

Community Education and Integrated Organization of Rural Areas based on Land Consolidation Processes in Poland

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Abstract: Any activities aimed at rural area development should not disregard the inhabitants who are "the tools" that implement given mechanisms. To a large extent, the effectiveness of social activities is determined by the participants' expectations towards the projects and their knowledge of the subject. Land consolidation projects are the ideal tools for rural development. Land consolidation may be described as the planned readjustment of land ownership patterns with the aim of creating larger and more rational land holdings. Other goals of land consolidation may include infrastructural improvements and the implementation of developmental and environmental policies. Members of the local community participating in the project should have sufficient knowledge about both positive and negative outcomes of their actions. Surveyors, designers, the relevant literature and guidebooks communicate only the positive results to farmers and other project participants to enhance their interest in land consolidation. This article discusses both positive and negative aspects of rural land consolidation and the opportunities and threats associated with consolidation measures. The environmental, social and economic prerequisites for consolidation are presented. Land consolidation measures will be evaluated in a SWOT analysis. Our findings should be presented to members of the local community to increase assist them in the decision-making process. Qualitative methods, in particular analytical, topological and identification methods were used to accomplish the above research tasks.

Keywords: land consolidation, rural development, environmental protection, local community.

Introduction

Land consolidation, which is also known as land readjustment, reallocation or reparation, is a spatial planning process and a highly complex spatial allocation problem. Land consolidation is defined as "introduction of optimal changes to land structure in a rural area based on the provisions of national laws regulating land consolidation (which, together with current practice, impose a series of criteria and limitations) to achieve the goals of a given consolidation scheme".

In many countries, including the EU Member States, land was consolidated to intensify farming operations. The above led to serious environmental problems, including soil, water and air pollution, and the loss of many wildlife species.

Land consolidation processes introduced for the sole purpose of improving agricultural production and working conditions can have negative consequences for the natural environment (Thomas, 2006).

Today, land consolidation is also regarded as an effective tool that contributes to rural development. The concept of rural development involves improvements in agricultural production, rural employment, tax policies, infrastructure, public utilities, residential construction and nature conservation (Weiss, Maliene, 2004). For this reason, land consolidation should be regarded as the main tool in sustainable development of rural areas.

The main objective of this study was to present the procedure of agricultural land consolidation as a whole. Procedures are not only beneficial for the space and society but also characterized by certain risks and opportunities. Our findings should be presented to members of the local community to increase assist them in the decision-making process.

The first part of the article deals with positive and negative consequences of land consolidation on the natural environment in rural areas. Social problems associated with land consolidation are discussed in the second chapter. The third chapter focuses on the economic consequences of consolidation. The final chapter contains a SWOT analysis of land consolidation projects.

The presentation of land consolidation requirements was preceded by the following research tasks:

- identification of the environmental effects of land consolidation;
- characterization of the local community and identification of social consequences of land consolidation;
- identification of the economic effects of land consolidation;
- SWOT analysis of land consolidation projects in rural areas in Poland.

Methodology

Qualitative methods, in particular analyses and logical constructions, including identification were used in the study (Dawidowicz, Żróbek, 2012). Those methods were applied to consolidate the analyzed problem and propose optimal solutions. Other research methods included comparative analysis as well as analyses of the relevant literature, documents and legal regulations (Dudzińska, Kocur-Bera 2014a; Dudzińska, Kocur-Bera, 2014b).

Results and discussion

1. Identification of the environmental effects of land consolidation

The degradation of agricultural land resulting from anthropogenic and natural factors leads to a qualitative deterioration of various elements of the agroecosystem, including soil, hydrographic conditions, air, landscape and landscape diversity (Korelewski, 2009). Environmental degradation resulting from agricultural activities affects (Domagała-Świątkiewicz, 2005):

- soil quality (risk of wind and water erosion, deterioration of the physical properties of soil due to mechanization, lower content of humic substances, risk of acidification and salinity, risk of pesticide and heavy metal contamination);
- air quality (greenhouse gas emissions to ambient air);
- water quality (nitrogen contamination, phosphorus contamination);
- preservation of rural landscape diversity.

Soil degradation caused by water and wind erosion

Water and wind erosion are natural processes that are often triggered by ineffective land management and land cultivation practices (Koreleski, 1987). Many natural factors and agricultural practices determine the duration, intensity, form and extent of erosive soil degradation. In areas characterized by considerable land fragmentation, those factors include a large number of fields whose orientation relative to sloping terrain obstructs agricultural practices, reluctance to apply contour plowing techniques and unsupportive land use structure (Wawer, Nowocień, 2006). Water erosion includes degradation caused by rising water levels due to heavy rainfall, flooding and snow melting (Siuta, Żukowski, 2010).

Degradation of land improvement systems

Polish land improvement systems are largely outdated and degraded in areas characterized by significant land fragmentation. The above contributes to further damage and degradation of the soil environment. Land improvement systems are introduced not only to protect farmland and soil against erosion and devastation, but they are also the least costly method of counteracting the negative consequences of drought, terracing and flooding. The main aims of soil stabilization and erosion control measures are to:

- limit erosion,
- protect the productive capacity of soil and prevent adverse changes in soil conditions,
- prevent structural deformation of land, in particular the formation of gullies and valleys that intersect farm fields,
- prevent adverse changes in hydrographic conditions and the extension of the hydrological cycle in the local landscape.

Land sliding

Land sliding takes place in areas that are susceptible to this form of land degradation due to their specific geological structure, landform and hydrogeological conditions. This adverse process can be triggered and exacerbated by agricultural practices that affect the stability of the slope. It is most often observed in mountains, foothills, along coastlines and sea shores, including on the Baltic Sea, and stream bed sections. They are sporadically noted at the base of very large heaps of mineral waste and earth excavated from strip mines. The technological progress made in landfilling methods and biological reclamation of dumping grounds minimizes the risk of soil erosion and land sliding.

According to M. Dudzińska and K. Kocur-Bera (2014b), the remaining positive environmental outcomes of land consolidation include: securing land for residential construction, minimizing the number of land plots with irregular shape, adapting plot boundaries to land improvement systems and land relief (preventing water erosion), making optimal use of the land-use structure and soil class for the needs of the chosen production system.

2. Negative environmental impacts associated with land fragmentation

Engineering practices associated with land consolidation have a two-fold impact on biodiversity. Firstly, construction materials can severely disturb or directly damage wildlife habitats. Excessive use of concrete, cement and asphalt not only destroys native biological communities, but it also greatly affects survival capabilities of soil microorganisms. Secondly, engineering practices destroy game trails and migration paths. Artificial construction materials degrade the local landscape, while engineering designs ignore wildlife movement.

Land consolidation projects modify the original landscape patterns through land levelling and changing the direction of roads and ditches. Engineering practices can considerably alter the original topography in very short periods of time (Zhang, Luo, 2012).

Land consolidation also leads to the intensification of agricultural operations, which is associated with a reduction in the area of mosaic habitats, allocation of more land for farming purposes and conversion of grasslands to arable land. Those processes contribute to a reduction in the area of natural and semi-natural habitats, the elimination of mid-field trees, ponds and strip boundaries, loss of species inhabiting crop fields (both plants, including weeds, and animals), isolation of wildlife enclaves and intensified erosion (Dobrzyńska, 2003).

A study of two sites in the Western Carpathians (Koreleski, 1987) revealed that the decrease in the area of strip boundaries resulting from land consolidation projects completed in 1976-1983 ranged from zero (Mogilny) to 0.0209 ha per 1 ha of consolidated land (Jablonka).

The increase in cattle populations leads to intensified production of fodder plants in grasslands. Excessive stocking rates contribute to eutrophication due to larger quantities of manure, higher soil erosion, expansion of plant species not consumed by animals and a decrease in the species richness of pastures. Higher stocking rates in pastures generate considerable losses in bird breeding grounds and force many bird species to desert their habitats (Dobrzyńska, 2003).

3. Characterization of the local community and identification of social consequences of land consolidation

Active public participation is indispensable for the success of any land consolidation program. Past experiences have revealed that mustering public participation in such programs is very difficult as it entails some compromise in terms of gain or loss of land. Any externally induced land consolidation program is unlikely to produce a desirable result. Forced consolidation never succeeded in Europe (Riddell, Rembold, 2000).

The following social components have been identified by M. Stanny and A. Czarnecki (2011) in the process of sustainable development at the municipal level (in Poland, land consolidation measures are initiated at the level of municipalities or cadastral districts): demographics, education, social engagement, local governance and living conditions. Population characteristics (age, gender, level of

education) and location of economic activities can inhibit or stimulate diversification of income and structural transformations in Polish agriculture (Sikorska, 2011).

Project participants

It should be noted, however, that land consolidation schemes are performed with the involvement of farmers whose holdings have a diverse structure. In Poland, 46% of all private farms (1,057,000) have the area of up to 2 hectares (and are defined as small farms). The interests of small and large farm owners do not coincide. Large-scale farmers aim to improve the structure of their land holdings. Large farms are characterized by high productivity in terms of the cost-to-income ratio, which is the basic prerequisite for success on an increasingly globalized market of food and agricultural products. This farming model also generates negative outcomes, such as environmental degradation and population decline in peripheral rural areas whose inhabitants rely mainly on agricultural production as a source of income (Czudec, 2013).

Due to considerable differences in size, the problems associated with the spatial parameters of small farms are generally less acute and the benefits of land consolidation are less apparent in small farms than in large agricultural holdings.

Land consolidation also promotes higher levels of social activity in rural areas. Social involvement in land consolidation projects that increase employment, improve infrastructure and social services leads to social stabilization. In West Europe, tax revenues increased in areas where land consolidation created job opportunities (Dacko, 2006).

By participating in land consolidation projects, members of the local community acquire new experiences, learn to cooperate and become more active. Local communities can become more self-reliant when provided with expert support (Kampka, 2009).

Education

The existing viewpoints in society and to a certain extent myths linked with them, for instance, that rural schoolchildren's education quality is lower than urban schoolchildren's education; moreover, teaching-learning process and their skills in rural schools are much lower; material basis is insufficient; it is easier for a teacher to work or on the contrary, it is harder to do the job responsibilities without books, workbooks and home tasks if they constitute the part of learning tools, it is next to impossible etc. (Anspoka, 2012)

Currently rural school education environment has become both the developmental environment of the personality as well as the developmental environment of rural society. Rural schools take the responsibility of its further development as well as the developmental sustainability of the whole local rural society. On the one hand, rural school education environment influences the on-going processes in the outer vicinity. On the other hand, the outer environment also impacts the school culture environment as well as each pupil's developmental personality (Katane, 2005).

There exist different educational needs of the society of local scale in different rural regions that, in their turn, depend on different factors: economical situation and population's employment, demographical situation, the number of rural inhabitants, structure and age peculiarities, already obtained education, values orientation, attitude, desire of self-realization, as well as aims and possibilities of professional development, etc. (Laizāne, Katane, 2012)

In Poland, the farmer is a person:

- agricultural education of at least vocational education level or secondary or higher education, or
- individual management of an agricultural holding or work in an agricultural holding for at least 5 years. (<http://www.un.org/esa/agenda21/natlinfo/countr/poland/ruralDevelopment.pdf>).

Modern agriculture requires a comprehensive knowledge (Kowalski, 1998). This statement applies particularly to managers of farms. For this reason, an important feature of farm managers, having a significant impact on production and financial effects of the business, is agricultural knowledge and skills.

Knowledge, in a situation of increasing competition, increasingly determines the amount of income from business activities (Klepacki, 2005). Thus, increasing skills and investing in agricultural education by individuals wishing to become professional farmers is a necessary condition for development. The farmer gains the skills needed for agricultural activities in various ways, but their formal reflection is the level of education, both general and vocational, particularly professional, i.e. relating to agriculture.

In Poland (in 2011), still about 20% of managers completed only primary school or secondary school. The proportion of farmers who left school at the statutory level decreased significantly compared to 2000, and was almost twice lower. Both in 2000 and in 2011, the most common was basic education; about 45-46% of farmers completed it. At the same time there has been a progress at secondary and post-secondary level (increase from 16 to 28%) and higher (percentage of managers of individual farms with this education increased from 3 to almost 7%). Studies confirmed further growth in a relatively big popularity of non-agriculture education among farmers. In 2000-2011, the share of people with school non-agricultural qualifications among managers increased from 40 to 53%. Improving the level of non-agricultural professional qualifications in the analyzed population should be considered as beneficial, not only from the point of view of diversification of economic activity and employment outside the farm, but also with regard to agricultural activities. Today, the effective operation of a farm requires a range of skills and competencies that go far beyond conventional preparation for the profession of a farmer (Alexandri, Chmieliński, 2013)

In Poland, the study program contains no data on land consolidation (Geodesy exception).

Development of roads, land improvement systems and social infrastructure

Land consolidation also promotes the development of roads and land improvement systems. In Poland, rural areas are characterized by low road density (approximately 48 km per 100 sq. km; source: Ministry of Agriculture and Rural Development) and poor condition of local roads (Rakowska, Wojewódzka-Wiewiórska, 2010). Many land plots do not have access to public roads and are subject to an easement. Land consolidation involves the development of a new road system, which facilitates access to individual plots and shortens the distance between farm fields and the farmstead. In Poland, road development is the main argument used by surveyors to elicit local community's participation in land consolidation.

Drainage ditches are renewed and rebuilt after the completion of land consolidation efforts. Land consolidation generates considerable benefits for farmers who experience flooding or drought due to the poor condition of drainage ditches. Land consolidation projects also involve zoning of common land. Commons may be created on land owned by the municipality or consolidation participants.

Administrative and legal proceedings

Land consolidation schemes eliminate the need for additional administrative and legal proceedings establishing joint ownership of agricultural land and common land. Land owners can distribute shares to property co-owners without having to cover the costs of legal and administrative proceedings. Common land is a form of collective ownership of agricultural land, forests and water bodies. It is reserved for the common use of all local residents. In Poland, commons are created by the State, rather than by the members of the local community. The associated rights or privileges of use are awarded to locally registered residents, which contributes to their uniqueness (Lipińska, 2010).

Pursuant to the provisions of Art. 5, section 1 of the Act of 29 June 1963 on commons management, common land may not be partitioned between commoners. The legislator has thus banned the dissolution of commons and has placed all commoners under the obligation to preserve collective ownership of such land. Collective ownership can be eliminated only through land consolidation that is approved by an absolute majority (Decision of the Supreme Court of 4 July 1997 [1997b], Ref. No. II CKN 227/97). During land consolidation schemes, land owners who do not reside locally are entitled to land in their place of residence as compensation for the land they lost (Leń, 2012).

4. Identification of the economic effects of land consolidation

The economic consequences of land consolidation have been discussed in numerous studies, therefore this aspects will be only briefly analyzed in the article. Land consolidation changes parcel shape, size and distance, saving time and triggering innovation by way of mechanization, although T. Van Dijk (2000) says the process also has another sequence: open markets bring competence. This calls for reducing production costs—mainly labour—with mechanization, and hence adapting parcels for mechanization (Crecente, Alvarez, 2002).

The degree of parcel scattering measures the distance among the parcels owned by a farmer. Comparison of this indicator before and after land consolidation will demonstrate the success of the performance in terms of potential time savings for vehicles using the local road network (Isla, Soy, 1998). Land consolidation also increases the size of parcels and, consequently, the amount of direct payments in virtue of land that did not qualify for the direct payment scheme in the past.

Table1

SWOT analysis of land consolidation projects

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> • improved territorial structure of farms and forests (reduced number of parcels, improved parcel shape, increased area of plots and farms), • development of service roads, land improvement systems and networks of rural roads, • rational spatial configuration of agricultural plots, • plot boundaries are modified to accommodate land improvement systems, roads and relief features, • regulation of hydrological processes on consolidated land, • reclamation of degraded areas, • development of social infrastructure, planning common land, • distribution of rights and privileges to common land among members of the local community. 	<ul style="list-style-type: none"> • high cost of reconstructing and renovating drainage ditches, • high cost of building local roads, • high cost of zoning land for purposes other than forestry and agricultural production, • land owned by farmers participating in consolidation schemes has varied territorial structure (farms have different size), • the parties participating in land consolidation have different interests, • high cost of land consolidation proceedings.
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> • reduced water and wind erosion, • reduced degradation of land improvement systems, • landslide prevention, • improved production efficiency through lowered production costs, labor input, transport time and fuel consumption, • reduced CO₂ emissions, • prevention of soil erosion and improved soil management, • members of the local community are actively involved in spatial planning processes, • improved plot parameters (larger area) entitle farmers to apply for subsidies, • the introduction of land improvement systems minimizes the risk of flooding and drought in consolidated land, • increased market value of consolidated farms and land, • making optimal use of the land-use structure and soil class for the needs of the chosen production system, • land consolidation projects actively involve members of the local community by creating new jobs, expanding the existing infrastructure and improving the quality of social services. 	<ul style="list-style-type: none"> • negative impacts on biodiversity (higher share of paved areas, lower share of natural and semi-natural areas, elimination of mid-field trees and shrubs), • intensification of agriculture, • increased water and wind erosion, • social conflict between farmers and services responsible for land consolidation.

The territorial structure of farms can be improved through enlargement by incorporating the land of farmers who wish to abandon agricultural production or by incorporating the land owned by the Agricultural Property Agency, an organization responsible for implementing the national agricultural policy.

Land consolidation improves plot parameters, reduces the number of plots and improves access to public roads, which increases the market value of the resulting property. The analysis shows the benefit is more than threats and loss (Table 1). The main problem is the large financial outlays. Another problem is also a threat to the environment which cannot be predicted. Land consolidation can also go a number of advantages for the environment: reduced water and wind erosion, reduced degradation of land improvement systems, landslide prevention, reduced CO₂ emissions, prevention of soil erosion and improved soil management. These are not the only benefits for agricultural production.

Conclusions

The process of management is one of decision-making by the performer of the task. It is generally understood that a decision is associated with making choices, solving problems that emerge, determining the goals and directions of activities, as well as determining the methods and means of accomplishing them. Acquisition of information and its use is very important at the stage of decision-making. This information should be processed in an appropriate way. This allows for a more efficient approach to the problem, the obstacle.

Land consolidation is a process that radically transforms rural areas. Successful consolidation schemes require the participation of the local community, and the relevant decisions should be made with the involvement of local inhabitants. Members of the rural community should be familiar with all aspects of the planned undertaking and should have rudimentary knowledge of the consolidation process in order to fully cooperate with the services responsible for land consolidation.

The presented SWOT analysis indicates that land consolidation is highly complex process. The results of the analysis can be disseminated to farmers to provide them with comprehensive and reliable information about the planned undertaking. The concepts addressed in the SWOT analysis should be explained in greater detail for the benefit of the local residents who are not experts in land consolidation.

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