CONTRIBUTION OF THE RURAL DEVELOPMENT PROGRAMME TO FACILITATING INNOVATION IN LATVIA

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Abstract. The paper evaluates the innovation of the projects implemented with the financial support of the Rural Development Programme (RDP), evaluating the implemented projects according to the innovation categories, types and levels. The methodology selected for attaining the research aim is based on the generally accepted typological division of innovations in various types. The theoretical background approbates the innovation classification applying the Diffusion of Innovation Theory, Kelley's designed Doblin model as well as the concept of innovation mapping described by Satell. During the research process, the adaptation of the respective models to the conditions and the investment made to the rural development in Latvia has been performed.

To execute the research tasks, the data available in the Rural Support Service (RSS) database on the projects implemented by the support beneficiaries was used.

The most significant conclusion regarding RDP 2014-2020 is that the implementation of the *Cooperation* measure, which is directly targeted at innovations, can be considered a successful measure in which the cooperation between scientists and entrepreneurs has played a particularly critical role. This way a significant number of inventions that correspond to the radical innovation level has been created. In the other measures, the support beneficiaries have also actively applied various types and levels of innovative solutions, especially at the level of farms. Agriculture comprises the largest number of innovative projects. Majority of the implemented projects have been acknowledged as a sustainable innovation, which means that they have facilitated a sustainable operation of the introducer of the innovation.

Keywords: innovation, rural, development, support.

JEL code: O31, O38.

Introduction

The research goal is to evaluate the contribution of the Rural Development Programme (RDP 2014-2020) to facilitating innovation in Latvia, assessing the type of innovation according to classification characteristics. For this purpose, the division of innovations in categories, types and levels is performed according to the theoretical principles described in the paper. The novelty of the study resides in the evaluation of the innovation degree in the large number of the projects supported by the European Union (EU) Funds, applying internationally recognized classifications. During the research more than 14,000 RDP 2014-2020 projects that have been implemented or are being implemented were evaluated. Therefore, it can be considered a significant contribution in the study of innovation introduction in the Latvian rural space. During the research, a methodology study was also performed, therefore its results can be used in future innovation research and classification.

The choice of the research methodology is determined by the scope and quality of the study as well as the innovation context. To attain the research objectives, the RSS database and the information available on the projects implemented by support beneficiaries were used. To evaluate the innovative RDP 2014-2020 projects, the project documentation was used, taking into account specialization, field, level and type (business organization, products, technological processes, marketing, social, and environmental and climate innovations). Based on the available information on the projects, it is not always possible to evaluate sufficiently precisely to what extent the project is innovative and to evaluate objectively its innovation degree. However, during the evaluation, the principles defined in the theory are taken into consideration and the evaluation is performed depending on the potential impact of project investment on the further operation of the enterprise.

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Research results and discussion

Like in other parts of the world, the definition of EU innovations is descriptive and leaves a sufficiently large room for interpretation. It can be especially attributed to social innovations. The Organization for Economic Cooperation and Development (OECD) defines it as follows: *innovation is a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process*) (OECD, 2018).

In the study of the Enterprise Industry Directorate-General of the European Commission "Innovation management and the Knowledge-Driven Economy" innovation is broadly described: "Innovation is the production, inclusion and use of a successful novelty in the economic or social area" (European Commission, 2004).

1. **Classification of innovations**

During the research, innovations are evaluated applying three types of division. The division of innovations in categories is based on the Diffusion of Innovations theory (Rogers E.M., 1995). Two of the four innovation categories described in the diffusion theory are used in this research regarding the projects of individual beneficiaries: invention and takeover. The latter combines voluntary innovation (adoption) and compulsory (adaptation) takeover because according to the available information, it is impossible to make unequivocal judgments about the character of acceptance.

The research uses an innovative conception for dividing innovations in levels (Satell G., 2017). The innovation matrix illustrates four innovation levels related to the level of technology changes and the impact of innovations on the market (Fig. 1). The selection of the four innovation levels depends on the research context and the considered industries. The innovation matrix has two dimensions. The vertical dimension indicates to the degree of the market (external environment). The horizontal dimension indicates to the scope of technological changes.

		Technological breakthrough	
		LOW	**HIGH**
Impact on market	**HIGH**	**Sustaining** Substantial product improvements aiming maintaining the position in the existing market	**Disruptive** Technology or new business model disrupting the existing market
	LOW	**Incremental** Continuous gradual improvements od existing products or services	**Radical** Technological breakthroughs transforming the industry or creating new markets

Source: Satell, G. (2017)

Fig. 1. **Innovation matrix**

The innovation level characterises their significance. According to the research methodology, all innovations are divided into four groups: incremental, sustaining, radical and disruptive innovation.

Incremental innovation is the most widespread level. Regarding goods or services, it is associated with gradual and constant improvement, and the impact on the market is low. The size of the products and their

weight can be decreased, or their appearance can be made more appealing (for example, the weight of a packet of butter can be reduced in food processing), while the main idea of the product and its main components do not change. Examples of incremental innovation in agriculture products are mainly referred to pre-treatment of products (purification, drying). Incremental technological innovations demonstrate a low level of technological novelty. In agriculture, an example of incremental technological innovations is increasing the capacity of the existing technique. Although an incremental innovation does not create new markets, as a result of it the goods or the service can be transferred to another segment of the current market (for example, to more affluent customers), or vice verse, can be made available to a wider customer base due to cost reduction.

Sustaining innovations involve significant improvements in the existing products and are aimed at maintaining the market position. Sustaining innovations have a low level of technological novelty and a significant impact on the market. An example of sustaining innovation in agriculture is modernization of a technical park thus increasing productivity and the offered volumes and reducing the selling price. Sustaining innovations are the antipode of disruptive innovations because they exist in the current market without creating new value networks. Similar to incremental innovations, goods or services developed as a result of repeated sustaining innovations are only slightly better than the ones offered before the innovation, or their previous defects have been prevented or reduced. The results of sustaining innovations can also be more expensive or with a higher profit, or the products can be cheaper and available to a wider customer base. Sustaining innovations with traditional business methods are frequently sufficient due to higher profitability and low risks.

Radical innovation can be considered revolutionary, such that creates a paradigm change. Mainly technological solutions that transform the industry or create new markets are included in this innovation level. Radical innovations demonstrate a high level of technological novelty and a small impact on the market. Radical innovations happen seldom; however, opposite to disruptive innovations, they use revolutionary technology and new business models. Radical innovations in agriculture are mostly related to processes and technology. Sensors of modern tractors, multi-culture approach, specially created websites that allow the growers to anticipate the yield potential and other significant indicators, use of unmanned aircraft are examples of radical innovations. In general, the separation of radical and disruptive innovations is not always possible and both types overlap in several studies.

With new technology or new business models, disruptive innovations change significantly (disrupt) the existing markets. Disruptive innovations exhibit a high level of technological novelty and a significant impact on the market. The goods or services developed as a result of disruptive innovations create a new value network when entering an existing market or creating a completely new market. In agriculture, examples of disruptive innovations are 'crowd' technologies with mobile robotic platforms that can be programmed for automatic loading of various agricultural resources and their removal on the field during sowing, planting, fertilizing, spraying and harrowing operations without physical presence of a man. Such systems are controlled via cloud technology from smart phones. Upon the completion of the respective operations, precise data about them are available in the GPS system. Robots with three-finger "hands" are used to pick fruit and berries, and, based on the variety, the fruit or the berry is either rotated or picked. Such robots can harvest up to 90% of the yield.

The division of innovations used in the research is based on Keeley's developed Doblin model (Keeley L., ... 1997). The model of ten innovation categories is based on the assumption that all significant historical innovations can be considered a combination of the ten innovation categories. Taking into consideration that the model is designed mainly for the use in the brand business, four innovation types correspond to

the research context: business model and/or organisation innovation; product innovation; process and technology innovation; marketing and service innovation. In addition to these four types of innovation, also the environment and social innovation types are used.

The division of innovations by categories, levels and types is depicted in Figure 2. Based on the above-mentioned division, all evaluated projects in the implementation stage or the already finished projects available in the RSS database were divided into the categories, levels and types presented in the above figure. In addition to the above mentioned, the industry aspect was also analysed, applying Nomenclature of Economic Activities (NACE) classification to evaluate in which industries innovations have been introduced.

Category	Invention
	Takeover
Level	Incremental
	Sustaining
	Radical
	Disruptive
Type	Business model and organization
	Products
	Processes and technologies
	Marketing and Service
	Social
	Environment and Climate

Source: authors' created

Fig. 2. **Division of innovations by categories, levels and types**

2. Evaluation of RDP innovation projects

To find out in which measures of the programme innovations can be expected, the requirements of the measure, the beneficiaries and the goal of the provided support were evaluated. The main RDP 2014-2020 goals related to innovations are:

1) to facilitate knowledge transfer and innovation in agriculture, forestry and rural areas;

2) to improve the viability of rural farms and the competitiveness of all types of agriculture in all regions and to facilitate innovative technologies of the farms and sustainable forest management (Latvia - Rural Development Programme…, 2021).

Although the goal of innovations is planned to be horizontal, the relation of the Programme with innovations at the level of measures mainly focuses on measures M1 (Education), M2 (Consultations), M06 (Rural development), M16 (Cooperation) and M19 (Local development strategy activities). Therefore, projects of these measures are evaluated. According to the terms of the measures that do not allow for a simple substitution of fixed assets but provide for the creation of a new activity, expanding an existing activity, introduction of new technique or technology, development of a new product, development of environmentally friendly technology, it can be conditionally considered that, in their essence, all projects of the respective measures are related to an innovative activity in one way or another. At the same time, measure M16 is aimed exactly at creating an innovation.

Further in the paper, the division of innovations based on the significance, type in which they are implemented, as well as the division of industries and territories is presented.

Evaluating all investment in the total of innovative elements, the division of their industries and territories will be similar to the structure of the respective measures. Taking into account that funding is mainly allocated to agriculture, more than 80% of the projects apply to agricultural sector respectively. In addition, 9% of the projects apply to industry, 8% to service industries and 1% to forestry (Fig. 3).

In the division of subsectors, a significant number of projects (5% or almost 600) apply to food industry, 2% to wood industry. The other 2% comprise a diverse range of industries, including manufacturing of metal products, furniture, textiles etc. The most popular service industries are accommodation and catering services, as well as art, entertainment and recreation (in total more than 500 projects or incomplete 5%). These projects are mainly related to developing and improving tourism infrastructure. But the other projects cover organization of active recreation. Furthermore, 1% of the total number of projects is related to trade, but the other projects comprise a wide range of service industries, including professional and research services, administrative services, ICT, education etc.
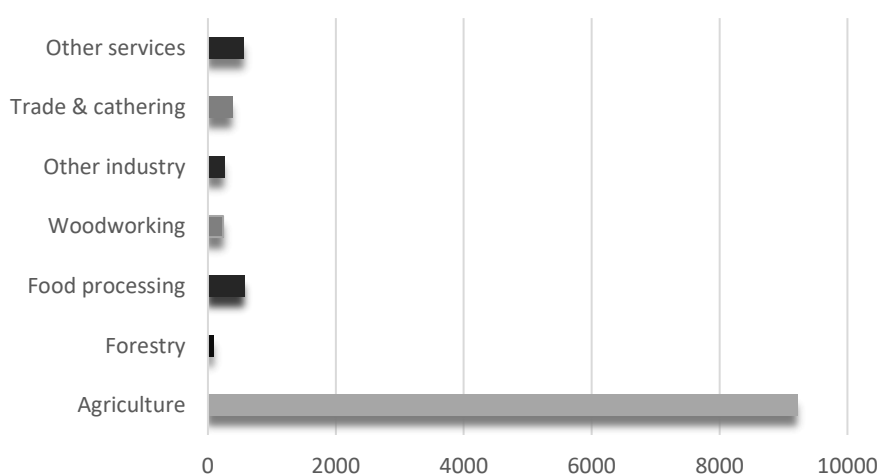
Source: authors' calculation using data of Rural Support Service Information system (RSS IS)

Fig. 3. **Division of RDP 2014-2020 projects with innovation elements by industries (number)**

Taking into consideration that most of the projects are implemented in agriculture, the industry is analysed in more detail by the type of specialization. More than one third of the projects (36%) apply to crop farming, the other significant specializations are breeding of fattening cattle (19%) and dairy farming (17% of the projects).

Generally, the structure of the specialization types in implementing innovative solutions in agriculture is similar to the structure of existing farms, however, with a higher proportion of fattening cattle and other grazing livestock (these industries are associated with extensive use of land), a higher proportion of perennial crops and vegetable growing, but a lower proportion of pig farming and poultry farming as well as mixed specialization.

Below the division by three classification criteria is presented.

According to the goals of the measure, invention refers only to M16 measures. All projects of M16.1 measure "Support for implementing European Innovation Partnership (EIP) agricultural productivity and sustainability work group projects" are evaluated as suitable for an invention. Whereas, based on the available information, the majority of the projects (81%) from M16.2 measure "Support for developing new products, methods, processes and technology" are evaluated as an invention, but a small part can be considered a takeover. The current number of projects that contain invention is 82 or 0.6% of the total

number of projects. These projects target facilitating the development of agriculture, forestry and food industry.
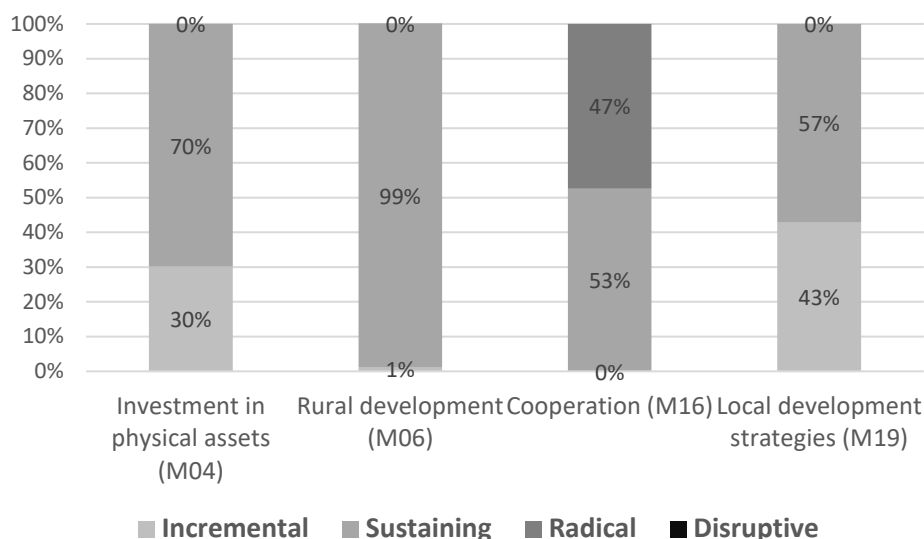
In the evaluation based on the innovation level or significance, purchase of a specific agricultural technique or equipment, improvement of the provided services, restoration of water runoff of national importance and other measures related to introducing upgrades in a particular enterprise, municipality etc. are most frequently recognized as an **incremental** innovation, but their implementation is not critical for the competitiveness and sustainability of the enterprise. Such innovations form about one fourth of all innovations – 26%.

Most of the evaluated projects are recognized as such that contain a **sustaining** innovation. It means that the investment has significantly improved the sustainability of the enterprise or the organization, including a significant impact on the market power. The majority of the evaluated RDP projects (73.5%) fall into this category.

Regarding the distribution by the measure, M06 measure comprises most of the sustaining innovation - 99% of the projects of this measure. Support to the new famers to start their economic activity (because a new farm is developed or a farm is taken over by a new farmer, which means the economic activity is sustained under new conditions) as well as support for starting an entrepreneurial activity via supporting small enterprises is considered a sustaining innovation. It is determined by the support objective to make these farms competitive in the market, thus enhancing the change of their business model (from self-consumption to market oriented). Sustaining innovations also include development of non-agricultural activities and diversification of enterprises, which significantly changes their business model and promotes business sustainability.

The largest part of M04 measure (investment in physical assets) or 70% of the projects are also evaluated as sustaining (Fig. 4). The main criterion in this case was whether the project content is sufficiently significant for the activity of the enterprise or a rural farm to facilitate significant changes toward sustainable activity, including a significant increase of the production volumes, introducing new technology, developing new products etc.

The most (57%) of the local development strategy (Leader) projects (M19) are admitted to be sustaining innovation. The proportion of sustaining projects is similar in both activity implementation measures 19.21 and 19.22. This means that they are introduced in both entrepreneurship and the development of the infrastructure.

Source: authors' calculation using data of RSS IS

Fig. 4. **Division of RDP 2014-2020 projects into measures based on the innovation level (%)**

Sustainable projects have been implemented in various industries – manufacturing, tourism and recreation industries, whereas infrastructure projects are associated with reconstruction of folk and gathering houses, construction of significant culture and recreation infrastructure, purchase of materials for ensuring the activity of interest groups etc.

57 projects or 0.4% of the evaluated projects are considered **radical**. Separate examples of radical innovations are also found in M04 measure – 7 projects; one project is found in M06 and M19, but the only measure with a significant spread of this innovation type is M16. That is understandable, taking into consideration the goal of the respective measures. According to the conducted evaluation, radical innovations are present in both M16.1 – 63% of all projects, and M16.2 – 45% of the projects, while they are not present in 16.3 (support for facilitating the development of rural tourism).

It would require some time to fix a **disruptive** innovation until such a significant impact on the markets would become visible. It cannot be traced now, and it would also be difficult to be expected, taking into account the fact that only a few cooperation measure projects are finished during the research period. In addition, most of them are within M16.2 measure, which mainly provides innovations of a business level.

Analysing the projects, the type or character of the innovation was evaluated, namely whether it is aimed at a new process or technology, a new product, a business model or business organization. Innovations related to marketing and service, social innovations and those that impact on the environment and climate were allocated. A particular project may comprise several innovation types.

The number of RDP 2014-2020 projects included in every type of innovations is summarized in Figure 5. On average, every project is attributed to several types, therefore the total of the indicators exceeds the total number of projects.
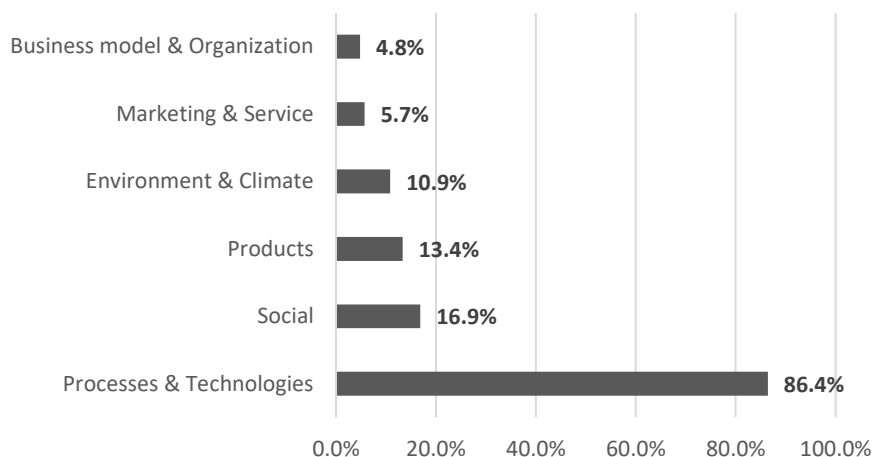
Source: authors' calculation using data of RSS IS

Fig. 5. **Frequency of innovation types in RDP 2014-2020 projects (i.e., what % of all projects include the respective innovation type)**

The most frequently met type of innovations is **process and technology** innovations – most of the RDP investment measures are aimed at these in order to invest in new technique and technology. They are spread in all measures and sub-measures included in the present study. They are most spread in the investment in agricultural enterprises, as well as in several other measures – M04.2 (support for processing) and M06.41 (diversification), whereas 85% of the Cooperation measure (M16) projects are related to process and technology changes.

Social innovations are the second most significant type of innovations. This innovation type is characterised by a benefit for society – the users of the innovation. The proportion of social innovations differs depending on the measure. Leader activity 19.22 possesses most of this innovation type – almost 100% of the respective projects. The activity is aimed at the development of the rural infrastructure. Another is sub-measure M16.3 – support for the development of rural tourism. 16% of business-related Leader projects have been admitted socially innovative, but the proportion of such projects is small in other entrepreneurial measures – 2% in M04 measure, 1.3% in M06 measure. It has to be admitted, however, that the evaluation depends on how broadly social innovations are interpreted. For example, in the present paper, projects aimed at developing entrepreneurship via supporting small enterprises were not considered social innovations, but one of their directions is maintaining employment. In the division of industries, social innovations most frequently refer to accommodation and catering services, art, entertainment and recreation, trade and other services. Activities like children's playgrounds and sports fields, purchasing costumes for ensuring the activity of interest groups etc. also belong to social innovations.

The next type, regarding the frequency, is **product** (the product also includes services) innovations that are characterised by developing a new product and offering it to the market.

Environment and climate innovations are treated according to the investment in environment and climate objectives (or the project is aimed at such an objective) as well as taking into consideration the project content. This groups comprises investment in purchasing resource-saving technology, construction of new buildings for animals and reconstruction of the existing buildings, taking into consideration that stricter environmental requirements are set for them; construction of manure storage places as well as those projects whose descriptions contain information that the project contributes to reducing the climate change.

The other two innovation types are observed significantly less frequently. **Marketing and service** innovations make 5.7% of the total number of projects. Those are projects that apply solutions directly in

sales and service delivery. Therefore, the proportion of such innovations differs a lot across the industries, concentrating in non-agricultural entrepreneurship and services.

A business model and organization is a less common innovation type in RDP 2014-2020 projects. It is found in the change of business organization when the type of yielding income is changed; in implementing significant changes in the operation of the enterprise or the farm. The most common examples related to RDP measures are establishing a rural farm or taking over an existing one as well as production diversification developing new industries.

Acknowledgements

Conclusions, proposals, recommendations

1)   Beneficiaries of RDP 2014-2020 support have actively applied various types and levels of innovative solutions, especially at the level of farms. Agriculture industry comprises the largest number of innovative projects. Food industry, accommodation and catering industry, entertainment and recreation industry as well as wood processing also contain a significant number of innovative projects.

2)   Division based on innovation types is mostly observed in process and technology innovations. Social, product, environment and climate innovations are significantly less met, but the least number of innovations is introduced in marketing and business organization.

3)   Most of the innovations are sustainable, which means that they promote significant changes toward sustainability of the innovation implementer.

4)   To facilitate taking over innovations in agriculture, forestry and food industry, there should be considered the opportunity to add additional points in the project selection criteria to the projects that invest in fixed assets as well as in facilitating rural entrepreneurship (current measures M04 and M06) if the paying agency recognizes these projects innovative at least at the level of the local municipality.

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