.6 mln people. These resources constituted, in turn, 7.7 % of UAA and 28.1 % of labour resources in the Community (*Rocznik rolnictwa...*, 2016). Polish agriculture is perceived as not very competitive against modern and efficient Western European agriculture. The production of vegetables, however, develops relatively well and can distinguish Poland on European and even global market (Filipiak T., 2014). The CSO data confirm that vegetable cultivation is increasingly important branch of agricultural production in Poland. The share of vegetables in global crop production increased in the period 2000-2015 in value terms from 11.6 % to 19.0 % (*Rocznik rolnictwa...*, 2007-2016).

In 2016, the area of vegetable cultivation in the world amounted to 61.8 mln ha and increased by 15.9 mln ha, i.e. 34.6 % (Fig. 1). The reverse situation was observed in the EU and in Poland. Vegetable cultivations stretched there respectively on the area of 2.266.8 thous. ha and 184.3 thous. ha. This area has decreased in the EU since the beginning of the century (by 535.7 thous. ha, i.e. 18.7 %) and in Poland (by 65.8 thousand ha, i.e. 26.3 %).



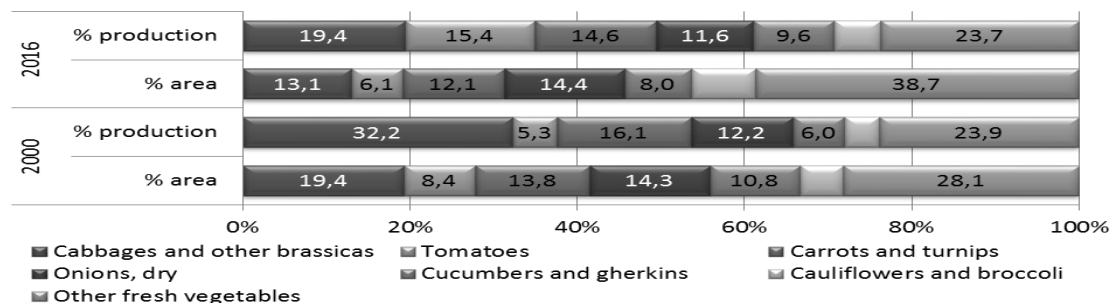
Source: author's calculations based on FAOSTAT, 2018

Fig. 1. Changes in the area of crops and the volume of vegetable production in Poland, the EU and the world in the years 2000-2016 (w %, 2000=100)

According to the most up-to-date farm structure survey (2013), there were almost 920 thous. entities engaged in cultivating vegetables in the EU, including 15.4 % in Poland. The average area of a vegetable farm in the Community was 1.7 ha, in Poland - 1.3 ha. Almost half of the vegetable growing area in the EU (47.2 %) was located in three Member States: Italy (19.5 %), Spain (16.6 %) and Poland (11.1 %). Poland has the largest area in the EU for growing organic vegetables (16.9 thousand ha, i.e. 19.8 % of the EU area of these crops), (Eurostat, 2016).

In Poland, there were large fluctuations in the area of vegetable crops, from 250.1 thous. ha in 2000 to 148.5 thous. ha in 2013. As a rule, this was related to the purchase prices of vegetables occurring in the seasons preceding production. In 2002, smaller area was the result of data correction after the census. In 2010, the decrease in space was caused by methodological changes. The herbs were excluded from these crops (Kulikowski R., 2013). In 2013, rainy spring caused flooding of the plantation and loss of a part of the crop. The increase in vegetable prices encouraged farmers to develop cultivation. Since 2013, an increase in the area devoted to vegetable crops has been observed.

In 2000, the largest area was occupied by growing cabbages, onions, carrots and cucumbers. In total, it was 145.6 thous. ha, i.e. 58.2 % of all vegetables grown in Poland (Fig. 2). The cultivation of tomatoes and cauliflowers was of lesser importance (together they covered 34.1 thousand ha and 13.7 %). The other vegetables occupied in total 70.3 thous. ha (28.1 %). In 2016, the area of cultivation was smaller than at the beginning of the century in case of 10 out of 16 analysed vegetable groups. A large reduction was recorded for basic crops. There were limited sowing areas of cabbage (by 50.2 %), onions (by 25.7 %), carrot (by 35.3 %) and cucumbers (45.2 %). This meant that the total area of these 4 species was reduced to 87.7 thous. ha, i.e. 47.6 % of the total area of vegetable cultivation. Tomatoes and cauliflowers were grown on a smaller area (25.3 thous. ha), but their share remained the same (13.7 %). Within 17 years, the proportions between basic and other vegetables have clearly changed in the area structure. The share of the latter increased to 38.7 % (although the area increased by only 1 ha). In total, in 2016 they occupied 25.3 thous. ha, i.e. 76.2 % more than in 2000. The changes which are taking place indicate growing species diversity of vegetables cultivated in Poland.



Source: author's calculations based on FAOSTAT, 2018

Fig. 2. Structure of cultivation area and vegetable production volume in Poland in 2000 and 2016 (in %)

Vegetable production in the world amounted to 1223 mln t in 2016 and increased by 57.1 % compared to 2000 (Fig. 1). In the EU, 69.3 mln t were produced and the increase was insignificant (0.2 %). In Poland, 5.9 mln t of vegetables were harvested. It was 2.0 % less than at the beginning of the century. Compared to changes in the area of cultivation, the decrease in production was small. Throughout the whole analysed period, production fluctuated constantly and changed in the range from 6.0 mln t in 2000 to 5.1 mln t - in 2010. However, the coefficient of volatility at the level of 5.2 % indicates relatively small fluctuations. In recent years, the reasons for the decline in production have been unfavourable weather phenomena. In 2013, there were flooding of crops, and in 2015 - a huge drought.

In 2000, 32.2 % of the production volume was cabbages (Fig. 2). The next, carrot and onion accounted for 28.3 %. The important crops also included cucumbers, tomatoes and cauliflowers (15.5 % in total). The other vegetables accounted for 23.9 %. In 2016, the shares of the basic vegetables in their overall production spread more evenly. It can be noticed that volumetric vegetables (cabbage, carrots) lost their importance in production and the role of qualitative vegetables (tomatoes, cucumbers) increased.

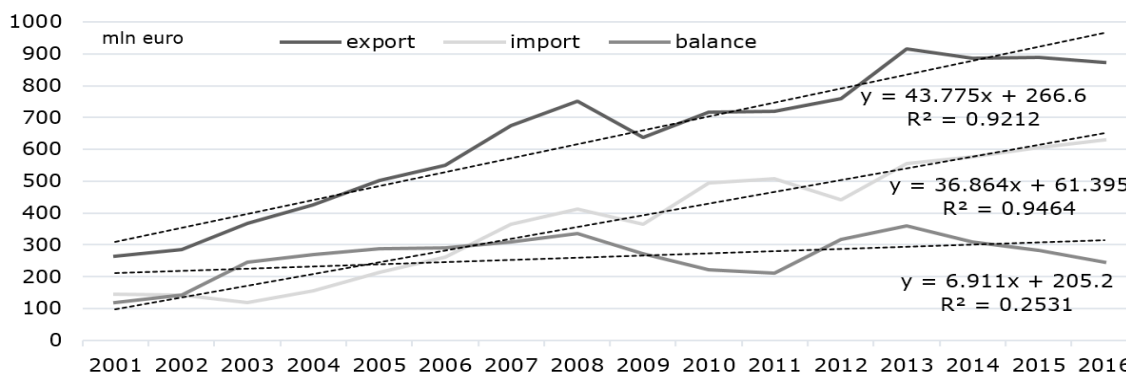
It is worth noting that the value of global plant production in Poland in the period 2000-2015 increased by 65.9 %, in which the value of vegetables - by 173.1 % to PLN 9.4 bn.

## 2. Poland's competitiveness in international trade with vegetables

Polish foreign trade, like the entire vegetable sector, have been recording a positive balance in terms of value for many years (Fig. 3). In 2016, Poland sold abroad vegetables worth almost EUR

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873.4 mln, which is almost 231 % more than in 2001. In almost the entire period under consideration, both exports and imports of vegetables grew (in terms of value). The exception was vegetable export in 2009 (lower by EUR 112.7 mln compared to 2008) and a declining trend visible from 2014 (the value of export decreased compared to 2013 by EUR 29.1 mln). In the case of vegetables import, its reduced value was recorded in 2009 and 2012. Compared to the previous year, it was lower respectively by EUR 48.5 mln and EUR 67.1 mln. The decreasing value of export and import in 2009 was caused by the growing global economic crisis.



Source: author's calculations based on [https://trademap.org/Product\\_SelCountry\\_TS.aspx](https://trademap.org/Product_SelCountry_TS.aspx)

Fig. 3. The value of turnover of Polish foreign trade in vegetables and their products in 2001-2016 (in EUR mln)

The largest positive balance in foreign trade in total vegetables was recorded in 2013 (EUR 359.6 mln), the smallest - in 2001 (EUR 119.1 mln). The increase in vegetable exports was related to the accession of Poland to the EU and entry into the Community market. However, the declining vegetable export after 2013 is, among others, the effect of the embargo imposed by Russia on vegetables and fruits from the EU, including Poland. Reducing vegetable markets contributed to the growth of their supply in the EU and forced the price war between manufacturers. Polish vegetables found recipients mainly in EU countries, i.e. Germany, Spain, the Czech Republic and the United Kingdom. Analysis of the trend line showed that the average annual increase in the value of export in period 2001-2016 (at  $R^2 = 0.92$ ) amounted to almost EUR 43.8 mln euros, while import - EUR 36.86 mln ( $R^2 = 0.95$ ).

The highest value of foreign trade turnover of vegetables and their products is obtained by Poland from exports to the EU. Among the EU countries, Germany, France, Great Britain, the Czech Republic and the Netherlands were the largest recipients of Polish vegetables (Tab. 1). Exports to the German market in 2001-2016 accounted for over 1/5 of the entire Polish export of vegetables and their products. In terms of value, the most was exported to Germany:

- other vegetables, fresh or chilled (excluding potatoes, tomatoes, alliacious vegetables etc.);
- vegetables, uncooked or cooked by steaming or boiling in water, frozen;
- dried vegetables, whole, cut, sliced, broken or in powder, but not further prepared.

The share of these three product groups (in terms of value) was from 85.15 to 92.36 % of all vegetables exported to Germany in the period under consideration.

The largest importer of vegetables from Poland is Germany (in 2016 - EUR 197.2 mln), but the highest dynamics of export value in 2001-2016 was recorded by Norway (from EUR 79.0 thous. to EUR 11.7 mln, ie. by 14 642 %). Since 2014, growing export of vegetables to Belarus has been visible, which may confirm the suspicion of re-export of Polish vegetables by this country to Russia.

Among the largest importers of Polish vegetables before joining the EU, apart from Germany, France and the Czech Republic, were the Netherlands, Russia and Italy.

Poland imports vegetables mainly from Spain, the Netherlands and Germany. In 2016, import from Spain accounted for 1/3 of the total Polish import of vegetables. Poland buys from Spain mostly unprocessed (fresh or chilled) products, i.e. tomatoes (in 2016 - almost 50 t worth EUR 56.3 mln) and other vegetables (in 2016 - 49.6 t worth EUR 68.6 mln).

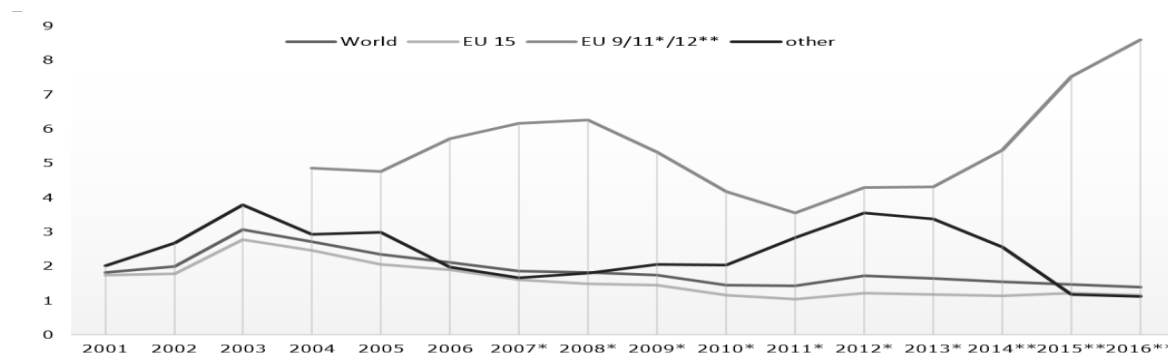
Table 1

**The largest exporters and importers of vegetables and their products in terms of value ( % )**

No.	Countries	2001	Countries	2004	Countries	2007	Countries	2010	Countries	2013	Countries	2016
<b>Importers</b>												
1	Germany	32.5	Germany	27.6	Germany	21.8	Germany	21.2	Germany	21.2	Germany	22.6
2	Netherlands	15.2	Netherlands	15.6	UK	13.0	Russia	16.7	Russia	19.0	UK	13.6
3	Russia	6.7	UK	7.0	Netherlands	11.3	UK	10.7	UK	10.8	France	8.2
4	France	6.5	France	5.9	France	8.4	France	7.8	France	6.9	Belarus	7.0
5	Italy	6.5	Czech Rep.	5.9	Czech Rep.	7.2	Netherlands	7.3	Czech Rep.	4.2	Czech Rep.	5.1
6	Czech Rep.	6.1	Italy	3.4	Russia	6.8	Czech Rep.	4.6	Italy	3.8	Netherlands	4.7
<b>Exporters</b>												
1	Spain	40.0	Spain	40.7	Spain	34.9	Spain	28.4	Spain	34.0	Spain	31.7
2	Netherlands	18.9	Netherlands	17.2	Netherlands	17.6	Netherlands	20.3	Netherlands	15.9	Netherlands	17.3
3	China	7.8	China	5.9	Germany	10.0	Germany	11.0	Germany	14.2	Germany	11.4
4	Hungary	6.6	Italy	5.7	Italy	8.5	Italy	7.5	Italy	8.0	Italy	7.9
5	Italy	6.5	Germany	4.8	China	6.4	China	5.2	China	4.1	China	5.3
6	Belgium	3.6	Hungary	3.7	France	2.9	France	4.4	Morocco	3.0	Belgium	3.1

Source: author's calculations based on [https://trademap.org/Product\\_SelCountry\\_TS.aspx](https://trademap.org/Product_SelCountry_TS.aspx)

The next step in the analysis was to calculate the TC index. It tells what part of the import expenditure is covered by revenues from exports. It also directly determines the scale of the trade surplus, and indirectly – the economic benefits of exchange. The TC index value in the years 2001-2016 fluctuated considerably (Fig. 4).



Source: author's calculations based on [https://trademap.org/Product\\_SelCountry\\_TS.aspx](https://trademap.org/Product_SelCountry_TS.aspx)

**Fig. 4. Trade coverage ratio (TC) of vegetables and their products from Poland in general and by EU 15, EU 13 and outside EU countries**

In the whole of the analysed period, the TC index showed values above 1, both in the exchange with the world, as well as with the selected groups of countries. This means a comparative advantage in the field of vegetable trade. In the case of the world, as well as the EU 15, this advantage decreased every year. However, in the exchange with non-EU countries, it began to



decrease since 2012. Poland gains the largest advantage in trade with vegetables with new EU countries, especially since 2011.

The study of intra-industry trade (Tab. 2) shows the effects of Poland's integration with the European Union countries, and more specifically with the EU 15. Quite systematically, the IIT shares grew since 2004, although the growth rate was declining. In the years 2003-2007, intra-trade with the EU countries increased by 36 pp. , while with EU 15 – increased by 33 pp. (in the years 2003-2006). The decline in the index is visible during the crisis years (2007-2009). In subsequent years, the index also showed a declining trend: with slight changes in 2013 and 2015 for the entire EU and in 2009 and 2011 for the EU 15. IIT indicators in trade with EU 15 countries are permanently higher than indicators obtained in vegetable exchange both with new Community countries as well as with non-EU countries.

Table 2

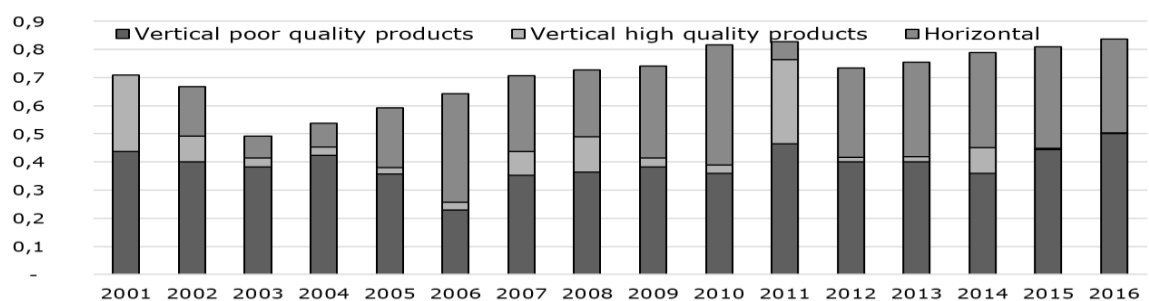
**Indicators of Polish intra-industry trade (IIT) in vegetables and its products with EU and non EU countries in 2001-2016**

Specifi- cation	2001	2002	2003	2004	2005	2006	2007*	2008*	2009*	2010*	2011*	2012*	2013**	2014**	2015**	2016**
<b>EU, in which:</b>	0.73	0.73	0.63	0.70	0.84	0.90	0.99	0.99	0.98	0.81	0.77	0.84	0.78	0.79	0.85	0.83
<b>- EU 15</b>	0.73	0.73	0.63	0.78	0.94	0.96	0.79	0.73	0.79	0.66	0.63	0.70	0.59	0.58	0.56	0.56
<b>- EU 9/11*/13**</b>	x	x	x	0.34	0.35	0.30	0.28	0.28	0.32	0.39	0.44	0.38	0.38	0.31	0.23	0.21
<b>Non-EU countries</b>	0.66	0.52	0.32	0.25	0.23	0.25	0.26	0.25	0.29	0.34	0.28	0.25	0.23	0.28	0.32	0.38

Source: author's calculations based on [https://trademap.org/Product\\_SelCountry\\_TS.aspx](https://trademap.org/Product_SelCountry_TS.aspx)

The study also shows the effect of trade shift. In 2009-2011, the IIT indicator in the exchange with the EU 15 decreased by a value close to the increase of this indicator in exchange with the new Member States. The share of new Member States in commodity exchange with Poland grew even during the collapse of world trade in 2009.

A detailed analysis of Poland IIT broken down into horizontal and vertical trade (Fig. 5) reveals that for the majority of the analysed period, the vertical exchange of low-value vegetables dominated.



Source: author's calculations based on [https://trademap.org/Product\\_SelCountry\\_TS.aspx](https://trademap.org/Product_SelCountry_TS.aspx)

Fig. 5. Horizontal and vertical intra-industry trade of Poland with the World

Since 2015, in the trade exchange a marginal share or lack of high-quality products is visible and there has been a decreasing share of horizontal exchange of varied vegetables (e.g. those that are not grown in a given country). The growing share of low-cost products in exchange could have been caused by the relation of PLN to EUR and lower costs of vegetable production in Polish

compared with the EU-15, not necessarily inferior quality. The importers of most Polish vegetables are the EU 15.

### **Conclusions, recommendations**

- 1) The area of vegetable cultivation in Poland is the third largest in the EU. Poland also has the largest area of organic vegetable crops. The importance of this branch of agriculture in Poland is growing, despite the fact that in 2000-2016 their area crops decreased by over ¼. During this time, the production volume decreased by only 2 %. This shows the increasing efficiency of this production.
- 2) The area of cultivation of most basic vegetable species has decreased, in particular: cabbage, onions, carrots and cucumbers (their total area has been reduced by nearly 50 %). At the same time, the growing species diversity of vegetables grown in Poland was noticed. Volumetric vegetables (cabbage, carrots) lost importance, and the role of qualitative vegetables (tomatoes, peppers) grew.
- 3) In Poland, in the years 2000-2015, the value of global vegetable production increased by 173.1 % (to PLN 9.4 billion). This results, among others, from the increase in the production of qualitative vegetables, which are more expensive.
- 4) The vegetable market in Poland is unstable, as evidenced by large fluctuations in production volume and crop area. Small farms, which are mainly vegetable producers, are not able to supply large and uniform batches of vegetables. They should associate producer groups and develop large-scale production of vegetables under covers.
- 5) Poland is actively involved in foreign trade in vegetables in the EU and has reported a positive turnover balance in the analysed years. The growing variety of grown vegetables and their attractive prices in relation to quality make the Polish vegetable sector more and more competitive in the EU, and recently also outside it.
- 6) In the study of intra-industry trade, positive effects of Poland's accession to the EU were visible. For Poland, the EU 15 countries are the most important partners for mutual exchange of vegetables.
- 7) Poland exports mainly cheap vegetables, although of good quality. The price of Polish vegetables is influenced by the exchange rate of PLN to EUR and USD, as well as lower production costs than in the EU 15 countries,. Thanks to attractive prices, they are also eagerly bought by countries outside the Community, i.e. Belarus, the USA and Norway.
- 8) Presented analysis and the conclusions drawn from them allow for partial confirmation of the hypothesis set in the introduction. It assumed growing competitiveness of Polish vegetables on the European market. In recent years, exports and participation in the IIT of the EU-15 countries have decreased, but the new EU Member States and Belarus started to buy more Polish vegetables.

### **Bibliography**

1. Greenaway, D., Hine, R.C., Milner, C. (1994). Country Specific Factors and the Pattern of Horizontal and Vertical Intra-Industry Trade in the United Kingdom, *Weltwirtschaftliches Archiv*, Vol. 130, No. 1.
2. Grubel, H.G., Lloyd, P. J. (1975). *Intra-Industry Trade: The Theory and Measurement of Intra-Industry Trade in Differentiated Products*, Macmillan, London.
3. Olszanska, A. (2016). Handel zagraniczny Polski produktami mięsnymi w latach 1996-2014 - ocena tendencji na podstawie wybranych wskaźników (Foreign trade of Poland with meat products in the years 1996-2014 - evaluation of trends based on selected indicators). *Zeszyty Naukowe SGGW w Warszawie. Problemy Rolnictwa Światowego*, 16(31), No. 2, pp. 232-241.

4. Sledziewska, K., Czarny, E. (2015). Unia monetarna a intensywnosc wymiany towarowej – studium przypadku strefy euro (Monetary union and the intensity of trade in goods - a case study of the euro area). *Acta Universitatis Lodzianensis Folia Oeconomica*, 5 (316), pp. 113-131.
5. Wang, X., Ouyang, Y., Liu, J., Zhu, M., Zhao, G., Bao, W., Hu, FB. (2014). Fruit and Vegetable Consumption and Mortality from All Causes, Cardiovascular Disease, and Cancer: Systematic Review and Dose-Response Meta-Analysis of Prospective Cohort Studies. *British Medical Journal*, Volume 349, Issue 5472, pp. 1-14.
6. Hjartaker, A., Knudsen, MD., Tretli, S., Weiderpass, E. (2015). Consumption of Berries, Fruits And Vegetables and Mortality Among 10,000 Norwegian Men Followed for Four Decades. *European Journal of Nutrition*, Volume 54, Issue 4, pp. 599-608.
7. Slavin, J. L., Lloyd B. (2012). Health Benefits of Fruits and Vegetables. *Advances in Nutrition*, Volume 3, Issue 4, pp. 506-516.
8. Fisher, J. O., Dwyer J. T. (2016). Next Steps for Science and Policy on Promoting Vegetable Consumption among US Infants and Young Children. *Advances in Nutrition Adv Nutr* vol. 7, Issue 1. pp. 261S-271S.
9. *Promotion of Fruit and Vegetables for Health*. Report of the Pacific Regional Workshop (2015). Rome: FAO, p. 3.
10. Eurostat. Retrieved: <http://ec.europa.eu/eurostat/data/database>. Access: 15.12.2017.
11. Eurostat. *The fruit and vegetable sector in the UE – a statistical overview*. Retrieved: [http://ec.europa.eu/eurostat/statistics-explained/index.php/The\\_fruit\\_and\\_vegetable\\_sector\\_in\\_the\\_EU\\_-\\_a\\_statistical\\_overview#Consumption](http://ec.europa.eu/eurostat/statistics-explained/index.php/The_fruit_and_vegetable_sector_in_the_EU_-_a_statistical_overview#Consumption). Access: 17.12.2017.
12. Kulikowski, R. (2013). *Produkcja i towarowosc rolnictwa w Polsce. Przemiany i zroznicowania przestrzenne po II wojnie swiatowej (Production and commodity of agriculture in Poland. Transformations and spatial differentiation after World War II)*. Polska Akademia Nauk – Instytut Geografii i Przestrzennego Zagospodarowania, Warszawa, p. 45.
13. Filipiak, T., (2014). *Zmiany na rynku warzyw i w gospodarstwach warzywniczych w Polsce po integracji z Unią Europejską (Changes in the vegetable market and vegetable farms in Poland after integration with the European Union)*. Wydawnictwo SGGW, Warszawa, p. 7.
14. FAOSTAT. Retrieved: <http://www.fao.org/faostat/en/#data>. Access: 10.12.2017.

## CHANGES IN POLISH AGRICULTURE AFTER THE ACCESSION TO THE EUROPEAN UNION

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**Abstract.** There have been many problems regarding Polish agriculture before the accession to the European Union. The following main weaknesses were identified: fragmentation of farms, the use of obsolete methods for cultivation and breeding, low profitability of agricultural holdings, lack of additional functions in rural areas (processing, tourism, other services), relatively high unemployment (registered and hidden) or environmental problems. Many financial instruments have been used since 2004, some of which are worth mentioning, namely: direct payments, structural benefits, promotional investment loans for farmers, agri-environment programme subsidies, funds provided under the rural development programme. The EU accession resulted in the changes to the countryside, including: enlargement of average farm area, higher average income for farmers, extension of the area under integrated farm management, increase in the number of organic farms or fixed assets in agriculture. The main goal of the paper is to analyse the changes in Polish agriculture after joining the EU (in general and for the regions). A database was generated in line with Polish Central Statistical Office (GUS) data. The correlation method and least squares method have been used in the course of the examination.

**Key words:** agriculture, Poland, regional differentiation, correlation method.

**JEL code:** O13, Q15, Q18, C54

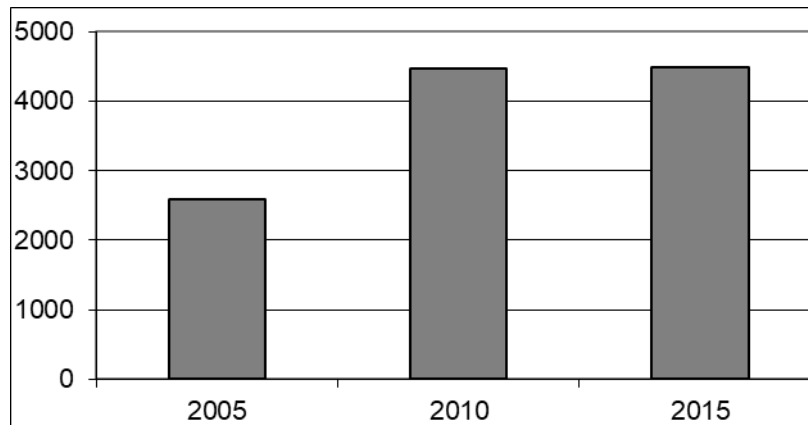
### Introduction

Till year 1989, Polish agriculture had been developing in conditions of non-market, centrally planned economy. In addition to private, family farms (comprising over 57 % of arable land), there had also been state-owned farms and (as a small percentage) agricultural cooperatives (Gazinski B., 2006). The main problems of Polish agriculture in the period after economic transition and before accession to the European Union (EU) were following: land and agricultural holdings fragmentation, overpopulation of rural areas (large number of people at the countryside on 100 ha of cropland), high agricultural unemployment rate (overt and hidden), relatively high poverty, low level of education in comparison to inhabitants of urban areas ( Fedyszak-Radziejowska B., 2005; Gazinski B., 2006; Gorzelak E., 2010; Matyka M., 2014).

The main aim of changes made after the year 2004 included adaptation of Polish agriculture to the functioning under market economy conditions. After joining the EU, the principles of Common Agricultural Policy (CAP) were implemented into its Polish counterpart. CAP is based on two main areas: market and price policy as well as structural policy. CAP includes many instruments providing improvement of agriculture productivity, better welfare for farmers, assurance of food the availability, guaranteed food self-sufficiency and a stable situation at the agricultural market (Deluga W., 2014; Gorzelak E., 2010). The presumptions of the CAP have been modified: in 2003 it was assumed that the agriculture support should be provided to improve its competitiveness, while at the same time, setting the requirements of higher standard of living for farmers and better environmental state (Gorzelak E., 2010). For years 2014-2020 two main areas of CAP have been established: marked measures regulating and supporting agricultural market and direct payments (1<sup>st</sup> fund) and rural development (2<sup>nd</sup> fund) (Grzelak M.M., 2014, s. 111).

Agriculture is one of the main sectors in Poland, although its share in GDP has been continuously decreased (*Concise Statistical Yearbook of Poland*, 2017; Matyka M. 2014). Since Poland joined the EU, farmers have been receiving financial assistance, including direct payments (area payment, production quotas, payment for special crops and special support) and others like

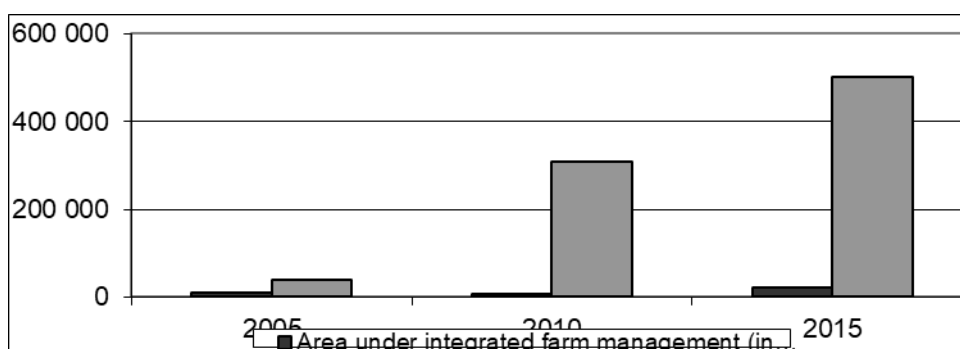
agri-environmental measures, LFA Payments (supporting farmers at less-favourable areas), promotional investment credits for agriculture, subsidies within the programme for agriculture development. Financial support has referred to selected activities as well, such as: structural pensions, the young farmer payment, afforestation, diversification payment, supporting semi-subsistence farms or producer groups etc. The value of such financial assistance has been permanently increasing from year to year. It resulted in improved farmers' income (Gazinski B., 2006; Orlykovskiy M. and Wicki L., 2016; *Subsidies versus economics...*, 2016).



Source: *Statistical Yearbook of Agriculture 2016*, p. 224

Fig. 1. **Average income of farmers per household (in PLN) - changes in years 2005-2015**

Consequently, owing to the actions taken since 2004, the structure of agriculture holdings has improved: the total number of farms and the amount of the smallest ones (of agricultural area less than 5 ha) have fallen down, while the average area of holding has increased. The decline in cultivated land area has been also noticed, as a result of transferring land for non-agrarian purposes (Deluga W., 2014; Kopinski J., 2015; Mickiewicz B. et al., 2013; Wigier M., 2014). Moreover, agricultural producer groups have started to develop (Falkowski et al., 2017) so have certified, organic farms (Kus J., 2014; Markuszewska I. and Kubacka M., 2017). Fixed assets in agriculture (including buildings, machinery and technical equipment) improved as well (Karwat-Wozniak B., 2011).



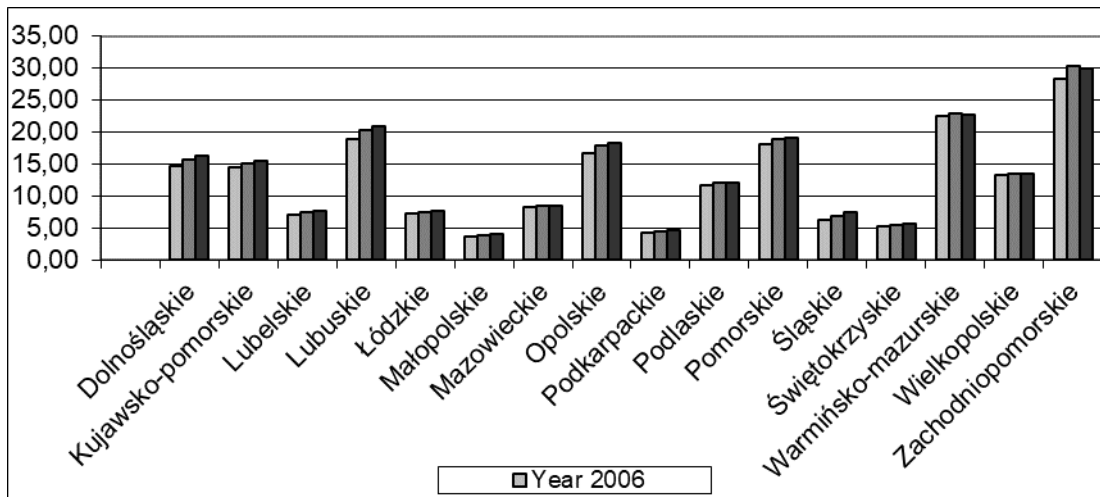
Source: *Statistical Yearbook of Agriculture, 2016*, pp. 112-113

Fig. 2. **Area of farms in Poland under integrated management and certified organic farms - changes in years 2005-2015**

It is also worth mentioning that despite general situation of Polish agriculture have enhanced, its regional differentiation remains significant. It depends not only on regional specialisation and specificity but also on applied aid instruments and their efficiency (Kopinski J., 2015).

The aim of the paper is to analyse main directions of changes in Polish agriculture after the accession to the EU and the differences between regions (provinces). Previously published research results concerning alteration in agriculture have focused on the analysis of selected factors, and

usually have considered the country level (Matyka M., 2014; Roman M. and Nuszkiwicz K., 2013). Quite rarely have the changes been examined at the regional level and, in general, only in case of a few, selected determinants, regarding agricultural productivity, changes in arable area, ecological farming or (more coprehensively) set of socio-economic factors (Karwat-Wozniak B. 2011; Kopinski J. 2015; Kus J., 2014; Mickiewicz B. et al., 2013). Novelty in the paper includes the use the least squares method and econometric model (based on 15 variables) to perform a complex analysis of the changes in Polish agriculture in years 2005 – 2015.



Source: Announcements of the president of The Agency for Restructuring and Modernisation of Agriculture; <http://www.arimr.gov.pl/pomoc-krajowa/srednia-powierzchnia-gospodarstwa.html>

Fig. 3. Average arable area in farm (ha)

Analysis at the regional level would allow identification of regional disparities between the socio-economic determinants of agricultural development, efficiency of the state policy and effectiveness of financial assistance in the regions.

## Research results and discussion

To examine the changes that took place in Polish agriculture after joining the EU, the following data were used:

- publications of the Central Statistical Office in the Statistical Yearbooks of Agriculture;
- the communication materials made available by the Agency for Restructuring and Modernization of Agriculture.

The years 2005, 2010 and 2015 were selected for the analysis. The choice of these years was caused by the availability of data, and at the same time allows observation of phenomena occurring in agriculture in cyclic terms, which took place in the same five-year periods.

The analysis was based on data at the voivodship level (NUTS 2). There are 16 such areas in Poland. The largest voivodship in terms of size is the Mazowieckie Voivodship, which covers 35 558 km<sup>2</sup>, while the smallest area has the Opolskie Voivodeship (9412 km<sup>2</sup>).

The most densely populated is the Silesian Voivodeship, where per 1 km<sup>2</sup> there were 370 people in 2016, and the least populated were the Warmian-Masurian and Podlasie Voivodships, where only 59 people per km<sup>2</sup> were occupied.

The largest share of agricultural land in percentage to the total area of the voivodship in 2016 was recorded in the Małopolskie Voivodship and amounted to 82.3 %, and the largest in the Opolskie Voivodship (95.75 %).

For a detailed analysis of the situation of Polish agriculture after entering the EU structures in the analysed years, at the initial stage, 40 variables were identified that are observable at the NUTS 2 level in Poland. However, only 15 variables were analysed in detail, which were characterized by a coefficient of variation at the level of medium and high variation.

The average size of agricultural land on an agricultural holding was considered to be an endogenous variable. The choice of this variable was influenced by the critical analysis of publications (studies), whose authors emphasized its importance for the development of the situation in Polish agriculture after accession. Changes in the area of farms (increase in the average area of the farm, sale of unprofitable farms, purchase of land from the state, EU subsidies for young farmers, etc.) contributed to the increase of economic efficiency of agriculture in Poland.

For further analysis (on the basis of the coefficient of variation), exogenous variables were defined, which were included in Table 1.

Table 1

**Exogenous variables**

No	Question
X1	Ecological farms with a certificate (pcs)
X2	The area of organic farms with a certificate (ha)
X3	Ecological farms in the waiting for the certificate period (pcs)
X4	The area of ecological farms in the waiting for the certificate period (ha)
X5	Cultivation area covered by integrated production methods (ha)
X6	The number of rural population (person)
X7	The number of rural population per 1 km <sup>2</sup>
X8	The number of rural villages (pcs)
X9	The average number of rural population in one village
X10	The revenues to the budget of local government units of the agricultural tax (PLN)
X11	The revenue to the budget of local government units due to the agricultural tax, including the commune (PLN)
X12	Working in agriculture (person)
X13	The value of agricultural products purchased in 1 ha of agricultural land -total (PLN)
X14	The value of agricultural products purchased in 1 ha of agricultural land - plant products (PLN)
X15	The value of agricultural products purchased 1 ha of agricultural land - animal products (PLN)

Source: author's own study

Then, for each of the three analysed years, a vector and a matrix of correlation coefficients between variables was calculated. The highest positive values of the correlation coefficient between exogenous variables for 2005 were obtained in the case of the impact of variables: X10 X11; X13 X15 and X7 X9. Whereas the highest negative values were obtained between variables X9 X11; X8 X9 and X1 X13. Respectively, in 2010 the highest positive values were recorded for variables X10 X11 (the same relationship was visible in 2005); X7 X9 and X3 X4; respectively, the largest negative values occurred for variables X4 X7; X1 X13 (this relationship was also in 2005) and X8 X9. In contrast, in 2015 the highest positive values of correlations between variables were recorded in the case of X10 X11; X2 X4 and X1 X3. The highest negative values for this year were obtained for X2 X7; X4 X7 and X3 X7 (Cieslak, M. 2005).

At the next stage of the analysis, the significance level of the model ( $\alpha = 0.1$ ) and  $n-2$  degrees of freedom were determined and the statistical values were read from the Student's t-charts. On this basis, the critical value of the correlation coefficient was determined ( $r^* = 0.426$ ). For each of the years the separation (2005, 2010, 2015) from the set of potential explanatory variables were

exogenous variables that were negligibly correlated with the endogenous variable. In the next stage, the variable most strongly correlated with the endogenous variable was selected. Then, these exogenous variables are eliminated, which are too strongly correlated with each other, because they repeat the previously provided information to the model (Sobczyk M., 2013).

On the basis of this analysis, the variables that should be included in the models (Table 2) were defined.

Table 2

**Exogenous variables obtained by elimination**

Years	2005	2010	2015
variables	X1; X7; X12; X14	X2; X4; X7; X9; X12; X14	X2; X4; X9; X12

Source: author's own study

Then, using the classic method of least squares, the values of structural parameters of models for each of the analysed years were calculated. In order to check the significance of the parameters, the F-Snedecor test was additionally used. Non-significant parameters have been eliminated. As a result, the following models were presented.

$$Y^{(2005)} = 0.005X_{14} - 0.133X_7 + 22.557$$

(+/-0.004) (+/-0.036) (+/-3.645)

Interpretation 2005:

if the purchase value of agricultural products from 1 ha of agricultural land of plant products increases by PLN 1, the average size of agricultural land on the farm will increase by 0.005 ha, assuming that the number of rural population per 1 km<sup>2</sup> will be at the same level.

If the number of rural population per 1 km<sup>2</sup> decreases by 1 person, the average area of agricultural land on the farm will decrease by 0.132 ha, assuming that the value of purchase of agricultural products from 1 ha of agricultural land of plant products will remain at the same level.

$$Y^{(2010)} = 0.005X_{14} + 16.828$$

(+/-0.030) (+/-3.968)

Interpretation 2010:

If the value of purchase of agricultural products from 1 ha of agricultural land of plant products increases by PLN 1, the average size of agricultural land on the farm will increase by 0.005 ha.

$$Y^{(2015)} = -0.001X_{12} + 22.128$$

(+/-0.001) (+/-2.334)

Interpretation 2015:

if the number of employed in agriculture decreases by one person, the average size of agricultural land on the farm will decrease by 0.001 ha.

It should be noted that in the analysed years 2005 and 2010, the average size of agricultural land in farms was affected by the value of purchase of agricultural products from 1 ha of agricultural land of plant products. In contrast, in 2005 and 2015 years are beginning to be noticeable demographic trends. The decline in the number of rural population and the lack of people employed in agriculture are becoming more and more important.

The model fit for 2005 was 78.21 %, for 2010 was 94.02 %, for 2015 was 87.80 %.

**Conclusions, proposals, recommendations**

- After Polish accession to the EU, the situation in the agriculture has significantly improved: the structure of crops and livestock breeding changed, the area under integrated farm management



and number of certified organic farms increased. The average income from farm and revenue of local authorities on agricultural tax rose remarkably as well. The amount of farmers injured in accidents at work in agriculture diminished noticeably. Life expectancy of farmland inhabitants lengthened. Due to high investment spending, the fixed assets (buildings, machinery, technical and transport equipment) in agricultural holdings also improved.

- Despite the aforementioned changes, some problems have not been solved. There are still differences between Polish agriculture and the EU (especially comparing to Western European countries), particularly in case of land fragmentation in Poland (only the small improvement since 2004) and farmers' income. The small farms up to 10 ha of arable area still dominating in Poland (the smallest ones, with the area until 5 ha consisted approximately 60 % of them). Significant problem is relatively high unemployment rate within rural areas.

## Bibliography

1. *Concise Statistical Yearbook of Poland* (2017). Warszawa: Główny Urząd Statystyczny, p. 395.
2. Cieslak, M. (2005). *Prognozowanie gospodarcze. Metody i zastosowania*. Warszawa: Wydawnictwo Naukowe PWN, pp. 139-148.
3. Deluga, W. (2014). *Wybrane aspekty finansowania polskiego rolnictwa w ramach wspólnej polityki rolnej Unii Europejskiej*. Roczniki Naukowe Stowarzyszenia Ekonomistów Rolnictwa i Agrobiznesu, vol. 16, No. 6, pp. 101-104.
4. Falkowski J., Chlebicka A., Lopaciuk-Gonczaryk B. (2017). *Social Relationships and Governing Collaborative Actions in Rural Areas: Some Evidence From Agricultural Producer Groups In Poland*. Journal of Rural Studies, vol. 49, pp. 105-106.
5. Fedyszak-Radziejowska, B. (2005). *Kilka słów o założeniach, realizacji i wynikach badania procesu demarginalizacji polskiej wsi*. Warszawa: Instytut Spraw Publicznych, Instytut Rozwoju Wsi i Rolnictwa PAN, pp. 1-2.
6. Gazinski, B. (2006). *Polskie rolnictwo w Unii Europejskiej i niektóre doświadczenia pierwszego roku członkostwa*. Biuletyn Instytutu Hodowli i Aklimatyzacji Roslin, No. 242, pp. 4-8.
7. Gorzelak, E. (2010). *Polskie rolnictwo w XX wieku. Produkcja i ludność*. Warszawa: Prace i Materiały Instytutu Rozwoju Gospodarczego SGH, pp. 21-24, 94, 100, 114-121, 183-187.
8. Grzelak, M.M. (2014). *Szanse i zagrożenia rozwoju polskiego rolnictwa w nowej perspektywie finansowej UE na lata 2014–2020*. Annales Universitatis Mariae Curie-Skłodowska, sectio H, vol. 46., No. 3, p. 111.
9. Karwat-Wozniak B. (2011). *Regional differentiation in the socio-economic development conditions of the agriculture in Poland*. Economics & Sociology, vol. 4, No. 2, pp. 12-24.
10. Kopinski, J. (2015). *Agri-environmental Effects Of Changes In Agricultural Production In Poland. Agrosrodowiskowe skutki zmian produkcji rolniczej w Polsce*. Economic and Regional Studies. Studia Regionalne i Ekonomiczne, vol. 8, No. 3, pp. 7-17.
11. Kus J. (2014). *Stan rolnictwa ekologicznego na świecie w Unii Europejskiej i Polsce*. In: *Wybrane problemy rolnictwa polskiego z uwzględnieniem stanu jego zrównowazenia*. Puławy: Studia i Raporty IUNG-PIB, vol. 40(14), pp. 34-43.
12. Markuszewska I. Kubacka M. (2017). *Does Organica Farming (OF) Work In Favour Of Protecting The Natural Environment? Case Study From Poland*. Land Use Policy, vol. 67, pp. 499-500.
13. Matyka M. (2014). *Stan rolnictwa w Polsce na tle Unii Europejskiej*. In: *Wybrane problemy rolnictwa polskiego z uwzględnieniem stanu jego zrównowazenia*. Puławy: Studia i Raporty IUNG-PIB, vol. 40(14), pp. 10-16.
14. Mickiewicz B, Mickiewicz A., Sobala M. (2013). *Analiza przyczyn zmiany powierzchni użytków rolnych w okresie międzypisowym (2002-2010)*. Optimum. Studia Ekonomiczne, No. 4, pp. 16-23.
15. Orlykovskiy M. and Wicki L. (2016). *Polityka i programy wsparcia rolnictwa w warunkach stowarzyszenia i członkostwa Polski w Unii Europejskiej. Wnioski dla Ukrainy*. Warszawa: Wydawnictwo SGGW, pp. 77-98.
16. Roman M., Nuskiewicz K. (2013). *Changes In Agricultural Production In Poland After Accession To The European Union*. Problems of World Agriculture, vol. 13, No. 4, pp. 157-161.
17. Sobczyk M. (2013). *Ekonometria*. Warszawa: Wydawnictwo C.H. Beck, pp. 33-67
18. *Subsidies Versus Economics, Finances And Income Of Farms* (2016). J. Goral (ed.). Warszawa: IERiGZ-PIB pp. 30-36, 49-50.
19. Wigier M. (2014). *The Competitiveness Of Polish Agriculture After Accession To The EU*. Economics of Agriculture vol. 1/2014, pp. 91-92

## THE ROLE OF PRODUCTIVITY GROWTH IN AGRICULTURAL PRODUCTION DEVELOPMENT IN THE CENTRAL AND EASTERN EUROPE COUNTRIES AFTER 1991

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**Abstract.** The land resources available for agriculture are limited. The global population is growing constantly, and so is demand for food. Increase in agricultural production can be achieved either through intensification of production or through technological progress. In the recent decades, increase in global agricultural production has been achieved mainly thanks to increase in effectiveness of production factors. **The objective of this study** is to compare changes in agricultural production in the selected new Member States of the EU after year 1991 and to determine the significance of TFP in production increase. The analysed period encompassed years 1991-2014; source data published by USDA were used. It was found that after the systemic transformation, a significant decrease in agricultural production – even to 40 % - was recorded. This was due to reduction of the area of farming land, limiting of use of production factors and their reduced productivity. In the following years, agricultural production in the countries examined increased notwithstanding further limitation of inputs. This was due to gradual increase in factor productivity. In the examined period, increase in TFP almost entirely balanced off the decrease in production inputs and limitation of production area. In 2014, compared to 1991, inputs in some countries decreased even by 50 %, while production was reduced by no more than 30 %. The strongest increase in factor productivity was achieved in Latvia (38 %), Poland (26 %) and Estonia (24 %); nevertheless, in all of the countries analysed except for Poland, increase in production was due only to increase in TFP. In Poland, this process was accompanied also by intensification of production. Increase in production factor productivity is the key variable that generates increase in agricultural production, also under the conditions of limitation of farming land and extensification of agricultural production.

**Key words:** total factor productivity, technological change, land substitution, development barriers, economy transition

**JEL code:** Q11, Q16, P25

### Introduction

Increase in agricultural productivity is one of the key factors that make it possible – now and in the future – to ensure the sufficient quantity of food for the growing global population. Thanks to increase in agricultural productivity after the second World War, food has become much more accessible and cheaper. According to Fuglie et al. (2012), since year 1900, real food prices have dropped by 1 % per annum, while the global population increased in this period from 1.7 to 7 billion people. Only in the short period after year 2000, the decrease in food prices somewhat slowed its pace, and it is impossible to predict whether this trend will be maintained over the long-term perspective.

The main type of activity, leading to technological change in agriculture, is agricultural R&D, conducted for the purpose of development of new production technologies and better varieties, animal races and machines. An important role is played by research associated with management of land and water in agriculture. Some of the new technologies, such as genetically modified organisms (GMO) are not widely used due to the associated controversies and prohibitions.

Increase in agricultural productivity can be achieved by increasing land resources, production inputs and by introduction of technological change. Increase in agricultural productivity in the last 20 years was mainly due to technical progress, and its significance tended to increase over time (Fig. 2). Economists of agriculture, studying the causes of increase in agricultural productivity, point to two key growth factors: almost 70 % of this growth is due to increased productivity, while only a small part – due to increase in production inputs. This dominant significance of technological change is due to many decades of expenditures for research and development in

agriculture (Alston et al., 2010; Gardner, 2002; Huffman and Evenson, 1993; Ruttan, 2002; Wang et al., 2015a). It has also been indicated that increase in agricultural productivity in the USA after year 1950 was significantly correlated with increase in TFP (total factor productivity), while no significant correlation was found between the level of production inputs and the size of agricultural production (Fuglie et al., 2017). For developing countries, there is a significant gap in achievement of land productivity and work in agriculture, which is several decades long. For the former Eastern bloc countries, this delay was estimated to be about 30 years, and for other European countries – about 15 years (Fuglie et al., 2012).

The factors that determine the possibility and pace of progress transfer and then – increase in agricultural productivity include economic and social factors, as well as those associated with the farm area structure. Farms characterized by lower economic strength and small scale of production encounter both the barrier of lack of funds to introduce technological change and the barrier of accessibility of solutions, appropriate for small farms. The most neutral to production scale is biological progress – however, the same does not apply to mechanization or organization (Wicki, 2010).

Achievement of higher productivity in agriculture requires a good professional background (education) of producers (Kesti, 2011), as in most cases, changes must be introduced in several areas at the same time, such as introduction of new varieties of plants or races of animals, accompanied by changes in the production techniques, as otherwise productivity increase cannot be achieved (Dudek and Wicki, 2009). Lack of complex introduction of new technologies leads to emergence and maintaining of a significant productivity gaps even between countries or regions within the area of a single country (Wicki, 2016a). In more developed countries, productivity increase is currently achieved mainly thanks to biotechnology (Stevenson et al., 2013; Wicki, 2008; Wicki, 2017b), in less developed ones, mechanization progress is still of key significance (Pawlak, 2010).

Farm size and area structure are barriers that prevent progress and productivity increase (Czyzewski et al., 2016; Piwowar, 2017). As land concentration increases, changes are implemented at a higher pace (Du et al., 2018; Esposti, 2011; Filipiak, 2014; Wysokinski et al., 2015). In the case of large farms, this is economically viable due to their strong associations with the surrounding environment and a stronger response to market factors (Franc-Dabrowska, 2013; Golebiewska, 2009; Golebiewska, 2011; Kasztelan, 2009). As a result, large farms achieve higher productivity of production factors. In the first place, mechanization of production processes leads to increase in productivity of labour, then – land and equity (Czyzewski and Kulyk, 2014; Czyzewski and Staniszewski, 2017; Golebiewski, 2013; Wicki, 2016b). On the other hand, higher agricultural productivity leads to an increase in land prices (Czyzewski et al., 2017), thus limiting land concentration and further development of productivity.

One of the most important factors in introduction of progress is the pricing mechanism. Favourable price correlations lead to a relatively greater pace of increase in productivity in selected agricultural sectors (Czyzewski et al., 2015) in accordance with the mechanism described by Hayami and Ruttan (1969). Thus, those sectors, in which higher production effectiveness is recorded, tend to develop more quickly (Wicka et al., 2016).

A very significant role in acceleration of changes in agricultural productivity is played by the state policy, and in the EU – also the common agricultural policy. Financing of research, focus on environmental protection, including reduction in emission of greenhouse gases or provision of other

public goods, such as animal welfare, may limit the dynamics of growth of agricultural production (Danilowska, 2015; Grontkowska and Gebaska, 2017; Lenerts et al., 2017). Similarly, changes in agriculture may be slowed down by support provided for small farms or aiming at limitation of production surplus, as well as supporting of development of new directions in production, such as biofuel production (Rubins et al., 2017; Wicki, 2017a). In most of the developed countries, also in Europe, there is a tendency to support increase in agricultural productivity on the basis of special governmental programs (Oliynyk, 2012; Orlykovskiy et al., 2016; Orlykovskiy et al., 2017; Wicki 2017c). Moreover, within the framework of the so-called smart specializations, some of the European Union Member States have struggled to increase agricultural productivity (Gemma and Bulderberga, 2017), although other policies indirectly limit their possibilities in this regard.

It should be pointed out that increase in agricultural productivity in the EU, including, in particular, in the new Member States, may depend on the most eagerly supported directions of the EU agricultural policy (Mickiewicz and Pilvere, 2017; Mickiewicz et al., 2017), since agricultural subsidies and the RDP contribute greatly to investing in agriculture (Nipers et al., 2017; Pietrzykowski et al., 2011), which is also indicated by the set of variables included in agricultural development models (Zeverte-Rivza et al., 2017). Achievement of higher productivity of agriculture as a whole in a given country takes place slowly, because the system is very complex and it is not centrally coordinated, and effects of implementation of innovative solutions are not always known (Broring, 2008). The actions taken are those, which are associated with the lowest risk levels (Boehlje et al., 2011, Wicka et al., 2013). Despite these conditions, indicated by various authors, it has been observed that in the long-term perspective, total productivity depends on the agricultural policy to a very small extent; in fact, it is more dependent on weather changes (Fuglie et al., 2017).

In measurement of changes in agricultural productivity, the total factor productivity is one of the best tools. It takes into account the entire land, labour, equity and other material inputs engaged in agricultural production, comparing these to the total quantity of plant and animal production achieved. If total production is growing faster than inputs, the TFP increases. TFP differs from such productivity measures as yield or added value per employee, as it takes into account a wider scope of inputs used for production.

## **Aim and methods**

The aim of this study is to compare changes in agricultural productivity in some of the new EU member states, achieved after year 1991, and to determine the significance of technical progress for these changes. The research tasks are as follows: 1) determination of changes in total agricultural productivity, 2) determination of change in the level of production inputs, 3) determination of relative significance of land, other production inputs and changes in TFP in generating growth of agricultural production. The analysed period encompassed years 1991 – 2014, that is, the period after the systemic transformation, and seven out of ten states, which acceded to the European Union in 2004. Slovenia, Malta and Cyprus were omitted as countries that had not been included in the former Eastern bloc before year 1991. The Czech Republic and Slovakia were considered jointly due to availability of data.

Source data for analysis was obtained from the United States Department of Agriculture (USDA) database, prepared on the basis of the data of FAO available on the Web page <http://www.usda.gov>.

Total factor productivity (TFP) is defined as the ratio of change in total production to total expenditures. If total production (output) is represented by Y and total expenditures (input) are represented by X, TFP can be presented as follows:

$$TFP=Y/X \quad (1)$$

Where: Y represents total production (output) and X represents total expenditures (input).

Changes in TFP over time are found by comparing the rate of change in total output with the rate of change in total input. Expressed as logarithms, changes in equation (1) over time can be written as

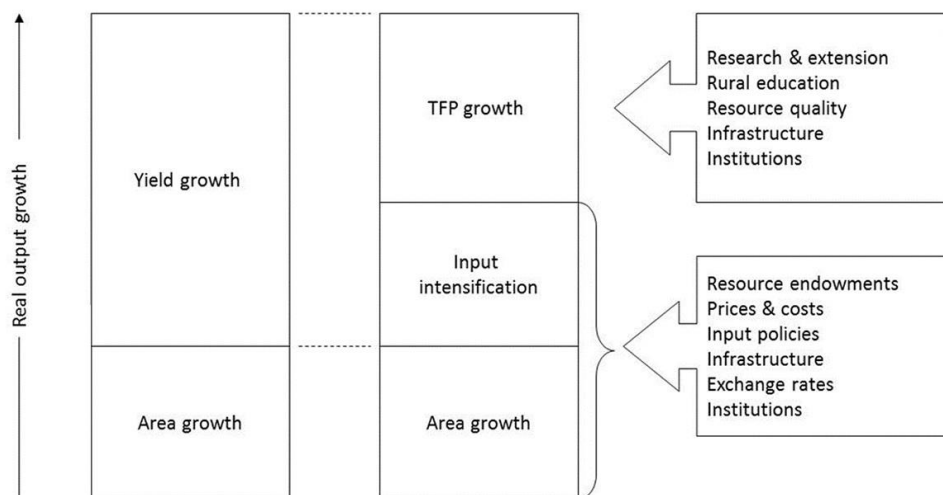
$$\frac{d \ln(TFP)}{dt} = \frac{d \ln(Y)}{dt} - \frac{d \ln(X)}{dt} \quad (2)$$

which simply states that the rate of change in TFP is the difference between the rate of change in aggregate output and input. It is also possible to focus on a particular input, say land (which is designate as  $X_1$ ), and all other inputs ( $X_j$ ) decompose growth into the component due to expansion of land (extensification) and after further decompose yield growth into the share due to TFP and the share due to using other inputs more intensively per unit of land.

$$g(Y) = g(X_1) + g(TFP) + \sum S_j g \left( \frac{X_j}{X_1} \right) \quad (3)$$

Where g - annual rate of growth in a variable and  $S_j$  is share of j-th input.

Figure 1 gives a graphical depiction of the growth decomposition described in equation (3). The height of the bars indicates the growth rate of real output. Growth in real output is first decomposed into growth attributable to agricultural land expansion (extensification) and growth attributable to raising yield per hectare (intensification).



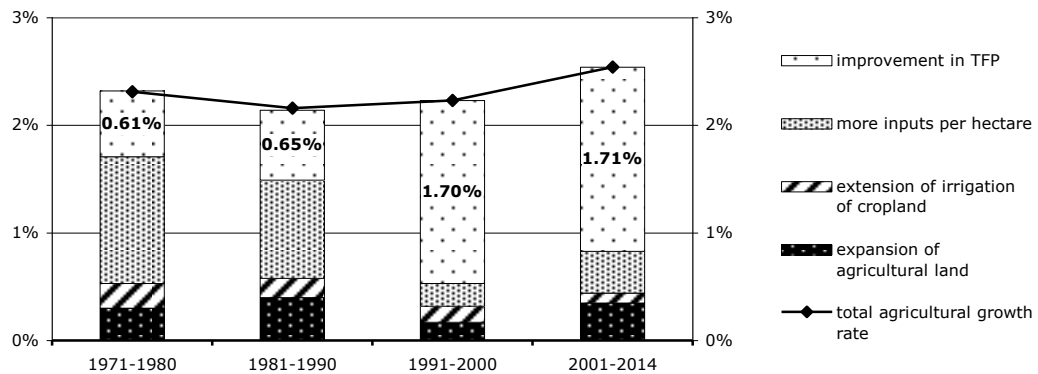
Source: Fuglie & Rada, 2013

Fig. 1. **Agricultural growth comes from increasing the use of land and other resources and/or from raising the productivity of those resources**

### Research results and discussion

Global agricultural production has increased since 1971 by more than 2 % per annum. In the subsequent periods, increase in the area of farming land and increase in production means per hectare for production growth has been gradually losing significance. On the other hand, significance of TFP in overall production increase kept growing. If we assume that whole of yearly

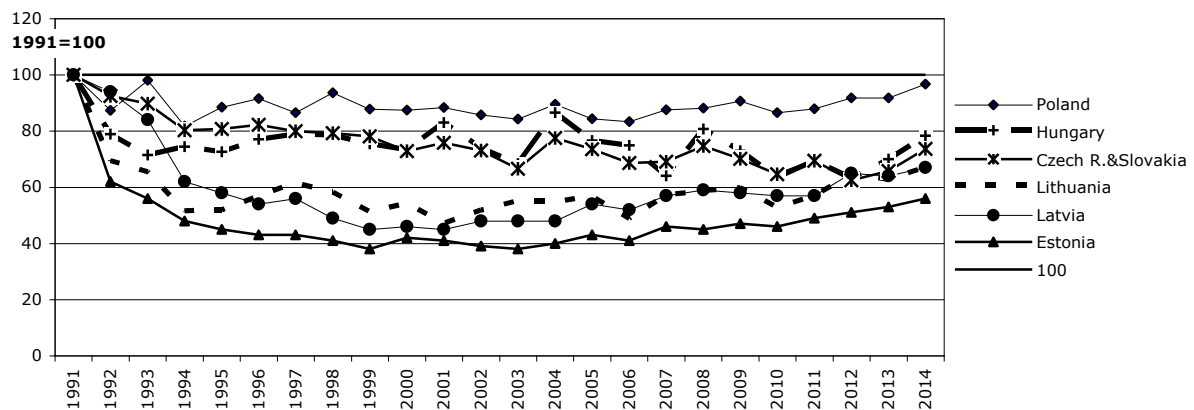
production increase is 100 % then we can observe that share of TFP in such growth in years 1971-1990 was about 25 %; however, after year 1990, this share increased to almost 70 % (Fig. 2).



Source: USDA, Economic Research Service, data as of October 2017

Fig. 2. Sources of growth in global agricultural output, 1971-2014

The value of agricultural production in the analysed countries varied significantly depending on the country size. In Poland, agricultural production in 2014 amounted to USD 22.4 billion (constant USD 2004-2006), in Hungary – USD 6.7 billion, in the former Czechoslovakia – USD 6.2 billion. In the Baltic countries, the figures were as follows: USD 0.7 billion in Estonia, 1.1 billion in Latvia and 2.3 billion in Lithuania. In the examined countries, changes in total agricultural production after year 1991 varied; however, in all of them, there was a strong initial decrease in the production levels (Fig. 3). After year 1996, production stabilized. The lowest decrease in production was observed in Poland, then – in the Czech Republic and Hungary. In year 2014, in Poland, the real agricultural production level amounted to approximately 97 % of production of year 1991. The highest decrease in real agricultural production was observed in Estonia – 44 % and in Lithuania and Latvia – 33 %.

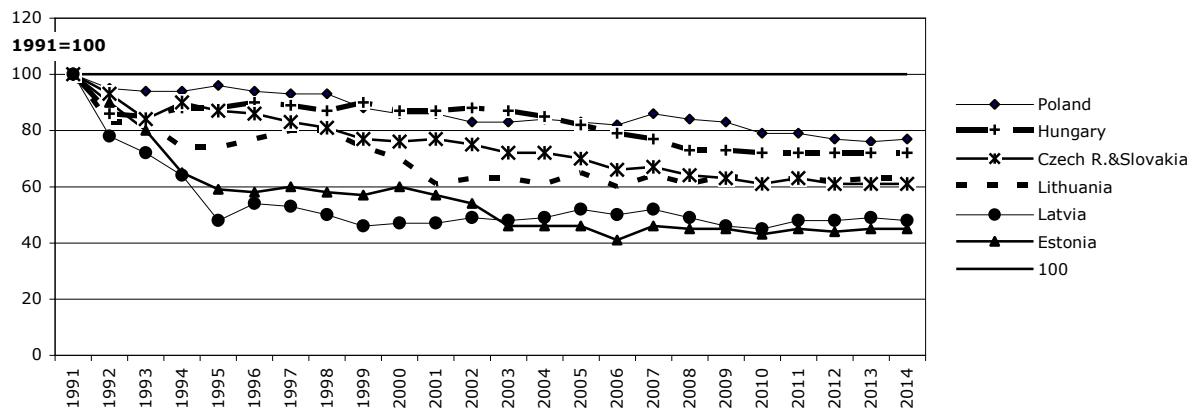


source: author's calculation based on USDA data

Fig. 3. Total agricultural production in period 1991-2014 (calculation based on prices in constant USD 2004-2006); 1991=100

A change in the size of agricultural production was due to a substantial reduction in the level of inputs, as well as exclusion of some parts of land from agricultural use. Figure 4 presents changes in the level of production input in agriculture in the examined countries. The level of inputs in agriculture (including land) decreased more than total agricultural output. The greatest decrease in production inputs was recorded in Latvia and Estonia – by more than 50 %, and the lowest – in Poland and Hungary: approximately 25 %. Decrease in the area of agricultural land in Estonia

reached as much as 40 %, 30 % in Latvia, while in Poland, Hungary in Lithuania, it was about 10 %.

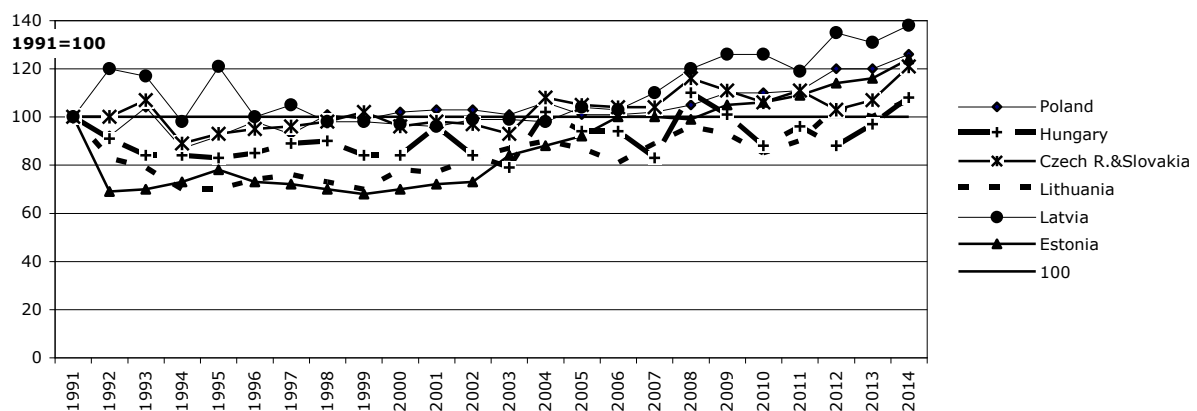


source: author's calculation based on USDA data

Fig. 4. Aggregate inputs in agriculture in period 1991-2014 (calculation based on prices in constant USD 2004-2006); 1991=100

Figure 5 presents the change in TFP in the analysed period for agriculture in individual countries. Until year 2014, the total TFP level in each of the analysed countries was higher in comparison with the base year 1991. The situation of Latvia should be mentioned separately. In this country, agriculture reached the highest level of productivity of resources, reaching increase of agricultural production, despite the production inputs did not grow. The most visible decrease in productivity was recorded in Lithuania in years 1994-2001. For all countries after year 2000, TFP increased in the subsequent years with some minor fluctuations. In the last year of the analysis (2014), total productivity of production factors in Latvia was higher by as much as 38 % in comparison with data for year 1991. Increase above 20 % was also recorded in Poland, the former Czechoslovakia and Estonia. In the remaining countries, it was 7 to 8 %. It should be noted, however, that in some countries, a substantial decrease in productivity was recorded in agriculture in the first years following the systemic transformation, reaching even 30 %.

Average annual change in TFP in the period of 1991 – 2014, estimated on the basis of the power function, amounted to 0.54 % in Hungary, 0.70 % in the former Czechoslovakia, around 1 % in Poland and Latvia, 1.2 % in Lithuania and as much as 2.3 % in Estonia.

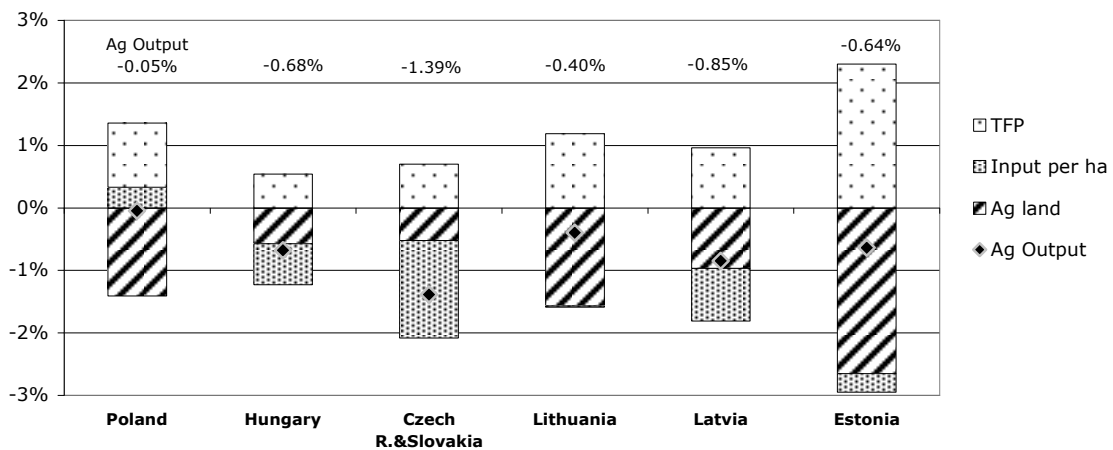


source: author's calculation based on USDA data

Fig. 5. Total Factor Productivity in agriculture in period 1991-2014, 1991=100

Taking into account the opposite impact of individual factors, that is, decrease in the level of inputs, accompanied by increase in productivity of inputs, the structure of impact of key factors on changes in agricultural production was presented. Three factors were identified: land area, production intensity level and TFP. The results have been presented in Figure 6.

In each of the countries presented, except Poland, there was a decrease in the area of arable land and a decrease in intensity of agricultural production in the examined period. The most significant decrease in arable land area was recorded in Estonia, Lithuania and Poland. In each of the countries examined, except Poland, agricultural production intensity also decreased, which was most visible in the Czech Republic and Slovakia. The observed increase in total factor productivity failed to compensate fully the decrease in expenditures and intensity, thus leading to reduction of the level of agricultural production. The most significant decrease in agricultural production was recorded in the Czech Republic and Slovakia (-1.39 %), and the lowest – in Poland (-0.05 %) (Fig. 6).



source: USDA, Economic Research Service, data as of October 2017

Fig. 6. Sources of growth in global agricultural output in percent annually, 1991-2014. CAGR of agricultural output in percent for each country is indicated high on the chart

In analysis of a shorter period, e.g. only years 2001-2014, there is a visible strong impact of TFP on agricultural production size. Technological change contributed to increase in agricultural production from 1 % per annum in the Czech Republic and Hungary to more than 3 % per annum in Estonia and Latvia. However, visible differences were recorded in terms of use of other production factors: in all Baltic countries, the area of farming land increased (from 0.6 % annually in Estonia to 2.8 % in Lithuania), while in the remaining countries, it decreased. In the Baltic countries, agricultural production increased in this period by more than 2 % per annum, while in other countries it either decreased, or increased only slightly.

## Conclusions

- 1) The growing global population and improvement of the standard of living results in increased demand for food. Thanks to progress in agriculture, this demand can be satisfied despite the limited availability of agricultural land.
- 2) The role of technical progress in increase in food production has been growing systematically. In years 1971-1990, the average annual global increase in agricultural production amounted to 2.2 %, and the share of technical progress in this phenomenon accounted for approximately 25 %. After year 1990, the production dynamics remained similar, while the contribution of increase in



productivity reached almost 70 %. At present, TFP remains the most significant factor of production growth in agriculture.

3) In the analysed countries of Central and Eastern Europe after year 1991, a significant decrease in agricultural production was recorded due to reduction of farming land resources and production inputs. After year 2000, agricultural production started to increase; however, only in Poland it has reached the level similar to that of 1991. In the remaining countries, it amounted to 60 to 80 % of the level recorded in year 1991.

4) Average annual increase in total factor productivity (TFP) in years 1991-2014 was high in each of the countries examined, ranging from 0.54 % in Hungary to as much as 2.3 % in Estonia. On the average, TFP increase amounted to approximately 1 % per annum. Increase in total factor productivity compensated 70 to 100 % of decrease in production area and in the level of inputs. Nevertheless, full substitution of use of these factors by TFP was achieved only in Poland. After year 2000, the share of TFP in growth of agricultural productivity almost doubled in comparison with the 1990s, and in Estonia, Lithuania, Latvia and Poland, production increased despite lack of increase in the level of production inputs.

5) Technological progress in the analysed countries, as well as on the global scale, has played a dominant role in achievement of increase in agricultural production and effectiveness of other inputs. In these countries, decrease of production inputs in agriculture, reaching even 30 %, has been compensated by technological change. In the future, agricultural production may increase further even if the volume of resources used remains unchanged.

## References

1. Alston, J., Andersen, M., James, J., Pardey, P. (2011). The Economic Returns to U.S. Public Agricultural Research. *American Journal of Agricultural Economics*, 93(5), pp. 1257-77.  
<https://doi.org/10.1093/ajae/aar044>
2. Boehlje, M., Roucan-Kane, M., Broring, S. (2011). Future Agribusiness Challenges: Strategic Uncertainty, Innovation and Structural Change. *International Food and Agribusiness Management Review*, 14(2), pp. 53-82.
3. Broring, S., 2008. How Systemic Innovations Require Alterations Along the Entire Value Chain-the Case of Animal Derived Functional Foods. *Journal of Chain and Network Science*, 8(2), pp. 107-119.
4. Czyzewski, A., Kulyk, P. (2014). Relacja ziemia-praca w warunkach finansowego wsparcia rolnictwa na przykładzie wybranych krajow swiata i Unii Europejskiej-15 po 1986 r. (The Relation Land-Labour Conditioned the Financial Support of the Agriculture on the Example of Chosen Countries of the World and UE-15). *Zeszyty Naukowe SGGW w Warszawie - Problemy Rolnictwa Swiatowego*, 14(29) (2), 31-42
5. Czyzewski, A., Majchrzak, A., Smedzik-Ambrozy, K. (2017). Land Productivity and Its Prices in the Countries of EU-15 and EU-12. *Economic Science for Rural Development*, 46, pp. 228-228.  
Retrieved: [http://lufb.llu.lv/conference/economic\\_science\\_rural/2017/Latvia\\_ESRD\\_46\\_2017-228-233.pdf](http://lufb.llu.lv/conference/economic_science_rural/2017/Latvia_ESRD_46_2017-228-233.pdf)
6. Czyzewski, A., Staniszewski, J. (2015). Cenowe uwarunkowania zmian struktury czynnikow wytworczych w rolnictwie polskim w latach 1999-2013 (The Price Conditions and Changes of the Structure of Production Factors in Polish Agriculture in Years 1999-2013). *Roczniki Naukowe Ekonomii Rolnictwa i Rozwoju Obszarow Wiejskich*, 102 (4): pp. 7-17. Retrieved: [http://sj.wne.sggw.pl/article-RNR\\_2015\\_n4\\_s7/](http://sj.wne.sggw.pl/article-RNR_2015_n4_s7/)
7. Czyzewski, A., Staniszewski, J. (2016). Zastosowanie regresji panelowej dla oceny produktywnosci i dochodowosci w rolnictwie krajow Unii Europejskiej po 2005 roku (The Use of a Panel Regression for the Assessment of Productivity and Profitability in The Agriculture of the European Union Countries After 2005). *Roczniki Naukowe Ekonomii Rolnictwa i Rozwoju Obszarow Wiejskich*, 103 (3), pp. 7-21.  
Retrieved: [http://sj.wne.sggw.pl/article-RNR\\_2016\\_n3\\_s7/](http://sj.wne.sggw.pl/article-RNR_2016_n3_s7/)
8. Czyzewski, A., Staniszewski, J. (2017). Wydajnosć pracy jako przesłanka restrukturyzacji zatrudnienia w rolnictwie (Labor Productivity as a Premise to Restructure Employment in Agriculture). *Zeszyty Naukowe SGGW w Warszawie - Problemy Rolnictwa Swiatowego*, 17(32) (1), pp. 31-42.  
<https://doi.org/10.22630/PRS.2017.17.1.3>
9. Danilowska, A. (2015). Provision of Public Goods by Agriculture in Poland. *Economic Science for Rural Development*, 37, pp. 142-151.  
Retrieved: [http://lufb.llu.lv/conference/economic\\_science\\_rural/2015/Latvia\\_ESRD\\_37\\_2015-142-151.pdf](http://lufb.llu.lv/conference/economic_science_rural/2015/Latvia_ESRD_37_2015-142-151.pdf)
10. Du, X., Zhang, X., Jin, X. (2018). Assessing the Effectiveness of Land Consolidation for Improving Agricultural Productivity in China. *Land Use Policy*, 70, pp. 360-367.  
<https://doi.org/10.1016/j.landusepol.2017.10.051>

11. Dudek, H., Wicki, L. (2009). Factors Influencing Productivity of Cereals in Polish Agriculture. *Economic Science for Rural Development*, 20, pp. 79-88.
12. Esposti, R. (2011). Convergence and Divergence in Regional Agricultural Productivity Growth: Evidence from Italian Regions, 1951-2002. *Agricultural Economics*, 42, pp. 153-169. <https://doi.org/10.1111/j.1574-0862.2010.00508.x>
13. Filipiak, T., (2014). Zmiany czynników produkcji a ich produktywnosc w gospodarstwach warzywniczych (Changes in the Factors of Production and Productivity in Vegetable Farms). *Roczniki Naukowe Ekonomii Rolnictwa i Rozwoju Obszarow Wiejskich*, 101 (3), 51-65. Retrieved: [http://sj.wne.sggw.pl/article-RNR\\_2014\\_n3\\_s51/](http://sj.wne.sggw.pl/article-RNR_2014_n3_s51/)
14. Franc-Dabrowska, J. (2013). Regional Diversification of Financial Situation of Agricultural Enterprises in Poland. *Earth Bioresources and Life Quality*, 4, pp. 1-15 [Online].
15. Fuglie, K., Clancy, M., Heisey, P., Macdonald, J. (2017). Research, Productivity, and Output Growth in U.S. Agriculture. *Journal of Agricultural and Applied Economics*, 49(4), pp. 514-554. <https://doi.org/10.1017/aae.2017.13>
16. Fuglie, K., Rada, N. (2013). *Growth in Global Agricultural Productivity: An Update*. Economic Research Service, USDA. Retrieved: <https://www.ers.usda.gov/amber-waves/2013/november/growth-in-global-agricultural-productivity-an-update>.
17. Fuglie, K., Wang, S., Ball, V. (eds.) (2012). *Productivity Growth in Agriculture: An International Perspective*. Wallingford, UK: CAB International.
18. Gardner, B. (2002). *American Agriculture in the Twentieth Century: How It Flourished and What It Cost*. Cambridge, MA: Harvard University Press.
19. Gemma, S., Bulderberga, Z. (2017). Smart Specialization Strategy in Latvia, Estonia and Lithuania. *Economic Science for Rural Development*, 45, pp. 71-78. Retrieved: [http://lufb.llu.lv/conference/economic\\_science\\_rural/2017/Latvia\\_ESRD\\_45\\_2017-71-78.pdf](http://lufb.llu.lv/conference/economic_science_rural/2017/Latvia_ESRD_45_2017-71-78.pdf)
20. Golebiewska, B. (2009). Efektywnosc wykorzystania nakladow materialowych w indywidualnych gospodarstwach rolniczych o zroznicowanym stopniu powiazan z otoczeniem (Efficiency of Material Outlays Utilisation at Individual Farms with Different Degree of Connections with the Surrounding Environment). *Zeszyty Naukowe SGGW - Ekonomika i Organizacja Gospodarki Zywnosciowej*, 73, pp. 95-104. Retrieved: [http://sj.wne.sggw.pl/article-EIOGZ\\_2009\\_n73\\_s95/](http://sj.wne.sggw.pl/article-EIOGZ_2009_n73_s95/)
21. Golebiewska, B. (2011). Significance of Connections with the Environment of Agricultural Farms in Poland for Their Production and Economic Situation. *Economic Science for Rural Development*, 24, pp. 40-49. Retrieved: [http://lufb.llu.lv/conference/economic\\_science\\_rural/2011/24\\_Production\\_and\\_Taxes.pdf#page=40](http://lufb.llu.lv/conference/economic_science_rural/2011/24_Production_and_Taxes.pdf#page=40)
22. Golebiewski, J. (2013). Changes in Competition Trends and Labour Productivity in the Marketing Chain of Foodstuffs. *Economic Science For Rural Development*, 32, pp. 178-183. Retrieved: [http://lufb.llu.lv/conference/economic\\_science\\_rural/2013/Latvia\\_ESR\\_32\\_2013-178-183.pdf](http://lufb.llu.lv/conference/economic_science_rural/2013/Latvia_ESR_32_2013-178-183.pdf)
23. Grontkowska, A., Gebaska, M. (2017). Wybrane zagadnienia przewozu zwierzat i ich zaladunku w gospodarstwie w ocenie rolnikow. *Roczniki Ekonomii Rolnictwa i Rozwoju Obszarow Wiejskich*, 104 (4), pp. 151-163. <https://doi.org/10.22630/RNR.2017.104.4.40>
24. Hayami, Y., Ruttan, V. (1969). *Factor Prices and Technical Change in Agricultural Development. The United States and Japan, 1880-1960*. Staff Paper P69-19, University of Minnesota: St. Paul.
25. Huffman, W., Evenson, R. (1993). *Science for Agriculture: A Long-Term Perspective*. 1st ed. Ames: Iowa State University Press.
26. Kasztelan, P. (2009). Substytucja czynników produkcji w wielkoobszarowych przedsiębiorstwach rolniczych (Substitution of Production Factors in the Large Scale Agricultural Companies). *Roczniki Nauk Rolniczych, Seria G*, 96(3), pp. 174-181. Available from: [http://sj.wne.sggw.pl/article-RNR\\_2009\\_n3\\_s174/](http://sj.wne.sggw.pl/article-RNR_2009_n3_s174/)
27. Kesti, M. (2011). Rozwoj kapitalu ludzkiego oraz wiedzy w relacji do produktywnosci (Human Capital and Knowledge Development Connection to Productivity). *Zeszyty Naukowe SGGW - Ekonomika i Organizacja Gospodarki Zywnosciowej*, 88, pp. 27-40. Available from: [http://sj.wne.sggw.pl/article-EIOGZ\\_2011\\_n88\\_s27/](http://sj.wne.sggw.pl/article-EIOGZ_2011_n88_s27/)
28. Lenerts, A. Popluga, D., Rivza, P. (2017). Selection of Greenhouse Gas Emission-Reducing Measures with Analytical Hierarchy Process Approach: A Case Study from Latvian Crop Production Sector. *Economic Science For Rural Development*, 44, pp. 267-273. Retrieved: [http://lufb.llu.lv/conference/economic\\_science\\_rural/2017/Latvia\\_ESRD\\_44\\_2017-267-273.pdf](http://lufb.llu.lv/conference/economic_science_rural/2017/Latvia_ESRD_44_2017-267-273.pdf)
29. Mickiewicz, A., Mickiewicz, B., Jurczak, R., Lisiak, S. (2017). Process of Shaping of Institutional Support for Agricultural Sector in Poland. *Economic Science for Rural Development*, 44, pp. 116-125. Retrieved: [http://lufb.llu.lv/conference/economic\\_science\\_rural/2017/Latvia\\_ESRD\\_44\\_2017-116-125.pdf](http://lufb.llu.lv/conference/economic_science_rural/2017/Latvia_ESRD_44_2017-116-125.pdf)
30. Mickiewicz, B., Pilvere, I. (2017). Shaping the Common Organisation of Agricultural Markets in the New Programming Period (2014 - 2020). *Economic Science For Rural Development*, 45, pp. 159-167. Retrieved: [http://lufb.llu.lv/conference/economic\\_science\\_rural/2017/Latvia\\_ESRD\\_45\\_2017-159-167.pdf](http://lufb.llu.lv/conference/economic_science_rural/2017/Latvia_ESRD_45_2017-159-167.pdf)
31. Nipers, A., Pilvere, I., Bulderberga, Z. (2017). Role of Support Payments in the Development of Territories in Latvia. *Economic Science for Rural Development*, 45, pp. 176-185. Retrieved: [http://lufb.llu.lv/conference/economic\\_science\\_rural/2017/Latvia\\_ESRD\\_45\\_2017-176-185.pdf](http://lufb.llu.lv/conference/economic_science_rural/2017/Latvia_ESRD_45_2017-176-185.pdf)
32. Oliynyk, O. (2012). Wsparcie panstwowe a produktywnosc pracy w rolnictwie (An International Comparison of the Effect of Government Support on Agricultural Productivity). *Roczniki Naukowe Ekonomii Rolnictwa i Rozwoju Obszarow Wiejskich*, 99 (3), pp. 70-76. Available from: [http://sj.wne.sggw.pl/article-RNR\\_2012\\_n3\\_s70/](http://sj.wne.sggw.pl/article-RNR_2012_n3_s70/)

33. Orlykovskiy, M., Wicki, L. (2016). Polityka i programy wsparcia rolnictwa w warunkach stowarzyszenia i czlonkostwa Polski w Unii Europejskiej. Wnioski dla Ukrainy (*Policy and Programs Supporting Agriculture in the Conditions of Poland's Association and Membership in the European Union. Applications for Ukraine*). Wydawnictwo SGGW: Warszawa.
34. Orlykovskiy, M., Wicki, L., Zaburanna, L. (2017). Agriculture in Poland and Ukraine – Potential and Dynamics of Changes in Production. *Zeszyty Naukowe SGGW w Warszawie - Problemy Rolnictwa Swiatowego*, 17(32) (4), 326-338. <https://doi.org/10.22630/PRS.2017.17.4.108>
35. Pawlak, J. (2010). Rola mechanizacji w rozwoju rolnictwa (Role of Mechanization in the Development of Agriculture). *Roczniki Nauk Rolniczych, Seria G*, 97(2), 165-175. Available from: [http://sj.wne.sggw.pl/article-RNR\\_2010\\_n2\\_s165/](http://sj.wne.sggw.pl/article-RNR_2010_n2_s165/)
36. Pietrzykowski, R., Wicki, L. (2011). Regionalne roznicowanie wykorzystania srodkow z programow Wspolnej Polityki Rolnej na modernizacje rolnictwa (Regional Differentiation in Absorption of CAP Funds on Agriculture Modernization). *Roczniki Nauk Rolniczych, Seria G*, 98(4), pp. 7-22. Available from: [http://sj.wne.sggw.pl/article-RNR\\_2011\\_n4\\_s7/](http://sj.wne.sggw.pl/article-RNR_2011_n4_s7/)
37. Piwowar, A. (2017). Struktury rolne i produktywnosc rolnictwa w Grupie Wyszehradzkiej (Agricultural Structures and Productivity of Agriculture in the Visegrad Group). *Zeszyty Naukowe SGGW w Warszawie - Problemy Rolnictwa Swiatowego*, 17(32) (1), 152-160. <https://doi.org/10.22630/PRS.2017.17.1.14>
38. Rubins, M., Pilvere, I. (2017). Development of Renewable Energy Policy in Latvia. *Economic Science for Rural Development*, 44, pp. 281-291. Retrieved: [http://lufb.llu.lv/conference/economic\\_science\\_rural/2017/Latvia\\_ESRD\\_44\\_2017-281-291.pdf](http://lufb.llu.lv/conference/economic_science_rural/2017/Latvia_ESRD_44_2017-281-291.pdf)
39. Ruttan, V. (2002). Productivity Growth in World Agriculture: Sources and Constraints. *Journal of Economic Perspectives*, 16 (4), 161-184.
40. Stevenson, J., Villoria, N., Byerlee, D., Kelley, T., Maredia, M. (2013). Green Revolution Research Saved an Estimated 18 to 27 Million Hectares from Being Brought into Agricultural Production. *Proceedings of the National Academy of Sciences of the United States of America*, 110(21), pp. 8363-8368. Retrieved: <http://www.jstor.org/stable/42656728>
41. Wang, S., Heisey, P., Schimmelpfennig, D., Ball, E. (2015a). *Agricultural Productivity Growth in the United States: Measurement, Trends, and Drivers*. Washington, DC: U.S. Department of Agriculture, Economic Research Service, Economic Research Report No. 189.
42. Wang, S., Heisey, P., Schimmelpfennig, D., Ball, E. (2015b). *U.S. Agricultural Productivity Growth: The Past, Challenges, and the Future*. Washington, DC: USDA, Economic Research Service.
43. Wicka, A. (ed.) (2013). *Czynniki i mozliwosci ograniczania ryzyka w produkcji roslinnej poprzez ubezpieczenia (Factors and Options for Risk Reduction in Crop Production Through Insurance)*. Wydawnictwo SGGW: Warszawa.
44. Wicka, A., Wicki, L. (2016). Bio-Economy Sector in Poland and Its Importance in the Economy. *Economic Science for Rural Development*, 41: 219-228. Retrieved: [http://lufb.llu.lv/conference/economic\\_science\\_rural/2016/Latvia\\_ESRD\\_41\\_2016-219-228.pdf](http://lufb.llu.lv/conference/economic_science_rural/2016/Latvia_ESRD_41_2016-219-228.pdf)
45. Wicki, L. (2008). Wykorzystanie postepu odmianowego w produkcji zbow w polskim rolnictwie (Influence of Biological Improvements Gained in New Varieties on Yields and Production of Cereals in Poland). *Roczniki Nauk Rolniczych, Seria G*, 94 (2), 136-146. Retrieved: [http://sj.wne.sggw.pl/article-RNR\\_2008\\_n2\\_s136/](http://sj.wne.sggw.pl/article-RNR_2008_n2_s136/)
46. Wicki, L. (2010). *Efekty upowszechniania postepu biologicznego w produkcji roslinnej (The Effects of the Biological Progress Dissemination in Plant Production)*. Wydawnictwo SGGW: Warszawa.
47. Wicki, L. (2016a). Wykorzystanie potencjalu plonowania zbow w produkcji rolniczej w Polsce (The Level of Utilization of Potential of Yielding of Cereals Species in Poland). *Roczniki Naukowe SERiA*, 18(5), pp. 267-273. Retrieved: <http://rn.seria.com.pl/rn/category/6-18-5.html?download=291>
48. Wicki, L. (2016b). Zmiany produktywnosci czynnikow wytworczych w polskim rolnictwie (Changes in Factor Productivity in Polish Agriculture). *Zeszyty Naukowe SGGW - Ekonomika i Organizacja Gospodarki Zywnosciowej*, (116): pp. 149-160. <https://doi.org/10.22630/EIOGZ.2016.116.52>
49. Wicki, L. (2017a). Food and Bioenergy – Evidence From Poland. *Economic Science for Rural Development*, 44, pp. 299-305. Retrieved: [http://lufb.llu.lv/conference/economic\\_science\\_rural/2017/Latvia\\_ESRD\\_44\\_2017-299-305.pdf](http://lufb.llu.lv/conference/economic_science_rural/2017/Latvia_ESRD_44_2017-299-305.pdf)
50. Wicki, L. (2017b). Postep w plonowaniu odmian pszenicy ozimej i zyta w doswiadczeniach odmianowych w Polsce (Changes in Yielding of Varieties of Winter Wheat and Rye in Variety Testing in Poland). *Roczniki Naukowe SERiA*, 19(4), pp. 224-230. <https://doi.org/10.5604/01.3001.0010.5191>
51. Wicki, L. (2017c). Poziom i zakres wsparcia upowszechniania postepu biologicznego w produkcji roslinnej w ramach dzialan Agencji Rynku Rolnego (The Level and Scope of Support of Biological Progress Dissemination in Crop Production Within the Measures of Agricultural Market Agency). *Zeszyty Naukowe SGGW, Polityki Europejskie, Finanse i Marketing*, 18(67), pp. 259-271. <https://doi.org/10.22630/PEFIM.2017.18.67.38>
52. Wysokinski, M., Baran, J., Florkowski, W. (2015). Concentration of milk production in Poland. *Economic Science for Rural Development*, 37, pp. 93-104. Retrieved: [http://lufb.llu.lv/conference/economic\\_science\\_rural/2015/Latvia\\_ESRD\\_37\\_2015-93-104.pdf](http://lufb.llu.lv/conference/economic_science_rural/2015/Latvia_ESRD_37_2015-93-104.pdf)
53. Zeverte-Rivza, S., Nipers, A., Pilvere, I. (2017). Agricultural Production and Market Modelling Approaches. *Economic Science for Rural Development*, 45, pp. 267-274. Retrieved: [http://lufb.llu.lv/conference/economic\\_science\\_rural/2017/Latvia\\_ESRD\\_45\\_2017-267-274.pdf](http://lufb.llu.lv/conference/economic_science_rural/2017/Latvia_ESRD_45_2017-267-274.pdf)

## ECONOMIC COMPARISON OF BEEF PRODUCTION SYSTEMS IN THE EU

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**Abstract.** The production system is one of the determinants of the economic situation and the way of farm management. This also applies to farms involved in the production of beef, which are located on the territory of the European Union. European farms are diversified in terms of the origin of calves used for fattening and the way of breeding beef cattle. The aim of the undertaken research was to indicate the differences in production costs and profitability of farms characterised by various beef production systems. The analysis used data from the agri benchmark Beef and Sheep network, with a research team including employees of West Pomeranian University of Technology in Szczecin. The conducted research shows that there is a dependence between production costs and the distinguished beef production systems. However, taking into account net cash farm income, it cannot be unequivocally shown that the cow-calf farms are characterised by higher profitability than the farms based on cattle from dairy production.

**Key words:** typical farms, production costs, profitability.

**JEL code:** Q12, Q13

### Introduction

Beef production is recognised in many regions of the world as a branch of production with high importance for agriculture and its development. This is the case in the countries of South America, the United States or Australia, to name a few. In the European Union, its importance is not so high; however, taking into account the years 2013-2016, its increase by almost 5 % can be noticed. A similar situation occurred in the case of consumption, which during the years 2013-2016 increased by almost 4 % (EU Agricultural outlook ..., 2017). Therefore, it can be assumed that the interest taken in its production may increase in the coming years as an alternative to the unstable dairy market. It is important to emphasise the opportunities that agricultural producers intending to beef finishing have in the scope of choosing a production system. As indicated by Deblitz et al. (2008) it is difficult to define the beef production system, but there are some parameters describing this system. These include: geographical location, connection with other branches of agricultural production (dairy, crop production), origin of animals intended for fattening (dairy, cow-calf, percentage of own or purchased), feeding system, sales channels or herd management (start of the fattening period, age of sale cattle, age of animals purchased, etc.).

The purpose of the article is to determine the differences in the economic situation of farms characterised by various beef production systems. Particular attention was paid to production costs. The analysis was based on data from typical farms participating in research carried out by the agri benchmark Beef and Sheep network.

### Research results and discussion

#### 1. Method and research material

The research was conducted on the basis of economic and organisational data of beef finishing farms, which are the result of many years of operation of the agri benchmark Beef and Sheep network in 2016. The network was established in 2001 as part of the International Farm Comparison Network. The network is created by scientists, advisers and agricultural producers. Its purpose was to create the basis for analysing agricultural production systems, structural, technological and agricultural policy changes around the world, and facilitating the exchange of information between economists interested in economic analysis at the farm level (Hemme et al., 2014).

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The agri benchmark Beef and Sheep network operates according to strictly defined principles. These principles are obligatory for all entities and relate to the collection and processing of data, the division of costs and the analysis of production costs and the presentation of results (Deblitz C., 2010). The farms participating in the research are an elementary importance for the analyses carried out. These farms are referred to as typical farms defined (together) as:

- being an existing farm or a data set describing a farm;
- farms located in the region with the largest share of farms that produce beef cattle in the total number of farms involved in its production in a given country;
- farms with a production system (combination of production factors) representing the majority of farms in a given country.

Table 1

### Calculation and explanation of variables

Category of variable	Description/calculation of variable
<b>Direct costs enterprises</b>	Purchase of animals, variable cost per head, purchase feed, seed, pesticide, fertiliser, variable machinery cost, contractor
<b>Cash costs</b>	Cash cost for purchased feed, fertiliser, seeds, fuel, maintenance, land rents, interest on liabilities, wages paid, veterinary costs plus medicine, water, insurance, accounting etc (excl. VAT)
<b>Overhead costs</b>	Cost on whole farm level (fixed cost=e.g. accounting, office) that are allocated to the enterprises for cost analysis
<b>Farm income (whole farm profitability)</b>	Market returns (+ coupled payments) (+ decoupled payments) – whole-farm costs +/- changes in inventory +/- capital gains/losses
<b>Net cash farm income (NCFI)</b>	Whole farm profitability + depreciation + changes in inventory + capital gains/losses
<b>Total returns</b>	Market returns (+ coupled payments) (+ decoupled payments)
<b>Non-factor costs (NFC)</b>	All costs except factor costs (labour costs, land costs, capital costs). NFC comprise: animal purchases, feed (purchase feed, fertiliser, seed, pesticides), machinery (maintenance, depreciation, contractor), fuel, energy, lubricants, water, buildings (maintenance, depreciation), vet & medicine, insurance, taxes, other inputs beef enterprise (bedding, transport, sales commission, fees, advisory service), other inputs

*Source: author's construction based on Beef Report 2008*

In studies of the economic situation of farms, the typical farm method is used by many authors such as: Harwood R. (1979), Dalgaard R. et al. (2006), Trindade H. (2015), Martins A. et al. (2014), Hatch T. et al. (1982), Alig M. (2015), Langemeier M. (2016). As shown by Feuz D. and Skold M. (1990), analyses conducted with the use of the typical farm concept are a very useful tool in the study of farms and can be used by policy makers involved in shaping agricultural policy as well as farmers.

In the calculation of beef production costs, two groups of costs are distinguished: non-factor costs and costs related to factors of production (Table 1). Non-factor costs are expenses incurred by the organisation for the purchase of production resources. These include, among others, feed costs, machinery maintenance costs, fertiliser costs, taxes, etc. The second group of costs includes labour costs, capital costs including the costs of interest on loans and land costs, which include rent or lease costs. Detailed information on the method of calculating individual categories of costs and profitability of beef production is provided in Table 1.

## 2. Production costs and profitability of farms producing beef cattle

The research covered nine typical farms involved in the production of beef from five European Union countries (Table 2). The data on organisational parameters of beef finishing included in

Table 2 show that the basic determinant of the applied production system is the origin of animals for fattening (Hocquette J. et al., 2011; Vries M. et al., 2015; Oomen J. et al., 1998). It should be noted here that, according to the European Commission DG Agriculture and Rural Development, three types of slaughter cattle farms can be distinguished: "breeders" are farmers with suckler cows not fattening their calves, "breeders & fatteners" fatten the calves born on their farms, and "fatteners" purchase young male animals and then finish fattening them (EU beef farms report, 2012).

Table 2

**Performance indicators of beef finishing**

Performance indicators	DE-1	DE-2	ES-1	ES-2	UK	PL-1	PL-2	FR-1	FR-2
<b>No. &amp; type of beef cattle sold per year</b>	260 bulls	380 bulls	406 bulls	245 bulls, 235 heifers, 39 cows	31 steers, 15 heifers	22 bulls	21 bulls, 9 heifers	35 bulls, 20 heifers, 14 cows	200 bulls
<b>Origin finishing cattle (Dairy or Cow calf)</b>	Dairy	Dairy	Dairy / Cow-calf	Cow-calf	Cow-calf	Cow-calf	Dairy	Cow-calf	Cow-calf
<b>Own (O) or Purchase (P)</b>	P	P	P	O/P	O	O	O	O	P
<b>Age at start (days)</b>	53	35	30 - 200	195	225	230	15	229	240
<b>Finishing period (days)</b>	494	535	260 - 335	180 - 232	467	210	535	235	300
<b>Weight at start (kg LW)</b>	87	83	50 - 175	225 - 240	300	290	60	305	312
<b>Final weight (kg LW)</b>	721	699	440 - 552	474 - 600	670	490	530	600	735
<b>Stocking rate (LU/ha forage area)</b>	2,58	4,48	1,58	277,40	0,89	0,32	1,29	1,81	4,15

*Source: author's construction based on agri benchmark Beef and Sheep database*

On German and Polish farms, a typical beef production system is based on calves obtained from dairy. In contrast, on Spanish or French ones, fattening of beef cattle breeds is pursued. By analysing the impact of the indicated factor on particular parameters characterising production, one can point to its strict correlation with the age at finishing start. Fattening of the material obtained from dairy production starts between the age of 15 to 53 days and the weight of 60-100 kg. The situation is different with cow-calf such as Limousin (PL-1, FR-1) and Charolais (FR-2). In this case, we deal with weaners aged 6-8 months and most often weighing in at 220-320 kg.

The information shown in Table 2 demonstrates that it is not possible to clearly indicate the relationship between the origin of animals for fattening and the weight when sold to the slaughterhouse. The cattle from typical German farms and from one French farm where the weight was close to or even exceeded 700 kg was an example of the biggest sale weight. However, on other farms it was in the range of 440-600 kg. The cattle stocking index calculated with the ratio of fattening expressed in cattle livestock unit (LU) and forage area was usually in the range from 0.32 to 4.48. However, its highest level occurred on a Spanish farm and amounted to 277.4 LU/ha, which results from the fact that there occurs intensive industrial fattening (feedlot) on this farm. Feedlot is a component of the production system in which the highest energy consumption per beef production unit and the most intensive land use occurs (Galyean M. et al., 2011). As indicated by

Ferraz J. and Felicio P. (2010), feedlot is used for about 18 % of beef cattle's life, with the food dose containing a high level of fibre and energy.

Table 3

**Farm feed sources**

Feed sources	DE-1	DE-2	ES-1	ES-2	UK	PL-1	PL-2	FR-1	FR-2
<b>Maize silage</b>	X	X			X	X	X	X	X
<b>Straw</b>			X	X					
<b>Grains</b>	X		X	X		X	X	X	
<b>Grass silage</b>		X				X	X	X	
<b>Concentrates</b>		X	X	X	X		X		X

*Source: author's construction based on agri benchmark Beef and Sheep database*

On the examined farms, cattle nutrition was based primarily on maize silage and feed concentrates for cattle (Table 3). Such situation is confirmed, i.e. by the research of Nguyen T. et al. (2010), Ryschawy J. et al. (2012), Oomen J. et al. (1998). Another situation occurs on typical Spanish farms, in which cattle feed includes mainly straw, which is also indicated by Castro T. et al. (2015). On Polish farms, as well as on French and German, feeding doses were also supplemented with grass silage.

The diversified scale and structure of agricultural production influenced the amount of income received by individual farms in 2016 (Table 4). The research conducted shows that farms in which beef cattle accounted for over 70 % of total income were typical farms from Germany, Spain and one from France. On the other hand, on Polish farms or British farms, there occurs a multi-directional production, where the sources of income also include dairy or crop production. Moreover, it can be noticed that there is a lack of connection between the origin of animals destined for fattening and the share of beef finishing returns in whole farm returns. This can be seen by comparing German farms with Spanish or French ones.

The income of farms located in the European Union is supported by the system of direct payments. The share in total revenues in the examined farms ranged from 7 % to over 35 %. The analysis shows that the largest share, amounting to over 20 % of direct payments in total returns occurred on Polish, English and French farms, that is on the farms with a small-scale beef production.

The data contained in Table 4 show a high share of direct costs in total costs, reaching over 60 %. This situation concerned two-thirds of the surveyed farms in 2016. On Spanish farms these shares were the highest and amounted to almost 90 % of the costs. The remaining types of costs with a significant impact on the profitability of the surveyed farms were overhead costs and depreciation.

The conducted research showed that in all of the analysed farms the agricultural income was positive, however its size was highly diversified. The highest level of income was achieved by German farms in which it exceeded 100.000 USD per farm. After including depreciation into the production costs and calculating net cash farm income, the difference in size is not as huge, especially if we compare German and French farms. This means that German beef farms, which are based on the purchase of calves from dairy incur the highest depreciation costs among all of the analysed typical farms. As shown in Table 4, Polish farms were characterised by one of the lowest incomes. This is confirmed by the report entitled: The EU cattle sector: challenges and

opportunities-milk and meat made by Ihle R. et al. (2017) on the order of the European Parliament's Committee on Agriculture and Rural Development.

Table 4

**Comparison of the beef finishing farms in 2016 – whole farm figures**

Indicators	DE-1	DE-2	ES-1	ES-2	UK	PL-1	PL-2	FR-1	FR-2
<b>Whole farm returns (1000 USD)</b>									
<b>Market returns (incl. other farm income)</b>	441	521	449	701	174	31	119	162	408
<b>Beef finishing</b>	90 %	100 %	100 %	84 %	35 %	48 %	20 %	56 %	77 %
<b>Coupled payments</b>			8	27		3	3	12	
<b>Decoupled payments</b>	33	40	42	86	60	14	29	29	42
<b>Whole farm costs (1000 USD)</b>									
<b>Direct costs enterprises</b>	291	275	426	709	96	27	72	99	288
<b>Overhead costs</b>	42	83	34	45	37	8	12	29	48
<b>Paid labour</b>		28			38	2	10		
<b>Rents paid</b>	19	47	2	19	17	2	8	5	18
<b>Interest paid</b>	4	3	0	2	1		0	2	8
<b>Depreciation</b>	52	74	16	31	50	11	7	27	41
<b>Whole farm income (1000 USD)</b>									
<b>Farm income</b>	118	125	37	39	45	9	49	68	88
<b>Net cash farm income</b>	66	51	21	8	-5	-2	42	41	47

Source: author's calculations based on agri benchmark Beef and Sheep database

The amount of beef returns indicates a differentiation in the purchase price of beef cattle in the groups of the "Old and new Union" countries (Table 5). This is confirmed by the beef prices, which were characteristic for Polish farms obtaining a significantly lower beef price in comparison with other ones. The second characteristic feature was that if we exclude Polish farms from the analysis, the beef price on other farms is very similar and does not exceed 0.3 USD/kg CW.

When analysing the production costs, one can point to lower cash costs on cow-calf origin farms. This can be seen in the comparison of French farms with German farms in which livestock of dairy breeds is kept. The calculations showed that on German farms in 2016 the cash costs were higher by 40-75 % compared to French farms. The difference in costs between beef production systems was also found on Polish farms. On a farm that fattens animals from dairy production, cash costs are almost 25 % higher than on a cow-calf origin farms. A similar situation occurs when Spanish farms are analysed. The cash costs of the feedlot farms are approx. 50 USD/100 kg CW lower compared to the farms which conduct fattening of both cow-calf and dairy origin.

The data contained in Table 5, detailing shares of particular types of expenses in production costs, indicate close relationship between the production system and cattle nutrition and the amount of feed costs. On cow-calf origin farms, where the basis for feeding is maize silage, the costs of feed are lower than on farms based on material derived from dairy production. This fact can be observed by comparing Polish and German farms with French and British farms. In the majority of surveyed farms, the share of feed costs in beef production expenses did not exceed 50 %, but this situation did not apply to Spanish farms in which the share was higher. This is due to the specific feeding system of cattle on these farms, where straw is the basic fodder. The costs of maintaining machinery and equipment also had a high impact on the production costs on cow-calf origin farms. In the majority of analysed farms, the share of these costs ranged from 30 % to



40 % (Spanish farms being the only exception). On the other hand, on farms which fattened dairy cattle breeds, it did not exceed 20 %.

Table 5

**Comparison of the beef finishing farms in 2016 – beef finishing enterprise**

Return/cost figures	DE-1	DE-2	ES-1	ES-2	UK	PL-1	PL-2	FR-1	FR-2
<b>Returns - absolute values (USD/100 kg CW sold)</b>									
<b>Beef returns</b>	363	363	383	383	390	250	283	376	367
<b>Total returns</b>	365	363	385	385	407	260	302	376	367
<b>Costs of the beef enterprise excl. animal purchases (USD/100 kg CW sold)</b>									
<b>Non-factor costs incl. depreciation</b>	221	235	242	199	286	262	225	184	160
<b>Depreciation</b>	45	51	13	16	109	87	13	59	39
<b>Cash costs</b>	193	238	230	184	282	207	255	136	135
<b>Non-factor costs excl. animal purchases - percentage composition</b>									
<b>Feed (purchase feed, fertiliser, seed, pesticides)</b>	47 %	38 %	72 %	65 %	17 %	34 %	43 %	24 %	33 %
<b>Machinery (maintenance, depreciation, contractor)</b>	20 %	18 %	5 %	4 %	37 %	29 %	5 %	36 %	34 %
<b>Fuel, energy, lubricants, water</b>	9 %	14 %	4 %	4 %	6 %	19 %	29 %	9 %	9 %
<b>Buildings (maintenance, depreciation)</b>	11 %	18 %	3 %	7 %	22 %	12 %	4 %	11 %	8 %
<b>Vet &amp; medicine</b>	2 %	4 %	3 %	7 %	2 %	1 %	5 %	5 %	3 %
<b>Insurance, taxes</b>	4 %	3 %	3 %	2 %	4 %	3 %	3 %	5 %	4 %
<b>Other inputs beef enterprise</b>	4 %	4 %	5 %	8 %	7 %	0 %	10 %	6 %	5 %
<b>Other inputs</b>	2 %	1 %	3 %	4 %	6 %	2 %	1 %	4 %	4 %

CW=Carcass Weight

Source: author's calculations based on agri benchmark Beef and Sheep database

**Conclusions, proposals, recommendations**

1) A characteristic feature of farms involved in the production of beef in the European Union is that the cattle comes from two sources. Therefore, farms specializing in calf fattening are distinguished, which in most cases have calves from their own suckler cows herd. Another case is the connection of beef production with milk production. In the European Union, three types of farms breeding cattle for slaughter are distinguished: "breeders" "breeders & fatteners" and "fatteners".

2) On typical European farms one can encounter farms specializing in the production of beef, as well as farms in which this type of production is one of the many directions of agricultural production. The conducted research has shown that in farms with high specialization there is a lower level of production costs, especially if fattening of beef cattle is conducted. This should encourage agricultural producers who decide to beef production to adopt such business strategy.

3) The expenses that had the greatest impact on the cost of beef production in the surveyed farms were the feed costs and machine maintenance (including outsourced services). Often, the indicated types of expenses accounted for over 70 % of production costs. Therefore, they should raise special interest among agricultural producers, as they have a significant impact on the profitability of beef production and can become a source of competitive advantage.

**Bibliography**

1. Alig, M., Sutter, M., Nemecek T. (2015). *Eco-efficiency of Grass-based Dairy Systems in Switzerland*. Grassland Science in Europe, Volume 20, Wageningen: Wageningen Academic Publishers, pp. 380-385.
2. *Beef Report 2008* (2008). Agri benchmark Beef Network. Braunschweig, Germany, pp. 3-40.

3. Castro, T., Cabezas, A., De la Fuente, J., Isabel, B., Manso, T., Jimeno V. (2015). Animal Performance and Meat Characteristics in Steers Reared in Intensive Conditions Fed with Different Vegetable Oils. *Animal*, 10(3), pp. 520-530.
4. Dalgaard, R., Halberg, N., Kristensen, Ib., Inger Larsen, I. (2006). *Modelling Representative and Coherent Danish Farm Types based on Farm Accountancy Data for use in Environmental Assessments*. *Agriculture, Ecosystems and Environment*, 117 (2006), pp. 223-237.
5. De Vries, M., Middelaar, C., De Boer, J. (2015). *Comparing Environmental Impacts of Beef Production Systems: A review of Life Cycle Assessments*. *Livestock Science* 178 (2015), pp. 279-288.
6. Deblitz, C. (2010). *Agri benchmark: Benchmarking Beef Farming Systems Worldwide*. Conference (54th), February 10-12, 2010, Adelaide, Australia.  
Retrieved: <https://econpapers.repec.org/paper/agsaare10/59096.htm>. Access: 04.02.2018.
7. Deblitz, C., Brömmer, J., Bruggemann, D. (2008). *Beef Production in Germany - Production Systems and Their Spatial Distribution*. *Landbauforschung - vTI Agriculture and Forestry Research* 1/2 (58), pp. 29-44.
8. *EU Agricultural Outlook for the Agricultural Markets and Income 2017-2030* (2017). European Union. p. 86.
9. *EU Beef Farms Report 2012* (2013). European Union, p. 3.
10. Ferraz, J., Felicio, O. (2010). *Production Systems – An Example from Brazil*. *Meat Science* 84, pp. 238-243.
11. Feuz, D., Skold, M. (1990). *Typical Farm Theory in Agricultural Research*. Department of Economics Staff Paper Series, Paper 75. Retrieved: [http://openprairie.sdstate.edu/econ\\_staffpaper/75](http://openprairie.sdstate.edu/econ_staffpaper/75). Access: 04.02.2018.
12. Galyean, M., Ponce, C., Schutz, J. (2011). *The Future of Beef Production in North America*. *Animal Frontiers* 1, pp. 29-36.
13. Harwood, R. (1979). *Small Farm Development. Understanding and Improving Farming Systems in the Humid Tropics*. Boulder, Colorado: Westview Press, Inc., p. 9.
14. Hatch, T., Gustafson, C., Baum, K., Harrington, D. (1982). *A Typical Farm Series: Development and Application to a Mississippi Delta Farm*. *Journal of Agricultural and Applied Economics*, Vol. 14, Issue 02, pp. 31-36.
15. Hemme, T., Uddin, M., Ndambi, O. (2014). *Benchmarking Cost of Milk Production in 46 Countries*. *Journal of Reviews on Global Economics*, Volume 3, pp. 254-270.
16. Hocquette, J. F., Chatellier, V. (2011). *Prospects for the European Beef Sector over the next 30 years*. *Animal Frontiers*, Vol. 1, No. 2, pp. 20-28.
17. Ihle, R., Dries, L., Jongeneel, R., Venus, T., Wesseler, J. (2017). *Research for AGRI Committee - The EU Cattle Sector: Challenges and Opportunities - Milk and Meat*. European Union.
18. Langemeier, M. 2016. *International Benchmarks for Soybean Production*. *Farmdoc daily* (6):171, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, September 9, 2016.
19. Martins, A., Goldsmith, P., Moura, A. (2014). *Managerial Factors Affecting Post-harvest Loss: the Case of Mato Grosso Brazil*. *International Journal of Agricultural Management*, Volume 3, Issue 4, pp. 200-209.
20. Nguyen, T., Hermansen, J., Mogensen, L. (2010). *Environmental Consequences of Different Beef Production Systems in the EU*. *Journal of Cleaner Production* 18, pp. 756-766.
21. Oomen, G., Lantinga, E., Goewie, E., Van der Hock (1998). *Mixed Farming Systems as a Way Towards a More Efficient Use of Nitrogen in European Union Agriculture*. *Environmental Pollution* 102, SI (1998), pp. 697-704.
22. Ryschawy, J., Choisis, N., Choisis, J., Joannon, A., Gibon, A (2012). *Mixed Crop-livestock Systems: An Economic and Environmental-Friendly Way of Farming?* *Animal* (2012), 6:10, pp. 1722-1730.
23. Trindade H. (2013). *Portuguese Dairy Farming Systems*. *Grassland Science in Europe*, Volume 20, Wageningen: Wageningen Academic Publishers, pp. 21-25.

## USE OF ENERGY IN POLISH AGRICULTURE

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**Abstract.** Energy consumption plays a fundamental role in a modern society. One of the objectives of sustainable development of agriculture and rural areas is the efficient use of energy at agricultural holdings. The energy needs of rural areas have been growing along with the development of civilization. The energy needs of the agricultural sector are largely influenced by the social and economic structure of Polish rural areas. Poland has a relatively high energy consumption in agriculture, including very low consumption of energy produced using renewable sources. The objective of this article is to assess of energy use in Polish agriculture. The analysis uses data obtained from Statistics Poland.

**Key words:** energy efficiency, energy consumption, energy management, agriculture, agricultural holdings.

**JEL code:** O13, P18, P4

### Introduction

Climate changes and their consequences are becoming increasingly apparent, particularly in agriculture (Baran, 2015). Stopping or slowing down these consequences is possible, inter alia, by improving energy efficiency. The duty to improve efficient energy use and, therefore, the need to save energy, results from the energy and climate policy adopted in Poland. This policy is primarily shaped by the EU acquis. Key regulations include: Directive 2009/28/EC on the promotion of the use of energy from renewable sources, and Directive 2009/29/EC amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community, which are included in the climate and energy package. This package assumes that, by 2020:

- emissions of greenhouse gases will be reduced by 20 % in EU countries;
- energy efficiency will be increased to save 20 % of its consumption;
- renewable energy will reach 20 % in the total energy consumption (for Poland, this target is set at 15 %) (Bienkowska – Golasa, 2016).

Energy is the basis for development of civilization. The ethical dilemma arises in terms of its correct use and keeping its sources for future generations. This approach is associated with eco-philosophy. Use of renewable energy sources is one of the methods to assure sustainable development. The European Union policy aims to reduction energy consumption and increase use of renewable sources of energy in the economy (Rokicki, 2016; Wicki, Wicka, 2016).

The need to take action to increase energy efficiency concerns our lives with respect to all levels: activity of the state, local authorities, enterprises, agricultural holdings, and households.

People need to manufacture and consume energy efficiently, provided that they don't disturb the balance of the ecosystem, and the natural and shaped environment will be left to future generations in a higher state of sustainability than at present (Wojcicki, 2006).

The execution of sustainability goals also involves the prevalence of distributed low-output energy sources, generating power locally and directly for the needs of agricultural holdings or households. These criteria are best met by renewable energy installations, such as biomass boilers, micro-scale biogas plants, small wind turbines and solar collectors. The use of these technologies in agriculture results—through independent energy production—in the decrease of the size and cost of its external purchase, which delivers quantifiable financial benefits. It can also contribute to decreasing the burden of agricultural production by using animal or plant production remnants, e.g. slurry or straw, for energy generation, leading to better cost-saving effects with respect to secure

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storage or disposal of such materials. Efficient use of these sources results in quantifiable benefits at the level of a single agricultural holding, as well as the entire agriculture.

Agriculture was and is both a consumer and producer of energy. The development of energy-related properties of agriculture, proposed by scientists and practitioners, introduces a new quality of agricultural management. Quantifiable economic benefits for farmers and residents of rural areas will come from the substitution of non-renewable fuels (coal, gas, liquid fuels) for locally-produced renewable fuels. The pursuit of local self-sufficiency of agriculture is an important part of developing energy security.

Operation of a modern agricultural holding is strictly closely linked with the need to respond to growing energy demands, in particular, the demand for electricity. Energy spending constitutes a significant share of costs of agricultural holdings (Cwil et al., 2017).

Heat in agricultural holdings is required not only to provide comfort of living for residents—it is also used in agricultural production and small-scale food processing at the holding. An agricultural holding's energy demand can be split into two main groups (Oniszk-Poplawska A. et al., 2011):

- demand for utility purposes—room heating, hot water, use of electricity for lighting and powering household appliances,
- demand for direct agricultural purposes—irrigation, drying, cultivation of greenhouse plants, animal husbandry, fuel for agricultural machines.

Improving heat use efficiency in agricultural holdings directly translates to their upkeep costs and the final economic output.

Energy is a significant component of agricultural production expenses. Energy consumption is affected by changes in the scope and technology of agricultural production, increase in prices of energy carriers and decrease in the number of entities included in the category of agricultural holdings. The energy needs of the agricultural sector are largely influenced by the social and economic structure of Polish rural areas.

The objective of this article is to assess of energy use in Polish agriculture. Specific objectives of the article are:

- analysis of reasons of energy consumption in selected areas of agriculture,
- identification of structure of final energy consumption in Poland broken down by sector 2005-2015,
- presentation of changes in final energy consumption in agriculture in 2005-2015,
- presentation of direct energy consumption in agriculture broken down by key energy carriers in 2010-2015.

## **Research results**

The agricultural sector covers a range of plant and animal activity types. Heating, lighting, air ventilation and circulation, and cooling constitute main energy-intensive areas of energy consumption in agriculture (Carbon Trust, 2006). Heating is a process with a significant impact on energy costs in agriculture and horticulture (Oniszk-Poplawska A. et al., 2011).

### Energy consumption in agriculture and selected areas of agriculture

Area	Energy consumption
<b>Horticulture</b>	heating takes up 90 % of energy consumed by a greenhouse
<b>Pig husbandry</b>	systems of animal care and feeding construction services, environmental protection, waste management, emissions control
<b>Poultry husbandry</b>	systems of maintaining good environmental conditions for the flock
<b>Dairy production</b>	milk cooling systems and heating systems constitute approx. 65 % of energy used lighting, processes related to industrial pump use
<b>Plant production</b>	maintaining proper insulation, temperature, storage; keeping the right balance between internal and external temperature in mixed production: storage and drying

Source: Goscianska-Lowinska J., 2015

In the structure of final energy consumption in Poland in 2015, the largest consumption was noted in households (31 %), transport (27 %) and industry (24 %). The lowest consumption was noted in agriculture (5 %) and services (13 %). In 2005-2015 in Poland, we noted an increase in the share of the final energy consumption of transport and service industries, and a decrease in the share of industry, households and agriculture. Agricultural share dropped from 8 to 5 %. The drop and the relatively small share of agriculture in final energy consumption were due to the increase in the importance of sectors of the economy such as transport and services in generating gross domestic product. Another reason is the increase in energy efficiency in agriculture (Table 3).

#### Structure of final energy consumption in Poland broken down by sector in 2005-2015

Sector	2005	2015
<b>Industry</b>	26 %	24 %
<b>Transport</b>	21 %	27 %
<b>Households</b>	34 %	31 %
<b>Agriculture</b>	8 %	5 %
<b>Services</b>	11 %	13 %
<b>Total</b>	100 %	100 %

Source: author's calculations based on data from Statistics Poland, 2017

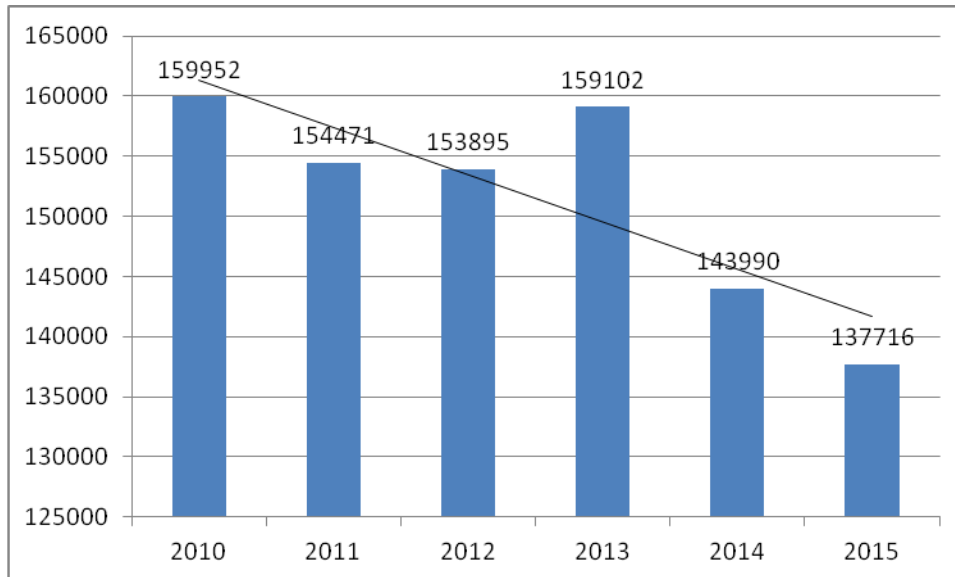
Energy consumption in agriculture decreased slightly between 2005 and 2015 (-1.2 Mtoe). This was influenced by the decrease of agricultural activity (-0.1 Mtoe) and the increase in energy efficiency in agriculture (-1.0 Mtoe), which means that the consumption drop resulted from energy efficiency.

#### Impact of variables on the change in final energy consumption in 2005-2015 (Mtoe)

Item	Households	Industry	Transport	Services	Agriculture	Total
<b>Change in consumption</b>	-0.8	-0.4	4.5	1.0	-1.2	3.1
<b>VARIABLES</b>						
<b>Activity</b>	-	5.0	6.9	2.6	-0.1	14.3
<b>Number of apartments</b>	2.1	-	-	-	-	2.1
<b>Lifestyle</b>	1.4	-	-	-	-	1.4
<b>Structural changes</b>	-	0.2	1.7	-	-	1.9
<b>Energy efficiency</b>	-1.2	-5.5	-3.4	0.0	-1.0	-11.1
<b>Weather conditions</b>	-1.6	-	-	-0.7	-	-2.2
<b>Other</b>	-1.5	-0.1	-0.6	-0.9	-0.1	-3.2

Source: author's calculations based on data from Statistics Poland, 2017

According to Statistics Poland, direct energy consumption in agriculture in 2010-2015 is characterized by a decreasing trend. In 2015, direct energy consumption reached the value of 137716 TJ, which—compared to 2010—is a result that is lower by over 22 thousand (Fig. 1). Decreasing in total energy consumption in Polish agriculture is the result of the progressive agricultural land and sown area reductions. Increase in energy consumption in 2013 was caused, inter alia, variability of weather conditions and crop yields (Pawlak, 2016).



Source: author's calculations based on data from Statistics Poland

Fig. 1. Direct energy consumption in agriculture in 2010-2015 (TJ)

Rural holdings are primarily based on distributed energy sources. In the European Union, refinery products, mainly gasoline, diesel fuel and fuel oil form the main source of meeting energy needs of agriculture, covering over 50 % of this sector's needs. However, current trends indicate that renewable energy will become the most dynamically developing industry having use in rural areas (Oniszk-Popławska A. et al., 2011).

In 2015, 1400 thousand tons of bituminous coal, 70 thousand tons of light fuel oil, and 57 thousand tons of liquefied petroleum gas (LPG) were consumed in agriculture. Despite the advancing gasification of rural areas, agriculture and rural households still consume large amounts of coal for energy purposes. Coal is an exceedingly burdensome source of so-called low emission, which also decreases the quality of living in rural areas. This trend takes place despite a significant increase in the price of coal for individual customers. Electrical energy consumption in 2010-2015 in agriculture decreased from 1616 GWh in 2010 to 1507 GWh in 2015.

Official statistics are incomplete with respect to the use of renewable energy sources in agriculture. They primarily omit small-scale, non-commercial sources that are not connected to an electrical, gas and heat distribution grid, such as solar collectors, small wind farms, household biomass boilers using locally available energy sources in the form of agri-biomass, i.e. of agricultural origin. Renewable energy sources in rural areas still haven't found mass use. The most important source of renewable energy for Polish agriculture – biogas and biomass (Wojcicki, 2007). Biomass energy consumption in agriculture, according to 2015 estimates, was 116 TJ, while biogas consumption reached 385 TJ.

**Direct energy consumption in agriculture broken down by key energy carriers  
 in 2010-2015**

Energy carrier	2010	2011	2012	2013	2014	2015
<b>Biogas [TJ]</b>	-	276	481	505	328	385
<b>Solid plant and animal waste-derived fuels [TJ]</b>	100	181	48	37	310	116
<b>Primary energy sources [TJ]</b>	74962	68696	68272	75737	61356	58187
<b>Coke and semi-coke [thousand t]</b>	33	35	10	20	10	9
<b>Petroleum gas [thousand t]</b>	50	51	50	50	60	57
<b>Diesel fuel I [thousand t]</b>	1600	1610	1625	1600	1604	1550
<b>Light fuel oil [thousand t]</b>	100	102	100	80	70	70
<b>Heavy fuel oil [thousand t]</b>	23	31	34	24	11	10
<b>Steam coal [thousand t]</b>	1760	1600	1650	1969	1500	1400
<b>Non-energy-related products [TJ]</b>	65	72	85	28	58	36
<b>Electrical energy [GWh]</b>	1616	1595	1559	1539	1500	1507
<b>Lignite [thousand t]</b>	200	160	165	200	160	140
<b>Methane-rich natural gas [million m3]</b>	38	39	45	37	35	26
<b>Nitrogen-rich natural gas [million m3]</b>	5	6	6	7	7	7
<b>Peat and wood [thousand m3]</b>	2200	2500	2200	2200	2000	2000

*Source: author's calculations based on data from Statistics Poland*

Energy loss in agriculture can take place in the following cases (Oniszk-Poplawska A. et al., 2011):

- heat loss often occurs during logistics-related operations, e.g. unloading goods;
- incorrect maintenance of temperature sensors' technical condition;
- low level of automation of the heating and cooling process;
- incorrect exposure of sensors in agriculture and horticulture;
- disturbances caused by external factors, i.e. sunlight, draught, interference of other electronic devices;
- incorrect maintenance of ventilation systems;
- lack of appropriate efficiency-focused training for the staff;
- lack of a lighting management system;
- incorrect maintenance of lighting systems;
- lack of energy-efficient lighting system;
- overloading cooling systems;
- incorrect exposure of cooling equipment;
- incorrect maintenance of cooling equipment's technical condition;
- incorrect maintenance of cooling systems;
- no utility room retrofitting.

**Conclusions, proposals, recommendations**

1) Modern agriculture is completely dependent on external sources of energy. The primary role in this matter is held by non-renewable energy sources, which contributes to the emission of greenhouse gases and, in consequence, to the degradation of the natural environment. It is therefore natural to strive towards improved energy efficiency and changes in the structure of energy sources. The key task for the agriculture of the future is to use renewable sources of energy.

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- 2) An efficient energy management system, one of the requirements of modern sustainable agriculture, has then two-fold benefits: it positively impacts the natural environment and contributes to positive financial results. The costs of energy in agriculture constitute an important part of production costs, which tells us to search for reduction opportunities in order to improve production profitability.
- 3) Energy consumption in Polish agriculture in 2005-2015 decreased, which—along with increasing agricultural production—unequivocally indicates that energy efficiency has improved.
- 4) The most frequently used energy source in Polish agriculture in the studied period was petroleum and bituminous coal, in contrast to renewable energy sources, the use of which was marginal.

## Bibliography

1. Baran, J; (2015); Regional Differentiation of Financial Support from the European Union and Its Impact on Agricultural Efficiency in Poland; *Economic Science for Rural Development*. No 38, Jelgava, Latvia, pp. 227-238.
2. Bienkowska-Golasa, W (2016): Produkcja i wykorzystanie energii elektrycznej na Mazowszu z uwzględnieniem OZE (Production and Use of Electricity in Mazowsze with the Consideration of Renewable Energy Sources), in: *Polityka ekonomiczna, Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, No 450, pp. 46-55.
3. Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC, in: *Official Journal of the European Union* L 140, 5 June 2009.
4. Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity, and repealing Directive 2009/54/EC (2nd energy directive), which repealed Directive 96/92/EC, in: *Official Journal of the European Union* L 211, 14 August 2009.
5. Wojcicki Z., (2006). Poszanowanie energii i środowiska w rolnictwie i na obszarach wiejskich (Saving Energy and the Environment in Agriculture and Rural Areas). *Infrastruktura i ekologia terenów wiejskich*, No 2/1/2006, pp. 34-35.
6. Cwil M., Ginalski Z., Raczkiewicz D., Staroscik J., (2017). Efektywne gospodarowanie energią elektryczną i ciepłą w gospodarstwie rolnym (Effective Management of Electricity and Heat on an Agricultural Holding). *Fundacja na rzecz Rozwoju Polskiego Rolnictwa*.
7. Carbon Trust (2006). Agriculture and Horticulture-Introducing Energy Saving Opportunities for Farmers and Growers. *UK Carbon Trust*.
8. Oniszk-Popławska, A., Curkowski, A., Wisniewski, G., Dziamski, P., (2011), Energia w gospodarstwie rolnym (Energy in Agricultural Holding). *Instytut na rzecz Ekorozwoju*, pp. 4-17.
9. Pawlak J., (2016). Nakłady energii a liczba gospodarstw i powierzchnia użytków rolnych (Energy Inputs and Area of Agricultural Land and Number of Farms). *Problemy inżynierii rolniczej*, 2016 (IV-VI); No 2 (92), pp. 53-66.
10. Rokicki, T., (2016). Sustainable Development in Energy Sector in the European Union Countries. *Economic Science for Rural Development. Proceedings of the International Scientific Conference*, No 43, pp. 108-116
11. Wicki, L., Wicka, A. (2016). Bio-Economy Sector in Poland and Its Importance in the Economy. *Economic Science for Rural Development*, No 41, pp. 219-228.
12. Wojcicki Z., (2007). Energia odnawialna, biopaliwa i ekologia (Renewable Energy, Biofuels and Ecology). *Problemy Inżynierii Rolniczej*, no. 2/2007, pp. 5-18.
13. Goscińska-Lowinska J., (2015). Postrzeganie efektywności energetycznej jako pro-jakościowego wyznika gospodarstw rolnych na terenie Wielkopolski (Perception of Energy Efficiency as a Pro-quality Indicator of Farms in Wielkopolska). Doctoral Dissertation. Poznan University of Economics and Business. Faculty of Commodity Science, pp. 70.
14. *Central Statistical Office*, (2017). Efektywność wykorzystania energii w latach 2005-2015 (Energy Efficiency in Poland in years 2005-2015), pp. 6, 62.



## FORECASTING PRICES OF BROILER CHICKENS USING THE CREEPING TREND

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**Abstract.** The article raises the issue of forecasting prices of broiler chickens. The forecasts were generated on a set of the weekly time series of mentioned prices in the 2011-2017 period. The forecasting methods which were used in this research are adaptive methods: simple random walk model and creeping trend with fixed segments of linear trends equal 5, 7, 9 and 11 periods. The accuracy of forecasts was verified in retrospect by preparing forecast in the past, forecasting errors and graphical analysis. Both the crawling trend model and the random walk model with greater weight take into account observations closer to the forecasted values, which worked well in the case of fairly large distortions of random variations in a series of purchase prices for broiler chickens. Reducing the length of the segment in case of large random fluctuations and breakdowns of the trend allows to obtain smaller forecast errors.

**Key words:** forecasting, creeping trend, broiler chickens.

**JEL code:** Q11, Q13, C51, C53

### Introduction

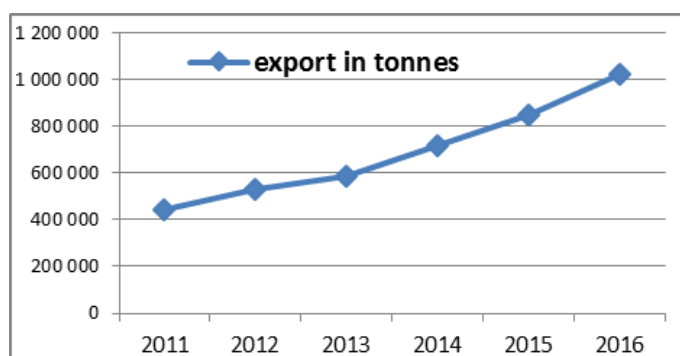
The accurate prediction of economic phenomena is very important from the point of view of making different types of decisions. The quality of the forecast determines whether decisions based on the prediction process will allow the business entities to develop. In the case of agriculture, forecasting is a necessary element of efficient farm management. Early information on the level of prices allows to properly plan work for farmers, but also allows planning the purchase, storage and processing of agricultural production to entities associated with the agricultural-food sector. On a macro scale, it provides the basis for making the right decisions regarding the adaptation of appropriate regulations for agricultural markets or the shaping of agricultural policy. The issues of price forecasting of the selected agricultural products were dealt with, among others, by Dudek (2005), Borkowski (2009), Lira (2011), Hamulczuk and Stanko (2009, 2011), Tluczak (2011) and Hamulczuk *et al.* (2012, 2013).

From many models that allow forecasting of economy phenomena, adaptive models gain more and more importance. Their high flexibility and adaptability in the case of irregular changes in the direction or speed of the trend or distortions in periodic fluctuations make adaptive models a convenient tool for short-term economic forecasts (Zelias *et al.*, 2003).

The aim of the article is to determine forecasts of extinct prices of broiler chickens using the random walk model (naïve method) and creeping trend models with fixed segments of linear trends equal 5, 7, 9 and 11 periods and assessing the accuracy of forecasts based on ex post error analysis. This will allow to answer the question: which approach allows to achieve the minimum values of forecast errors. The study used average weekly prices of broiler chickens expressed in PLN/kg, quoted from January 2011 to December 2017. The data comes from the archive of cenyrolnicze.pl website. In order to eliminate the impact of inflation, nominal buying-in prices were converted into real prices, using monthly core inflation indicators (previous month=100), published by the National Bank of Poland (NBP).

The production of poultry, especially chickens, has been developing very dynamically in Poland in recent years. The high price competitiveness combined with the quality of production and the growing global demand for cheap source of animal protein caused that in 2016 Poland became the largest manufacturer of poultry in the European Union (14 %). According to the National Chamber of Feed and Poultry Producers, in terms of growth dynamics of poultry meat production, Poland

was the undisputed leader in 2012-2016 with the increasing production per annum by an average of two-digit percentages. What is more, while in Poland production continued to grow continuously, there were declines in other large producer countries. The analyses of PKO Polish Bank of the poultry production sector indicate that high efficiency results from the still significant access to relatively cheap feed and skilled labour, favourable to the regulatory environment, a strong level of concentration and the integration of production. In addition, strongly growing exports are a key factor in the development of the poultry industry in Poland in the last decade. In 2010-2016, the average annual growth rate of foreign sales amounted to 16.4 %. In 2016, exports reached a high volume of 1.023 million tons (+20.5 % y/y) (Fig.1). The European Union is the main recipient of poultry from Poland (76 %); however, in recent years, exports to non-EU countries has also gained considerable importance, mainly to Asia and Ukraine (Dziwulski, 2017).



Source: author's presentation based on MARD<sup>1</sup> data 2011-2016

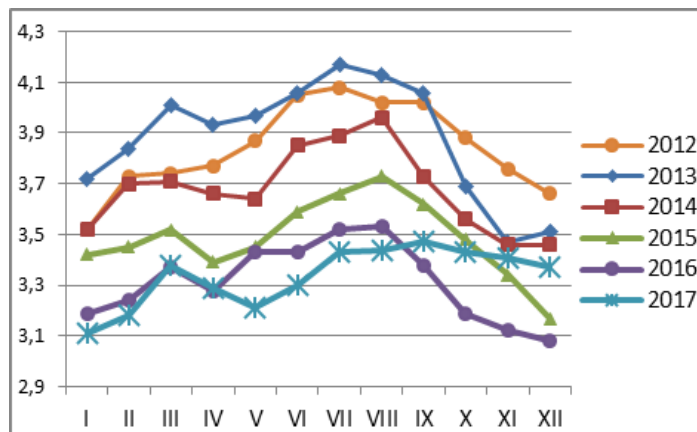
Fig. 1. Polish export volume of poultry meat in tons

However, 2017 brought about a weakening of the pace of poultry production growth, which was the result of the spread of the bird flu epidemic across the country. As a consequence of these events, there were significant restrictions on the export of poultry meat. Despite this, during the first nine months of 2017, 10 % more poultry meat and offal was exported from Poland than in the same period of 2016, and meat and offal production increased by 8 %. In 2017, about 60 % of the domestic production of poultry meat was intended for the needs of the internal market. The consumption of this type of meat in 2017 amounted to around 30 kg/person, which is one of the highest values in Europe where the average consumption of poultry is around 23 kilograms. For comparison, four years earlier it was maintained in Poland at the level of 26.5 kg/person. This increase in consumption is the result of both changes in the dietary preferences of consumers, as well as favourable relations between the price of poultry and red meat (Dziwulski, 2017).

### Purchase prices of broiler chickens in 2011-2017 – selected information

The purchase prices of broiler chickens in 2011 remained significantly below the production costs and this has resulted in the resignation of breeding by many breeders. The average weekly purchase prices was 3.78 PLN/kg, with a minimum level of 3.15 PLN/kg, and a maximum of 4.21 PLN/kg. In 2012, a high growth rate of production was noted, which was related to the increased demand for poultry meat due to high prices of red meat, i.e. beef and pork. The average weekly minimum price for broiler purchase was 3.39 PLN/kg, and the maximum price was 4.38 PLN/kg. The average weekly price of chickens in 2013 amounted to 3.91 PLN/kg and was 1 % higher than the average for 2012 (Table 1). High purchase prices were maintained with the increasing production and growing exports, but relatively expensive fodder (Fig. 2.).

<sup>1</sup> Ministry of Agriculture and Rural Development



Source: author's presentation based on MARD data 2012-2017

Fig. 2. Average monthly purchase prices of broiler chickens in PLN/kg

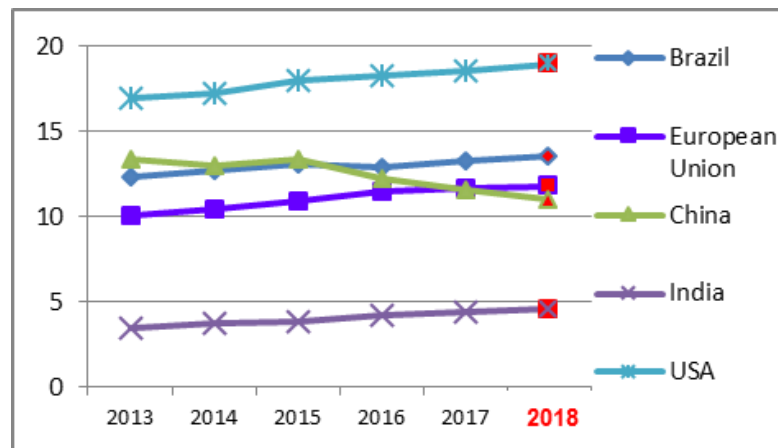
In 2014, the profitability of chicken production increased year-to-year, despite lower purchase prices (weekly average 3.73 PLN/kg), as prices paid to producers for slaughterhouse raw material were slower to drop than the prices of industrial feeds. The lower purchase prices of broiler chicken in 2015 than last year were the result of a further increase in domestic production, reduction of red meat prices and lower prices of chickens on the EU market than last year. In 2016, there was another decline in the price of poultry in the country (Fig. 2.). Prices of broiler chickens in Poland at the end of the year were the lowest in the EU. In the week from 28 November to 5 December 2016, the price in Poland was 457.1 PLN/100 kg and it represented only 58.9 % of the average EU price (776.02 PLN/100 kg). Since the beginning of 2017, the purchase prices of broiler chickens have remained at a low level (avian flu, export restrictions). Moreover, after a nearly 13 % increase in production in 2016 (Institute of Agricultural and Food Economics data), in 2017, its apparent slowdown up to 8 % was observed. It is worth noting that in the fourth quarter of 2017, when a seasonal drop in prices is usually observed, purchase prices of broiler chickens remained stable. This was favoured, among others, by the increased import demand from EU contractors, resulting from smaller supplies from outside the EU and the ban on imports of poultry from Brazil (the world's largest exporter of this type of meat and the largest supplier to the Chinese market) due to the corruption scandal and information on the sale of rotten meat and meat contaminated with salmonella by major production companies in this country.

### Factors affecting the level of purchase prices:

According to the Agricultural Market Agency (ARR), the most important factors determining the purchase prices of broiler chicken include:

#### – production of poultry livestock in the world

Foreign Agricultural Service/USDA forecast that global production will grow by 1 percent in 2018 to 91.3 million tons, primarily from gains in the United States, Brazil, India, and the European Union (Fig. 3.). The USA and Brazilian expansion is driven by higher exports while the European Union and India are due to slow but steady growth in domestic demand. China's production is forecast down 5 percent in 2018 for a third year in a row. China continues to be constrained by highly pathogenic avian influenza (HPAI), the limited availability of genetics, a saturated market, weak prices, and soft demand (Livestock and Poultry, 2017).



Source: author's presentation based on *Livestock and Poultry, October 2017*

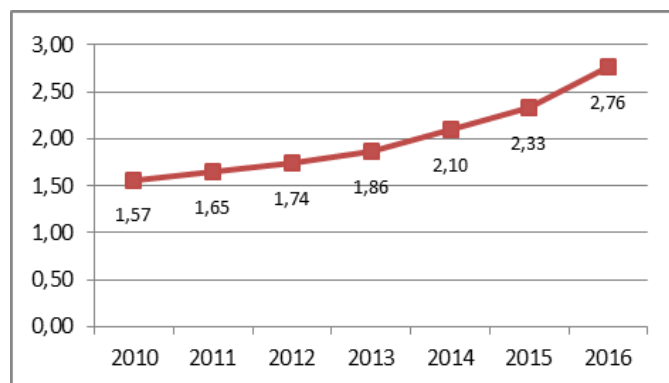
Fig. 3. **Broiler Meat Trade – selected countries in 1.000 metric tons**

### – production of poultry livestock in the EU

The European Union is the fourth largest producer of poultry in the world – after the United States, Brazil and China. The EC forecasts show that in 2018 the EU production will increase by 1.2 % to 14.86 million tons, and export by 2.5 % to 1.56 million tons. Moreover, the community is also the third exporter of poultry meat, and at the same time is at the forefront of global importers taking the fourth place (after Japan, Saudi Arabia and Mexico). The expected slowdown in the growth rate of poultry meat production is primarily the result of forecasts of the EU export growing much slower, due to strong competition on foreign markets from the Brazilian and American suppliers, as well as due to outbreaks of avian flu in Europe and restrictions introduced by non-EU countries in import from the EU. The increase in production also slows down the scale of internal consumption growth resulting from the saturation of the EU market, which is lower than in previous years.

### – production and purchase of poultry livestock in Poland

The domestic poultry market has been characterized by a significant dynamics of production growth for years, which is mainly due to the growing foreign sales. The total poultry production in Poland in 2016 reached 3.2 million tons, and its growth rate amounted to 13 %. The production of broiler chickens amounted to 2.7 million tons (Fig. 4.), 19 % more, and turkeys – 460 thousand tons, 2 % more.



Source: author's presentation based on *Institute of Agricultural and Food Economics data*

Fig. 4. **Poultry production (broiler chickens) in Poland in million tons**

In 2017, poultry production continued to grow and amounted to approx. 3.46 million tons. The slowdown in pace of poultry production growth in 2017 was due to the limited possibilities of increasing export and the low profitability of poultry slaughtering, similar to the limit values.

#### **– foreign trade**

About eighty percent of Polish export goes to European Union countries. The potential of this direction is naturally exhausting. In 2016, over 1.2 million tons of poultry was sold abroad – 19 % more than in 2015. The increase in sales to foreign markets in 2016 resulted mainly from the price and quality competitiveness of Polish poultry in relation to the offer of other EU exporters. At the end of 2016, there were outbreaks of avian flu in the country, which resulted in some countries introducing restrictions on the import of poultry assortments from the whole area or from some regions of Poland. These constraints contributed to the slowdown in the growth rate of exports in 2017. In the first five months of 2017, 525 thousand tons of poultry assortment were exported from Poland, 7 % more than the year before. During this period, 405 thousand tons of chicken meat were exported, 13 % more than the year before, and 78 thousand tons of turkey meat, 15 % less than the year before. It is expected that throughout 2017, export growth rate will be around 12 %, so it will be slower than in 2016 and 2015. The final results of domestic poultry export in 2017 will depend on, among others, from restoring the possibility of selling Polish poultry to the markets of third countries that have introduced restrictions on imports from Poland. Major markets within the EU are the United Kingdom, Germany, France, the Netherlands, and the Czech Republic. Hong Kong, China, and Ukraine are the main markets outside of the EU. The Polish poultry industry is highly integrated and export oriented. Although the majority of exports are directed to the internal EU market, the industry and GOP is trying to open new market opportunities, including U.S. market access (Annual Poultry, 2017).

Imports of poultry meat mostly consist of chicken and turkey cuts from Germany, Slovakia, and the UK. In 2016, it amounted to 139 thousand tons and was 16 % larger than in the previous year. In 2017, a further 3 % increase in imports of poultry was predicted.

#### **– consumption**

In 2016, retail prices of poultry meat were 2.3 % lower than in 2015, which was conducive to an increase in its consumption. According to the IERiGŻ – PIB estimate, consumption of poultry meat in Poland in 2016 amounted to 29.5 kg per capita and was 2.4 kg (9 %) higher than in 2015. It is expected that throughout 2017, its consumption may increase up to 30.5kg per capita, due to further reduction of retail prices of poultry.

Poultry meat remains the cheapest animal protein on the Polish market, which stimulates demand. Since 2013, poultry meat retail prices have trended downward. Although Polish consumers continue to prefer pork, with annual per capita consumption at 41 kilograms, poultry meat is perceived as a more healthful and less expensive alternative. Post forecasts that 2018 poultry consumption will increase by two percent because of higher production and lower retail prices. Poultry meat constitutes 38 percent of meat consumed in Poland, compared to 53 percent for pork and only three percent for beef.

## Description methods

### The study used two forecasting methods.

One of the simplest and yet most important models in time series forecasting is the random walk model. This model assumes that in each period the variable takes a random step away from its previous value, and the steps are independently and identically distributed in size. At period  $t$ , the  $k$ -step-ahead forecast that the random walk model (where the distribution of step sizes has zero mean) gives for the variable  $Y$  is:

$$\hat{y}_{t+k} = y_t \quad (1)$$

In others words, it predicts that all future values will equal the last observed value (Nau, 2014).

The creeping trend model is interesting and useful for the short-term prediction method from a wide range of adaptive models, in other words, models adjusting to the output  $Y$  series. In comparison to the moving average models and exponential smoothing, the creeping trend model is much more difficult to implement. Its advantage is the forecasting of series, which are characterized by high irregularity or slumps of the trend. This method was presented by Z. Hellwig in 1967 and relies on estimating the trend value in each predefined fragment of the series by means of adjusted linear trends, and then extrapolating the creeping trend thus obtained using harmonic weights.

For a given time series  $y_1, \dots, y_n$  and the smoothing constant  $k < n$  determined by the prognosis, the  $n - k + 1$  parameters of sectional forms are estimated:

$$\hat{y}_{ij} = a_{0j} + a_{1j}t \quad (2)$$

$(j = 1, \dots, n - k + 1, \quad t = j, \dots, j + k - 1)$

where:

$k$  – smoothing constant is the number of cases for each partial trend

$j$  – number of partial trend equation

$\hat{y}_{ij}$  - determined smoothed value. For a given  $t$  from 2 to  $n - 1$ , there is a set of approximants calculated from the partial trends equations.

$a_{0j}, a_{1j}$  - estimated values of the partial trends equations.

The creeping trend is computed according to the formula:

$$\hat{y}_t = b_{0t} + b_{1t}t \quad (3)$$

and the following calculation can be used to obtain the estimates:

$$b_{0t} = \frac{1}{m} \sum_{j=j_0}^{j_0+m-1} a_{0j} \quad (4)$$

$$b_{1t} = \frac{1}{m} \sum_{j=j_0}^{j_0+m-1} a_{1j} \quad (5)$$

where:

$\hat{y}_t$  - determined smoothed value (fitted value) for period  $t$

$b_{0t}, b_{1t}$  - estimated values being mean values of estimates of the partial trends equations for  $t \in \langle j, j + k - 1 \rangle$

$m$  – number of the partial trends equations for  $t \in \langle j, j + k - 1 \rangle$

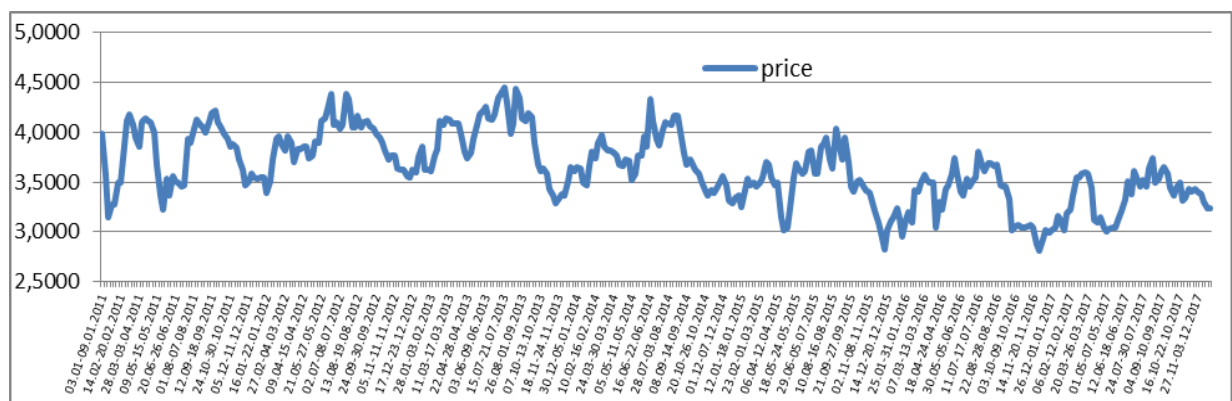
$j_0$  – number of the first partial trend equation for  $t \in \langle j, j+k-1 \rangle$

By combining successive points  $(t, \hat{y}_t)$ , a development trend of the time series is obtained in the segment form, the so-called creeping trend. Let us note that the series of predictions is exactly the same length as the output series of real observations. To make a forecast, an algorithm based on harmonic weights should be used (Zelias *et al.*, 2003).

### Results of the study

Average weekly purchase prices of broiler chickens from the first week of January 2011 ( $t = 1$  for 03.01-09.01.2011) until the last week of December 2017 ( $t = 365$  for 25.12-31.12.2017) are shown in Figure 1. The average price of one kilogram of broilers in the analysed seven years was 3.64 PLN, with a minimum price of 2.81 PLN recorded at the turn of November and December 2016 and a maximum price of 4.45 PLN from July 2013. Chicken purchase prices were usually the lowest in the fourth quarter of each year (in November and December), and the highest in the third quarter (in July or August). In Figure 1, one can notice a certain tendency regarding the purchase prices of broiler chicken in particular years. Mostly at the beginning of the year, prices were relatively low. In March, they were higher on average by around 6 % compared to the price in January. In April, the downward trend followed and from May the trend changed direction to the growing, and each year the prices reached their maximum in July and August. With the approaching end of the year, the prices of chicken were mostly decreasing. The year 2017 was the exception, when the prices in November and December were at a similar level as in July and August.

The Table 1 contains the results of the basic descriptive statistics calculated for weekly buying-in prices of broiler chickens for years 2011-2017. They confirm that the highest chicken purchase prices, with the highest observed variability, were registered in 2013, and the lowest in 2016 and 2017.



Source: author's presentation

Fig. 5. Weekly average buying-in prices of broiler chickens for 2011-2017 years

Table 1

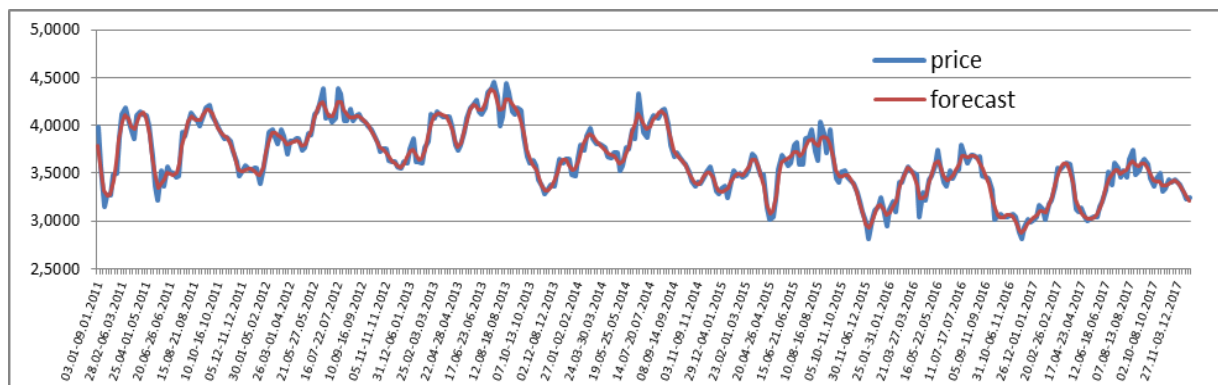
**Descriptive statistics of weekly buying-in prices of broiler chickens  
 for 2011-2017 years**

Year	mean	median	min	max	range	Standard deviation	coefficient of variation	the average growth rate
2011	3.78	3.86	3.15	4.21	1.06	0.30	7.94	-0.235 %
2012	3.86	3.89	3.39	4.38	0.99	0.23	5.96	0.038 %
2013	3.91	3.99	3.29	4.45	1.16	0.33	8.44	0.005 %
2014	3.73	3.72	3.29	4.33	1.04	0.24	6.43	-0.178 %
2015	3.49	3.51	2.82	4.03	1.21	0.27	7.74	-0.108 %
2016	3.33	3.40	2.81	3.80	0.99	0.26	7,81	-0.076 %
2017	3.35	3.38	3.00	3.74	0.74	0.21	6.27	0.152 %

Source: author's calculations

In order to check the usefulness of the creeping trend model and the random walk model to predict the purchase prices of broiler chicken, their validity was tested by making forecasts expired for 2011-2017. The study assumes that the length of the verification interval for expired forecasts will amount to 7 years. The *ex post* error analysis was used to determine the acceptability of forecasts. Comparison of the values forecasted for the past and the real ones observed during this period provided the basis for conclusions on the usefulness of the crawling trend model with fixed segments of linear trends (5, 7, 9 and 11 periods) and the random walk model in forecasting chicken purchase prices. In addition, it made it possible to determine the error rate between forecasts and actual condition. Figure 6 (for smoothing constant  $k=5$ ) and figure 7 (for smoothing constant  $k=11$ ) presents the real and forecasted prices of chicken purchase. Figure 8 illustrates the actual purchase prices and expired forecasts obtained with the random walk model.

The estimates of the forecast accuracy were made by comparing the data estimated for 2011-2017 (*expired forecast*) with actual data from this period and the calculation of *ex-post* errors. The results of root mean squared error (RMSE), mean absolute error (MAE) and mean absolute percentage error (MAPE) are presented in Table 2.



Source: author's calculations

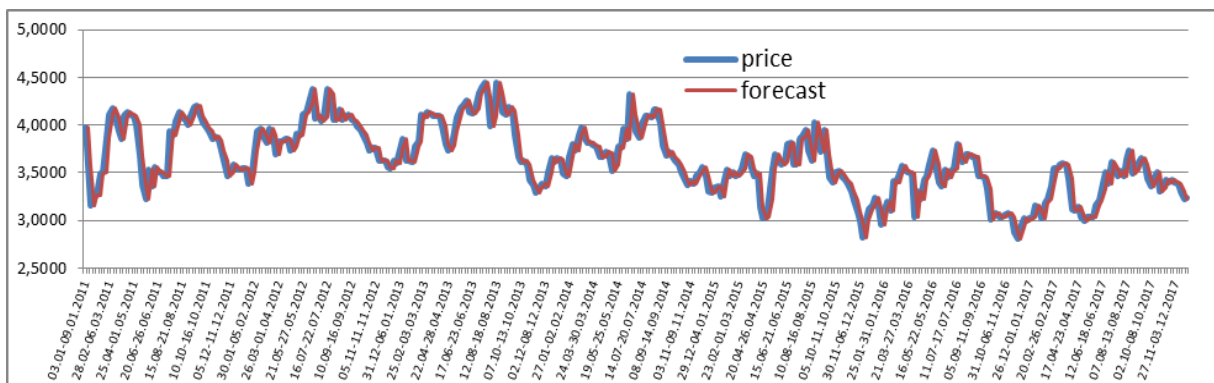
Fig. 6. Real and forecast buying-in prices of broiler chickens – smoothing constant  $k=5$





Source: author's calculations

Fig. 7. Real and forecast buying-in prices of broiler chickens – smoothing constant  $k=11$



Source: author's calculations

Fig. 8. Real and forecast buying-in prices of broiler chickens – random walk model

Based on figures 6, 7 and 8, it can be concluded that the selected adaptation models are substantively compatible and offer a good fit to the actual data.

Both the crawling trend model and the random walk model with greater weight take into account observations closer to the forecasted values, which worked well in the case of fairly large distortions of random variations in a series of purchase prices for broiler chickens.

Standard deviation values of RMSE forecast errors and absolute MAE errors indicate that the expected chicken purchase prices are close to ideal forecasts. MAPE forecast errors are at a level that allows expired forecasts to be considered acceptable.

Table 2

**Values of the different accuracy measures**

Forecast model	RMSE	MAE	MAPE [%]
Creeping trend model (for $k=5$ )	0.0598	0.0455	1.2545
Creeping trend model (for $k=7$ )	0.0782	0.0592	1.6265
Creeping trend model (for $k=9$ )	0.0958	0.0726	2.0010
Creeping trend model (for $k=11$ )	0.1067	0.0817	2.2570
Random walk model	0.1342	0.0991	2.7387

Source: author's calculations

**Conclusions**

Forecasting purchase prices for broiler chicken were carried out using two different approaches: the creeping trend model and the random walk model. The best results, understood as the smallest mean values of relative *ex post* forecast errors, were obtained for the forecasts determined by the creeping trend model with the shortest segments. Forecast errors increased depending on the

increase in the value of the smoothing parameter  $k$ . These results can be explained by high irregularity and busts of the trend.

The presented results should not be treated arbitrarily, because in the case of a different type of time series with a different course, trend slumps and a high share of random variations, better results can be obtained with the help of other models. Reducing the length of the segment in case of large random fluctuations and breakdowns of the trend allows to obtain smaller forecast errors. The effects of using the creeping trend model with linear regression are satisfactory. This model can also be used to predict other phenomena and processes.

## Bibliography

1. Annual Poultry and Poultry Products Report Warsaw Poland, December 2017
2. Borkowski B., Krawiec M., (2009) Ryzyko cenowe na rynku surowców rolnych, [in:] Nr 148 Zarządzanie ryzykiem cenowym a możliwości stabilizowania dochodów producentów rolnych - aspekty poznawcze i aplikacyjne IERiGZ-PIB, p. 47 – 81
3. Dudek H., (2005) Prognozowanie cen skupu mięsa drobiowego za pomocą sezonowego modelu AMIRA, Stowarzyszenie Ekonomistów Rolnictwa i Agrobiznesu, Roczniki Naukowe T. VII (5) p. 19 – 25
4. Dziwulski M., (2017). Industry Monitoring PKO BP, Poultry market, March 2017, [http://www.pkobp.pl/media\\_files/e80dcc1e-7899-4c18-9ca3-16e098faed24.pdf](http://www.pkobp.pl/media_files/e80dcc1e-7899-4c18-9ca3-16e098faed24.pdf) Access:15.02.2018
5. Hamulczuk M. Stanko S. (2009) Prognozowanie cen podstawowych produktów na przykładzie pszenicy i żywyca wieprzowego, [in:] Nr 148 Zarządzanie ryzykiem cenowym a możliwości stabilizowania dochodów producentów rolnych - aspekty poznawcze i aplikacyjne IERiGZ-PIB p. 181 – 208.
6. Hamulczuk M., (2011). Nr 10 Prognozowanie cen surowców rolnych z wykorzystaniem modeli szeregow czasowych, Publikacje Programu Wieloletniego 2011-2014, IERiGZ-PIB
7. Hamulczuk M., Stanko S. (2011) Prognozowanie cen surowców rolnych – uwarunkowania i metody, Komunikaty, raporty, ekspertyzy nr 547, IERiGZ-PIB p. 5 – 43
8. Hamulczuk M., Gedek S., Klimkowski C., Stanko S., (2012) Prognozowanie cen surowców rolnych na podstawie zależności przyczynowych, IERiGZ-PIB, Warszawa
9. Hamulczuk M., Klimkowski C., Stanko S., (2013) Metody ilościowe w systemie prognozowania cen produktów rolnych, IERiGZ-PIB, Warszawa
10. Livestock and Poultry: World Markets and Trade. USDA Foreign Agricultural Service, April 2017
11. Lira J., (2011) Prognozowanie targowiskowych cen żywyca wieprzowego w Polsce. Roczniki Naukowe SERiA XIII (3) p. 168-172
12. Nau R., (2014) Notes on the Random Walk Model, [https://people.duke.edu/~rnau/Notes\\_on\\_the\\_random\\_walk\\_model--Robert\\_Nau.pdf](https://people.duke.edu/~rnau/Notes_on_the_random_walk_model--Robert_Nau.pdf) Access: 15.02.2018
13. Tluczak A., (2011) Prognozowanie w rolnictwie na podstawie wybranych modeli szeregow czasowych. Wydawnictwo Uniwersytetu Opolskiego, Opole
14. Żelias A. Pawełek B. Wanat S., (2003). Prognozowanie ekonomiczne, PWN, Warszawa.