Strategies for the agri-food sector and rural areas – dilemmas of development

INSTITUTE OF AGRICULTURAL
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Strategies for the agri-food sector and rural areas – dilemmas of development

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The published materials refer directly to the current and future strategic objectives and principles of agricultural policy for the agri-food sector and rural areas, address the issues of equilibrium between agriculture, forestry and land use, as well as productivity and production efficiency and tensions between sectoral and territorial action and cohesion policy.

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The strategies and dilemmas of development – introduction

Choosing a strategy for agriculture and food economy is a difficult task not only due to differences in concepts and theories, but also due to the large variability and uncertainty of the political, economic and climate situation, both globally and nationally. The theoretical concept and basis for strategy building is the identification of appropriate selection and integration institutions. The former are based on the assumptions of the mainstream of economics and presuppose the application of a competition-based market mechanism to agriculture and the producers' choice of areas to maximise their economic objectives. On the other hand, integration institutions, which have a new interdisciplinary character, take into account macroeconomic premises that ensure economically, environmentally and socially sustainable development, and hence the multifunctionality of rural areas and agriculture. They assume the application of such a policy that integrates microeconomic objectives with the general ones in order to ensure sustainable development, in which, apart from economic activity, multifunctionality and access to public goods are an important function.

Over the last decades, the EU's agricultural policy has slowly evolved from the strictly market-oriented policy to the multifunctional and sustainable rural development policy (with still a very significant element of income maintenance – direct payments). Policy programming has increasingly begun to reflect the diverse needs of individual Member States' agriculture and their rural areas, as well as different opportunities. In order to ensure increased efficiency and tangible benefits, a number of environmental and social measures (public goods, new climate challenges, sustainable and multifunctional development, prevention of exclusion) were included in the rural development policy.

Although the adjustments of agricultural and rural policy objectives and its budget to cohesion with other policy areas have approximated the areas of their interdependence, they still leave much to be desired in terms of synergies (they are relatively limited, and some activities have led directly to increasing disparities). There is also little to testify to the fact that the second pillar of the CAP has had a significant impact on reducing territorial differences. However, due to its economic, social and environmental potential, rural areas are one of the key areas of the EU that are important for the conducted Cohesion Policy. In 2016, more than half of the EU population resided outside cities, and the rural areas alone constituted about 90% of the territory of 28 Member States. Agriculture and forestry are key sectors of the economy from the point of view of managing natural resources. At the same time, they are a platform for multifunctional development and diversification of economic activity in rural communities.

The forecast of changes in the global economy is an important prerequisite for choosing future development strategies. We have large shifts on the world map of economic powers. By 2040, China will have the largest share in the world GDP, with the USA losing its leading position, and the share of the EU countries will also decline. There is also a significant increase in the entrepreneurship of societies, in particular in Asia, mainly with regard to the activation of women in the labour market. Increasing use of the Internet and other electronic technologies in the economy and in agricultural production leads to rapid technological changes. The settlement structure will change at an even faster pace than before – huge urban agglomerations will emerge as a result of urbanisation. According to expectations, they will accommodate 60 per cent of the population in 2030, and as much as 72 per cent in the next 20 years. Consequently, the importance of international trade and capital flows will increase. This, simultaneously, brings socio-economic implications such as: changes in the demand, including quality, for food (new, large food production and consumption centres will be emerging), the need to develop new sources of energy and the growing importance of healthcare. Economic growth will depend on the unknown results of the introduction of new technologies, on political and social events that are unpredictable today. The growing scale of environmental and climate hazards associated with human functioning on Earth will also pose a huge challenge. Research by the American Institute of Biological Sciences shows, for instance, that:

- The population of Earth has grown from 5.5 billion to over 7.5 billion over the last 25 years (i.e. since 1992), it will reach 9 billion in the middle of the century, whereas in 1800 there was only about 1 billion people on Earth;
- The average temperature of the planet has risen by 0.9 degrees Celsius over the last half century, and the further increase of approx. 3 degrees Celsius is expected by the end of the century (according to the Paris climate agreement of 2015);
- World CO_2 emissions are twice as high as 25 years ago and amount to over 40 billion, which is as much as 5-3 million years ago, when the average earth temperature was about 2-3 degrees higher and the ocean level was higher than it is now by about 10-20 m;
- Compared to 1970, the vertebrate population has declined by ca. 60%, and it will fall by 30-50% by the end of the century;
- The number of forests in the last twenty-five years has decreased to about 4 billion hectares (i.e. by about 100 million hectares) and to make matters worse, they are separated by more and more dense network of roads (this is why the surface of Earth is divided into about 600 000 pieces);

- Due to nitrogen and phosphorus compounds flowing from the fields, the number of death zones in the oceans has doubled, besides many areas have been overfished due to over-exploitation of resources.

When formulating future development strategies for the agri-food sector and rural areas, we must undoubtedly take into account the above-mentioned limitations. The tasks that we face include: reduction in greenhouse gas emissions, the fight against environmental pollution, investment in renewable energy sources, protection of natural habitats, restoration of natural ecosystems and protection of species. The current CAP does not solve these problems. In order to gain supporters of its maintenance in the European dimension, it should be reprogrammed to prove that, apart from the territorial advantages, agricultural policy also brings benefits to all inhabitants of rural areas and affects the whole society.

This will be of major importance in the debate on the development strategy and the future of the CAP after 2020, along with direct payments, which will represent ca. 72% of the CAP budget in 2013-2015 and nearly 30% of the total EU budget. Their share in net farm income was 47%, while other public transfers represented about 15% of this income, and market revenue was 38%. Although the 2013 reform introduced various measures to compensate for the disparities in the distribution of direct payments between farms, a vast majority of them go to farms whose income from agriculture exceeds the median farm income. The capitalisation of direct payments increases the cost of entry of new entities onto the market or the cost of expansion of activity by existing farmers.

Other strategic challenges for the CAP and rural development policy beyond 2020 include, but are not limited to: increase in productivity and counteracting low incomes in agriculture, reducing market risk and volatility, counteracting the outflow of people from peripheral areas and maintaining farming in areas with difficult farming conditions, the reduction of distribution chains and the support to small farms, protection of the natural environment (including soils, water resources and biodiversity) and cultural landscape, adaptation to climate change (including reduction of greenhouse gas emissions, prevention of extreme events), development of renewable energy sources, food safety and quality, animal welfare.

It is easy to see that the first five challenges were the Treaty objectives of the CAP, while the others were added as part of its reform (in the mid-nineties, and especially after the launch of its second pillar). Some of the challenges (future problems) were created by the agriculture and human activity itself because both agriculture and human contribute to the degradation of the natural balance in the environment. This is true of minimum soil fertility, biodiversity, air and water quality, climate change. Therefore, the challenge after 2020 will be to simultaneously improve resource efficiency and restore or maintain natural capi-

tal in rural areas. Apart from the basic role of agriculture as food production, it will play an important role in the measures for bio-economy and environmental protection, economic, social and environmental sustainability, renewable energy production, waste reduction, recovery of biomass and nutrients. It will be equally important to search for the right balance between agriculture, forestry and spatial development, as well as to strive for greenhouse gas emission reduction.

However, there is no consensus in the societies of the EU about which challenges are the most important ones and which should be considered priority. On the contrary, there are many opposing positions, e.g. some are primarily interested in income and want to focus on improving efficiency and productivity, while others are concerned about the crossing of environmental barriers. The tension between sectoral and territorial measures and the Cohesion Policy remains a key issue. Undoubtedly, the future rural development policy will focus on a more strategic and integrated approach concentrated on sustainable and harmonious territorial development.

As already mentioned before, a challenge for policy is to try to define future strategic objectives and rules for the agri-food sector and rural areas. However, is science able to formulate a common position on changes in all areas related to food and rural areas, is it ready to recognise, explain and describe their consequences, and above all, to develop the theoretical basis for choosing the future strategy? These questions were addressed by the Institute of Agricultural and Food Economics – National Research Institute, when organising a scientific conference entitled "Strategies for the agri-food sector and rural areas" (19-21 June 2017, Stary Licheń, Poland). The conference was attended by scientists from Poland and abroad, mainly from the countries of Central and Eastern Europe, which have been in the EU since 2004. Their accession to the EU has led to great modernisation changes in the food economy and in the social life of rural areas. Today, however, questions about the strategy and the future of the entire Common Agricultural Policy of the European Union are very important. The conference, by focusing on its numerous challenges and economic, environmental and social dilemmas faced by the agri-food sector and rural areas in the 21st century, was an important contributor to the discussion on the sector's development strategy after 2020. These reflections are consistent with the discussions and consultations that take place on the EU forum concerning modernisation and simplification the CAP after 2020. The conference discussed in particular the issues related to:

- Megatrends and major development challenges in the European and global food economy and their rural areas,
- Sources of growth in the agri-food sector,

- The role of farms and agricultural enterprises in the measures for a sustainable development strategy,
- Transformation of rural economy and policy programming for rural areas and agriculture,
- A strategy for innovation in the agricultural and food sectors and rural economy,
- Problems and obstacles to effective implementation of agricultural and rural development objectives,
- CAP instruments and their adaptation to local, European and global challenges.

This monograph consists of an introduction and 19 self-contained chapters written by 45 scientists employed in 17 different scientific and research centres and universities in 10 countries of Central and Eastern Europe (most of them are the EU Member States). The articles contained in this monograph provide materials and substantive arguments that can serve as a basis for future policy decisions on agri-food and rural development strategies. It may be useful to compare the experiences from different countries and to evaluate the implemented solutions, especially since there is a large variation in the level of development, the structure of the agricultural and food economy and the problems that need resolution. Some countries have already begun work on a future strategy on adaptation to the new EU policy after 2020. In others there is still a debate on whether there is a chance to develop a single, effective, scientifically justified strategy for the agri-food sector and rural areas.

The conference in Stary Licheń was already the 21st international scientific conference organised by the IAFE-NRI under the Multi-Annual Programme. A list of conferences organised so far by the Institute as part of the Multi-Annual Programme series and the related publications is included in the Annex at the end of this monograph. All publications from previous conferences, scientific monographs and other materials are available on the following website: www.ierigz.waw.pl. The first Multi-Annual Programme implemented by the Institute in 2005-2010 was entitled "Economic and Social Factors Conditioning Polish Food Economy Development after Poland's EU Accession". In the second edition of the Multi-Annual Programme implemented in 2011-2014, the Institute focused on "Competitiveness of the Polish food economy in the conditions of globalization and European integration". The current third Multi-Annual Programme for 2015-2019 entitled "The Polish and the EU agricultures 2020+. Challenges, chances, threats, proposals" is horizontal and, at the same time, strategic as it provides real premises to support decision-making processes for public policies.

Finally, I would like to thank all who contributed to the organisation of the conference and release of this publication, i.e. the Scientific and Organisational Committee, the authors of the papers, the reviewers and the technical editors. We are aware that despite the tremendous amount of scientific and organisational effort, we have not exhausted all the problems related to the issues in question. However, one thing is certain – these issues are so important that we recognise that these issues should be the subject of further research, substantive discussions, and conclusions should be communicated to the public, the administration and politicians. We encourage you to read this publication.

Dr Marek Wigier

IAFE-NRI

1. Backcasting as an approach to creating long-term development strategies for the agri-food sector[1]

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Abstract

Creating the development strategies for the agri-food sector is a very difficult task. In the case of the agri-food sector, it is particularly difficult to identify changes in external conditions of the functioning of the sector, which further complicates creating the strategies. The objective of the article is to present the backcasting approach and possibilities of its application to create the development strategies of the agri-food sector. Using backcasting, we should, however, remember that backcasting itself designates only the framework of work on building the strategies. The details depend on the relevance of the selected research methods and the comprehensiveness of the approach to the entire study. At the same time, we should bear in mind that backcasting does not reduce the disadvantages of individual research methods and tools.

Keywords: backcasting, development strategy, agri-food sector, agricultural policy

JEL codes: Q18, Q19, Q59

1.1. Introduction

Creating the development strategies for the agri-food sector is a very difficult task. We should take into account many factors, and uncertainty as to the nature, scale, and even the direction of their impact on the development, further complicates the creation of the strategies. In the case of developing long-term strategies, we usually take into account forecast trends of development and create several alternative development scenarios by adjusting to it the strategy assumptions.

However, more and more popular becomes a different way of developing the long-term development strategies. In this case, the starting point is to define how the given sector or the area of socio-economic life, for which the strategy is created, is to look in the future. This approach is called backcasting.

[1] Article prepared for International Scientific Conference "Strategies for the agri-food sector and rural areas – dilemmas of development"organised by IAFE-NRI, 19-21 June 2017, Stary Licheń, Poland.

The objective of the article is to present the backcasting approach and possibilities of its use to create the development strategies of the agri-food sector. The first part of the text discussed the specifics of the backcasting approach, its various forms and use, and the other presented examples of using backcasting to create action strategies in relation to various problems associated with agriculture.

1.2. Specifics of backcasting

The backcasting approach has been used since the 1970s, when the use of a "look back analysis" was suggested by A.B. Lovins [Quist, Vergragt, 2006]. At the beginning, it was used in the studies on energy systems and, in particular, their effectiveness in the face of the diversified energy demand. Currently, it is used in many areas. Generally, it works well in relation to complex problems analysed over a long period of time and covering social issues as well as technological changes [Dreborg, 1996].

The name of the approach[2] was suggested in 1982 by J. Robinson [Robinson, 2003]. This concept refers to the approach to studies on the future based on the creation of normative scenarios, for which the starting point is the expected final state. The objective of the study is, in this case, to determine a possibility of getting to this point and to designate instruments for achieving the assumed final state. Backcasting allows to streamline the issue of selecting state policy instruments. This makes it possible to determine what direction and shape the current state policy should assume, so that it was possible to obtain the intended state in the given final point.

Therefore, currently backcasting is also called the decision-making process assisting method [Haslauer, 2015]. As opposed to the approach based on forecasts (forecasting), whose objective is to define how the future will look like, backcasting is used to indicate the effects of various ways of shaping the future, which were designated based not on the probability of their occurrence, but on the criteria defined within the expectations relating to the given aspect of the socio-economic life. Therefore, the result is not an assessment of the probability of a given situation, but a definition of the scope of freedom of currently taken actions. For this reason, backcasting must take into account social preferences and rules for the functioning of the social system and environment [Robinson, 2003].

[2] We are talking here about the approach consistent with the statement by K. Dreborg [1996], that it is more useful to treat backcasting as an approach rather than as a research method. However, some authors perceive backcasting as a method [e.g. Oluwarotimi, 2014; Haslauer, 2015].

Due to the fact that backcasting is often discussed in opposition to forecasting, we must present the key differences between the two, which were shown in Table 1. At the same time, it should be noted that backcasting approach is also considered to be complementary [Brunner et al., 2016]. It can be generally stated that the backcasting approach works best for analyses of problems in which:

- The problem is complex and applies to many sectors and various levels of the society.
- There is a need for fundamental changes in the current functioning.
- The dominant trends are a part of the problem.
- A significant impact on the problem is exerted by externalities, which the market cannot handle.
- The time horizon is long enough to facilitate making a sensible choice [Dreborg, 1996].

Table 1. Major differences between forecasting and backcasting

Feature	Forecasting	Backcasting
Philosophical views	Causality; determinism; context of justification	Causality and teleology; partial indeterminacy; context of discovery
Perspective	Dominant trends, likely futures; possible marginal adjustments; answering the question "how to adapt to trends?"	Societal problem in need of solution; desirable futures; scope for human choice; strategic decisions; retain freedom of action
Approach	Extrapolate trends into the future; sensitivity analysis;	Define interesting futures and analyse consequences and conditions for these futures to materialise
Methods	Various econometric models	Partial and conditional extrapolations highlighting interesting polarities and technological limits
Techniques	Various mathematical algorithms	-

Source: Dreborg [1996, Fig. 2].

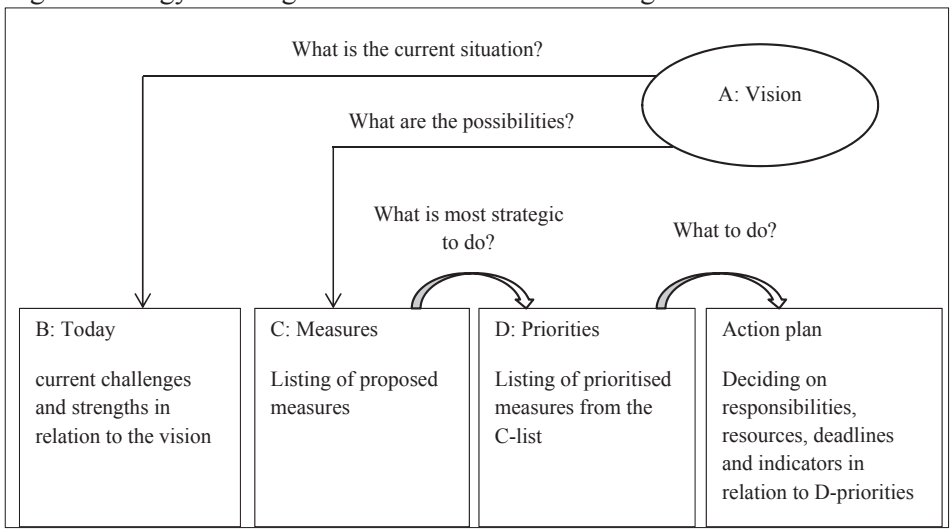
To show how backcasting is used in practice, we must present its individual stages. Naturally, individual authors present various divisions of the backcasting use process into successive stages [e.g. Coppel, 2011; Robinson, 1990; Brunner et al., 2016]. In the practical use of backcasting, the ABCD planning is applied. It is presented in the literature of the subject in various ways[3]. Regardless of these differences, this planning concerns four stages of building the strategy based on backcasting. Starting from the vision (Fig. 1), we are going to ana-

[3] The individual letters are assigned the different meaning. For example, the vision may be marked with "C" as in the document "The Natural Step Framework: A Review" available on: http://www.thenaturalstep.org/our-approach/.

lyse the current situation, then to select available instruments to implement the designated vision and, finally, to determine the priority instruments.

However, the presented ABCD planning scheme does not show the study work necessary for its implementation. This work includes an analysis of scenarios and a selection of the best way of action in terms of the efficiency and effectiveness of implementing the adopted vision. Building the scenarios applies to the stage of selecting possible instruments of action. Then, the impact of the individual scenarios on possibility of implementing the strategy as well as the boundary conditions enabling its implementation shall be assessed, which refers to selecting priority instruments in the ABCD planning.

Fig. 1. Strategy building scheme based on backcasting



Source: Ronge [2017, Fig. 6].

In practice, various forms of backcasting are used. They differ mainly by the extent of involving various stakeholders in creating a vision of the future, as well as by the very purpose of using this approach. The following types of backcasting may be identified:

- Goal-oriented backcasting – focuses on developing and analysing futures meeting the goals and these goals are quantified.
- Development path-oriented backcasting – strict definition of the goals is less important, while we focus on how to lead to a proposed change and what instruments should be used.
- Action-oriented backcasting – the main goal is to create a strategy of action. At the same time, it focuses on who could lead to this change.

- Participatory backcasting – backcasting takes a form of a creative workshop, attended by various groups of stakeholders. This form of backcasting concerns not only involvement of various groups of stakeholders in the process but also their mutual learning. This allows to use backcasting for studies at the conceptual or holistic levels in relation to social processes and requires a multidisciplinary approach. The participatory approach allows to expand the goals of backcasting. As a result, they may include:
  - Generating various scenarios of the future;
  - Creating an action plan for various groups of stakeholders to achieve the desired shape of the future;
  - Presenting stakeholders with the available options and their consequences.

  This means that backcasting may indicate a need to change the current development path, if following it may not be appropriate to achieve the desired final effect.
- Practice-oriented participatory backcasting – uses participatory backcasting and its objective is to translate the analysis from the environmental or technological level to the language of specific social behaviour.

1.3. Examples of using backcasting

The range of problems in relation to which backcasting is used is growing systematically. Among the examples of using this approach, we may mention, e.g.:

- Strategic planning in the energy sector [Robinson, 1982; Anderson, 2001].
- Water resources management strategy [van Vliet, Kok, 2013; Kok, van Vliet, 2011].
- Sustainable development of technologies [Weaver et al., 2000; Jansen, 2003].
- Supply and demand for ecosystem services in regional terms (Brunner et al., 2016).
- Sustainable households [Green, Vergragt, 2002].
- Urban development strategy [Eames, Egmose, 2011; Höjer et al., 2011].
- Climate change [van de Kerkhof et al., 2002].
- Transport system [Tuominen et al., 2014; Soria-Lara, Banister, 2017].
- Strategy and planning at the level of enterprises [Robinson, 1992; Holmberg, 1998].
- Food aid [Galli et al., 2016].
- Regional sustainability [Tansey et al., 2002; Robinson, 2003].
- Creating a national agriculture transformation strategy [Kanter et al., 2016].

In order to better illustrate how to use backcasting in practice, below there are two examples of the issue related to the agri-food sector. Each presented example applies to a different research problem and the studies were carried out differently.

Use of backcasting to assess the supply and demand for ecosystem services in regional terms

Brunner and others [2016] decided to assess the scale of supply and demand for ecosystem services in one of the Swiss regions. The authors applied the backcasting approach using many research methods, by combining normative visions with models of land use and ecosystem service provision.

The objective of the study was to determine a strategy for the land-use policy allowing to balance the regional supply and demand for ecosystem services.

In order to define the vision of the future in relation to the demand for ecosystem services, an experiment was made (discrete choice experiment). It was participated by a group of residents of this region, and its objective was to define the preferences declared by those residents as regards the changes in the demand for four categories of ecosystem services – cultural heritage, protection against natural threats (e.g. flood, fires, soil erosion), protection of flora and fauna, and protection of the landscape aesthetics. At the same time, the use of the experiment made it possible to estimate the marginal value of changes in the scale of provided ecosystem services.

Then, the boundary conditions, i.e. socio-economic determinants were defined. For this purpose, a formative scenario analysis was used. This technique allows to combine qualitative assessments with optimisation of these assessments by means of statistical methods. Building of scenarios was based on translating global greenhouse gas emissions scenarios prepared by the Intergovernmental Panel on Climate Change (IPCC).

The next stage of the study was to designate the transformation paths. For this purpose, the agent-based land-use model has been applied. The already existing model designed especially for the study area – Alpine Land Use Allocation Model – Agent Based. The recursive dynamic model allows to develop a simulation of annual changes. This model assumed maximising farmers' income with specific socio-economic, political and environmental constraints. The simulations resulting from the application of the model showed different trends of changes in land use and hence also in the supply of ecosystem services. It was to specify a set of land-use policy strategies affecting the future supply of ecosystem services based on the sensitivity analysis. The use of the experiment and

of the economic land use model allowed to integrate the production function and utility function in terms of the economics of prosperity.

Then, based on the results of the sensitivity analysis (elementary effects method) of the applied model, the most important exogenous factors affecting the results of the model were identified. The impact of individual factors and their combinations was analysed. On this basis, the agricultural policy instruments were proposed. Only on basis of the potential state policy instruments, the alternative paths to provide ecosystem services were developed. What was analysed were not only the individual state policy instruments and their sets, but also different dates of their implementation. It was also checked how the changes in external factors would affect the implementation of the individual policy instruments.

The final step in implementing the study was to assess the individual paths in relation to the desired shape of the future. The marginal utility coefficients, from the experiment carried out at the beginning, was used to determine the level of benefits provided by ecosystem services on each transformation path.

The results of the study clearly show that the scale of provided ecosystem services depend on the applied state policy instruments and the moment of their introduction. In general, the sooner the state policy instruments from various areas of the state activities (e.g., agricultural policy, forestry policy, spatial planning) are introduced, the easier it is to increase the supply of ecosystem services. In addition, the study showed that residents valued most the protection of the landscape aesthetics. The study did not include, *inter alia*, the analysis of the costs of implementing individual sets of the instruments, however, it included only those whose introduction, with the existing socio-economic and political conditions, would be possible.

Use of backcasting for building the food aid strategy at the regional level

A completely different way of perceiving backcasting was applied in the study by Galli and others [2016]. The researchers applied explorative scenarios and backcasting recognising that in this way they created the foresight study. Usually, the foresight approach meant studies using forecasting. Those two concepts were even often used interchangeably.

The rationale for combining building the scenarios and backcasting was the specificity of the research problem. As pointed out by the authors of the study, the fact that food aid, and rather a need to provide it, depends on the ever-changing and uncertain socio-economic environment. On the other hand, the use of backcasting allowed stakeholders to go beyond the existing restrictions and to determine a long-term vision they desired. A clash of expectations with scenarios al-

lowed to determine which one of them is suitable for use from the point of view of the long-term vision.

In the initial phase of the study, partly structured interviews were carried out with the entities dealing with food aid, moreover, the premises of those entities were visited and data were collected. All those activities were to identify practices applied and resources held. Then, two workshops were conducted. The first one was to create a preliminary version of the local food aid strategy using backcasting, i.e. determining a specific vision of the future, and then determining the steps to be taken from now on, so as to implement the defined vision. In the next step, the existing scenarios for European food systems were translated into the local level so as to have the context to create scenarios for Tuscany. Then, local scenarios were developed by analysing, how the situation in Tuscany would look like in any of the European scenarios.

On the other hand, the second workshop analysed and assessed the scenarios and paths of reaching the selected point in the future, built during the first workshop. The objective was to determine the reality of the individual plans and to develop new concepts and ideas for achieving the chosen goal.

Based on four scenarios, the strategy of providing food aid with the time horizon of 2030 was designated. The result of the workshop was the creation of a vision called "Alliance for Food". This strategy assumed developing cooperation among all entities involved in food aid in Tuscany. Owing to the time limitation for the duration of the workshop, the vision was not developed in detail, but can be used as a basis for further work on more detail.

1.4. Conclusions

Creating a strategy, which will allow to implement its objectives, despite uncertainty and risk of changes in the factors, is an enormous challenge. It seems good to start from the desired shape of the future and adapt to it the instruments and tools of the strategy. This type of approach to creating the strategy is called backcasting.

Backcasting was evolving since the 1970s. Currently, it has many forms and is used to build the strategies with regard to various types of problems. It is particularly useful in the case of complex issues, which require introducing radical changes and for which external factors play an important role. The issues whose analysis used backcasting include, *inter alia*: sustainable development, energy use, transport networks, functioning of households or providing ecosystem services. We can also meet the work on various agriculture-related issues such as providing ecosystem services, food aid or national strategy for transformation of the agricultural sector.

Backcasting may also be used to build the development strategies for the agri-food sector. The development of this sector is a very complex problem, strongly dependent on external factors and, in the case of some of its problems, the market cannot fully handle e.g. the valuation of public goods generated by the sector. Therefore, the use of backcasting is most appropriate. However, we should keep in mind that backcasting itself designates only the framework of work on building the strategies. The details depend on the relevance of the selected research methods and the comprehensiveness of the approach to the entire study. At the same time, we should bear in mind that backcasting does not reduce the disadvantages of individual research methods and tools.

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2. Strategic dilemmas of the rural and farming policy in Poland[1]

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Abstract

The course on sustainable agricultural and rural development (SARD) was politically adopted. In view of this, there appears the issue of the policy of support of such development because market mechanisms are not sufficient in this respect. An effective policy requires relying on developed and politically adopted strategy of development, in which vision and strategic social goals will be defined. Among social goals, being in the field of view of the sustainable agricultural and rural development policy, the most important ones relate to the food security, natural environment, vitality of the rural environment and family farms. The purpose of the study is to identify the most important dilemmas of strategic importance for each of the distinguished goals and their appropriate justification.

Keywords: sustainable development, policy, social goals

JEL codes: Q01, Q18, R11

2.1. Introduction

Sustainable development has become the unquestionable existential challenge. The dispute is about the content of such development and the manner of meeting this challenge. With regard to the content, there is rather a consensus that it is not only about the preservation of biosphere capacity to perform ecosystem functions, but also about balance in the economic and social fields. Of course, the environmental field can be viewed as more important (as requested by environmentalists), than the economic field (which is indicated by entrepreneurs formulating the concept of corporate social responsibility) or social field (which takes place in the case of placing social goals as the most important, as it is in the socially sustainable farming). In relation to the method – the selection is within the range determined by two trajectories. One comes down to continuation (or rather modification) of the existing way of farming development, whereas the other comes down to an essentially different way (alternative).

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The first way was started in the period of replacing the feudal formation by the capitalist one, which was accompanied by the acceleration of the industrialization and urbanization processes – which forced the transformation of farming – referred to as modernization by industrial ways. Basic components (characteristics) of that way are: commercialization, concentration, intensification and specialization. The commercialization consisted in the excitation of a need to obtain money by peasants and the reorientation of production towards the market, rather than only towards self-supply. The concentration consisted in increasing the production potential, especially of an area, which enabled the increase in the scale of production and, therefore, in reduction of unit costs of production and the increase in work and income capability. The intensification consisted in the increase in consumption of industrial means for agricultural production (agricultural technology, fertilizers, plant pesticides, fodder and other) which expanded the supply of agricultural products. Finally, the specialization consisted in selecting the most beneficial products from the point of view of economics, simplifying the production structure, and at the same time boosting the scale of production and reducing unit costs. The process of farming modernization was possible as a result of the development of industrial means of production for the agricultural and trade purposes (including the import of fodder from overseas) as well as innovations. In this way, the agriculture succeeded in a great and indisputable way that is synthetically summarized in the metaphor of cheap and abundant food. The modification of that way consists in the technologies decreasing the pressure on the natural environment (precise agriculture, integrated agriculture) and innovations under the sustainable industrial intensification[2].

The alternative way consists in turning to the forces of nature and humanistic values, not ignoring, however, the economic efficiency. It is usually brought down to the concept of sustainable development of farming which includes different forms of farming, like the agri-environmental one. Materializing the way of sustainable development or rather the way towards sustainability requires the involvement of political institutions. However, one should be aware that just as the market is fallible, the politics is defective. The effective politics is a dream, as beyond all, the *sine qua non* condition of effectiveness are political institutions that are governed by the common good – hopefully embodied in strategy – rather than by particular interests. Certainly, the state, if sufficiently efficient, may serve the common good better than the market[3] that is governed

[2] Documented by H. Runowski, M. Maciejczak and T. Filipiak in [Zegar (ed.), 2017].

[3] In the opinion of Thomas Pikkety: "the market economy based on private property left alone contains important forces of convergence associated especially with the popularization of knowledge and qualifications, but also forces the stratification, powerful and potentially being

by actual or implied advertising consumer needs [Eckersley, 2004]. There is, however, no automatism, as the state may also fail[4]. In addition, the state has no full freedom in politics – it encounters understandable restrictions. Even in the past, states of absolute power did not have complete freedom with regard to determining strategy, not to mention its implementation. In democratic countries, the matter is much more complex and carries substantial amount of uncertainty. In democratic procedures the strategy even with the most correct and necessary objectives and programmes may fail. Such are the rights of democracy – *vox populi* has the legal importance of *vox dei*. Seldom is the majority right – it makes an optimal choice. It rather makes a choice which is a compromise that wins the majority.

Creating an accurate strategy of sustainable development requires a holistic approach to specify a vision and strategic goals, and then to determine efficient and effective instruments, among which the market is the most important.

Among the goals of sustainable agricultural and rural development, the most important are: food security, natural environment protection, vitality of the rural areas and family farming. Food security is important for a simple reason: it satisfies the basic human need that must be satisfied, which is a non-assignable duty of the state. Protection of the natural environment is important and necessary for existential reasons. The vitality of the rural areas – rural localities – and maintaining family farming do not have the rank of an existential need, but of a deliberate choice flowing out from agreed values.

Achieving the aforementioned goals requires resolving dilemmas (a selection of options) appearing in the field of operation of politics. The identification of these dilemmas and reflection on the choice of options are the basic purposes of this article.

2.2. Values – vision – strategy – policy

All rational actions come from values. Values are a great and complex matter. Generally speaking, the most fundamental values were recorded in the Decalogue, to subsequently be developed and supplemented by humanity, as during the French Revolution – in reaction to the breach of values in the feudal

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a threat for our democratic societies and values of social justice on which they rely on" [Piketty, 2015, p. 723].

[4] This is justified, e.g. by Tim Harford: "The force arising from deficiency, external effects and imperfect information do not disappear in a magical way, when the economy is managed or regulated by the state. Thus, if both the market and the government are unreliable, the decision consists often of choosing the lesser evil" [Harford, 2011, p. 196]. Similarly, Grzegorz Kołodko notices that macroeconomic decisions are often the function of a kind of political logic, ideology or particular interests of the dominant group [Kołodko, 2008, p. 85].

formation (disregarding slavery). Capitalism also breached some values. Such was the case in economic Darwinism, and such is the case at the stage of neoliberal capitalism. Values are also a social choice in which all social groups are involved. A particular role in this respect is played by politicians, the world of science and culture and mass media. These groups have a special responsibility for popularizing values. People act in accordance with values which they respect [Speth 2008, p. xvi]. Following values is particularly important in the chaotic world of the West, which, in the opinion of Sławomir Sztaba [2013], has lost the ability to predict as well as its self-preservation instinct. At the level of, state, the primary value should be the reason of the state, taking account of the durability of the nation (state).

Values are important in the economy. They were appreciated by the father of classical economics, Adam Smith: "The virtue which as a perfect lubricant smooths the wheels of the society (…) whereas an offence is as hideous rust which makes them jerk and rub against one another (…) virtue is desired by itself and an offence is in the same manner an object of aversion, it is not the mind that at first differentiates these differences of quality, but a direct feeling and experience" [Smith, 1989, p. 481]. The importance of values in the economy, G. Kołodko explained in a convincing manner in his book, one of the chapters (VI) of which is entitled "The economy without values is like a life without meaning" [Kołodko, 2013, p. 164 and the following].

Values are – or at least they should be – a starting point for the formulation of a vision, for which one can assume a sustainable development of agriculture and rural areas to be. Not everyone shares this direction in thinking, but the number of opponents of the idea of sustainable development is decreasing. Development strategy should be subordinated to the vision as it just begins with a vision. The strategy covering social goals and policy directions is necessary to avoid straying, and to achieve the intended goals effectively at the smallest effort. The strategy may be compared to a travel, which in a spatial dimension has to cover the way from a geographic point *A* to point *B*, and in the time scope it commences in one specific time *t0* and finishes in another one, perhaps not exactly specified *t1*. The point is to know the port at which we want to arrive[5]. In social and economic development the matter is far more complex, because point *B* is some kind of vision – an idea of the desired condition in the future. It is

[5] The famous Roman thinker Lucius Annaeus Seneca (4 BC – 65 AD) in LXXI letter to Lucilius indicated the need for orientation on good, which is the purpose of life: "He who wishes to shoot an arrow should know at whom it is aimed, and only then direct and prepare the weapon (…). For sailors who do not know what port they want to arrive at, each wind is contrarious" [Seneka, 2010, p. 238].

necessary to avoid chaotic actions and achieve or approach the desired condition. But it is also about the way – the way to achieve the target condition. Especially when it comes to whether the way will be steady or flat, and then steep or perhaps another. This is the known dilemma of short and long time. In the case of farming – food meeting a basic need – it is an extremely important dilemma. Augustyn Woś observed this fact [1990, p. 10]: "by choosing the strategy of farming development, not only the sum of food production in all years of the period covered by the projection is important, but also what will happen in particular years of this period". The strategy is necessary, first of all, for the policy, which was justified by Jerzy Wilkin [1995, p. 17-18]: "Policy should origin from the development strategy of farming policy and food economy. The lack of rooting of agricultural policy in the development vision of farming and the whole economy will make it unstable, ineffective and inefficient". The strategy should also identify strategic goals. Determination of objectives is nothing more than just the beginning of politics. To achieve agreed objectives one has to take some actions, which will make business entities and other participants of actual processes achieve these objectives. One has to follow a maxim that "the government is not for rowing but for steering". The whole art of politics consists just in making decisions by political institutions, resulting in reactions of the above entities in line with the expectations.

In formulating a strategy, a systemic and holistic approach is indispensable, because farming is a highly complex socio-economic system – a whole with hierarchical structure of subsystems of a various level that compose it and many aspects and internal connexions, as well as interactions with the environment. Internal connexions refer to relations between elements of a system. These elements are indeed subsystems, i.e. systems of a lower level (order) or systems showing the "smaller" whole. According to the theory of systems, the environment of agricultural system is the superior system containing a set of other systems.

In the case of the sustainable agricultural development, the principle of holism will apply both to systemic perspective of this development and programming the strategy to manage it. In the first case, it is about reflecting the multifunction of farming, determination of goals and desired levels for achieving them and multiway relationships between them. Market mechanisms normally lead to achieving some goals in surplus and others in deficiency. In particular, it refers accordingly to the so-called negative and positive external effects. In the second case – programming the strategy to manage sustainable development of farming – it is about the determination of objectives of such development and identification of instruments to impact the real system in order to achieve the assumed goals. In fact, it comes to politics or the commitment of an institutional factor to achieve

the assumed goals at the smallest expense of resources and measures, which is in an optimal manner. And that is where a problem of a criterion of the optimum appears, which at the reductionist approach – competent for the theory of (neo)classic economics – appoints the optimum differing from the social optimum. It skips the external effects thus generating a discrepancy between the private account (microeconomic) and the social account (macroeconomic). The principle of holism is considered only by multicriterial function of purpose taking the external effects into account.

The complexity of agricultural system also requires a complex method of testing it. It applies to testing an agricultural system in a static view and even more in its dynamic view. As statics is about testing structural connexions and sizes of components (elements) of a system, dynamics is also about conducting tests of factors (forces) driving its development – changes of conditions in time. In particular, it comes to avoiding the error of submission and using the effect of synergy.

The application of principles of holism in programming and sustainable agricultural development brings us to real (material) rationality[6] – an important praxeological principle[7], which has a direct impact on the effectiveness in management[8]. The strictly economic rationality is defective, though, it responds to the demands of the market. The process of management is also a social process which justifies the need for aiming at socio-economic rationality [Secomski, 1978]. The criteria of this rationality should cover goals of operations and measures and methods of operation. In this case, in the opinion of Józef Pajestka [1983, p. 121] there is a problem of "including ethically evaluating assessments in economic discussions".

[6] The differentiation between real rationality and methodological rationality was introduced by [Kotarbiński, 1973, p. 134 and the following].

[7] The praxeology is looking for the conditions of rationality of actions in general, and the economics – for the conditions of rationality in management [Kotarbiński, 1973, p. 381]. In common understanding of the term "rationality" means "the use of adequate measures to achieve well specified goals, while for an economist rationality means "making choices in accordance with an organized collection of preferences…maximizing expected usability" [Blaug, 1995, p. 334].

[8] In the theory of economics, the rationality involves the management effectiveness which in the opinion of Zdzisław Sadowski [1980, p. 88] "is an expression and measure of rationality in management, the more effective an action is, the more rational it is". In a conventional (classic) account of effectiveness, the effects and expenditures are quantified. In this situation each improvement in efficiency is favourable – consistent with a reasonable action. Such an account was questioned because of its negligence of external effects, many of which are not quantifiable and also because of new goals and restrictions in management. This created a need for a new approach to management rationality in which, in particular, one agreed that in the formula of the account of effectiveness, the effects do not have to be fully quantifiable, and that it is enough when they have a quantitive character – they can be arranged in terms of valuation: one is larger than another, while outlays must be quantified [Lange, 1964, pp. 12-13].

The problem is complicated by the hierarchical structure of the system expressing a sustainable development of farming. It turns out that achieving the optimum at the level of subsystems (elements, parts) does not always mean achieving the optimum at the level of the whole. It is nothing else but an effect of an error of submission. Therefore, in the strategy of sustainable development of farming one has to, at the same time, act for the balance between functions of farming (horizontal goals) and balance between vertical levels.

Rationality, just like effectiveness, has different content at different levels of management. Typically it is characterized by the microeconomic rationality and the macroeconomic rationality. The first is found at the level of business entities and is typically called the private rationality. The second is present at the macro level and is typically called social rationality. Along with globalization and the occurrence of absolute environmental barriers – there appeared the term of rationality at the planetary level, called planetary rationality or existential rationality.

The microeconomic rationality serves the optimization of benefits of the entrepreneur from the management and consists in "the use of principles of management for the implementation of a private purpose, for maximization of a private profit; it does not serve any purpose covering all economic activities of the society" [Lange, 1967, p. 224]. The microeconomic rationality is served by a classic economic calculation based on neoclassical economic theory. The macroeconomic rationality takes into account the aspect of manufacturing and sharing the social product and "it consists in such an allocation of production factors that enables to achieve the highest dynamics of economic growth, acceptable from the point of view of the economic balance" [Stacewicz, 1988, p. 16]. Social rationality is served by a social economic calculation based on the theory of ecological economics. Such an account should include external effects and limited natural resources, as their inclusion in the macroeconomic account creates the basis for the social optimum [Zegar, 2010, p. 262].

2.3. Food security

In historical retrospect, food security – an inalienable obligation of the state authorities – in fact comes down to the quantitative dimension – the delivery of the respective quantity of calories. Food – food product – was produced in a natural way, without the use of means of chemical synthesis and industrial pharmacological and growth enhancing agents. This started to change along with the development of industry, in particular chemical industry, and agriculture mechanization based on mechanical pulling power. Principal changes were introduced, however, in the second half of the 20th century with the dissemination of neoliberalism, industrial methods in agriculture, "the enrichment" of food

products in the food industry, the development of industry of the means of production for agriculture and the dominance of the corporate agri-food system. Neoliberalism promotes the thesis that only this system can provide food security in the most effective way. It is obvious, however, that the capital subordinates the agri-food system for profits rather than for feeding. This system is economically effective, but burdened with external effects, which cause its social inefficiency. An unquestionable merit of this system is an incredible increase in the production of relatively cheap food. At the same time, the growing awareness of ecological effects of food manufacturing by industrial methods and the relations between the quality of food and health (food diseases) caused the contestation of such methods and search for alternative methods.

Turbulences on the agri-food market in the second half of the first decade of this century caused the contestation of global agricultural-alimentary system as the only guarantor of the food security of particular countries. It turned out that it is advisable to have not only a certain level of food self-sufficiency and that there is a place for local systems. The latter are firmly supported by bottom-up social movements and the awareness that manufacturing food should proceed in a manner increasing the consistency of local communities. It is the direction in which actions of many agglomerations go in order to create municipal food systems.

The improvement in the economic level of societies increases interest in the quality of food. Admittedly, a lion's share of individual demand will be directed in the foreseeable future at products of industrial agriculture which are cheaper, but in spite of higher prices, the market segment of agricultural organic products of high nutritional and health values is expanding rapidly. Along with the increase in ecological-health awareness, increasing the level of income and reduction in the share of expenses on food within the structure of expenses in households, the role of the price subsides to a broadly understood quality.

In the light of the above, in regard to the food security, two strategic dilemmas appear. The first is concerned with relations between global systems and local systems, and the second with the method of manufacturing food: industrial or organic.

2.4. Natural environment

In such conditions, the preservation of the natural environment to allow nature to provide ecosystem services and services for the man is an absolute imperative. Agriculture serves an important role in this respect because, on the one hand, it is a significant user of natural resources (as in the case of physical space, soil and water) and it also puts pressure on natural environment (especially regarding methane and oxides of nitrogen emission and biodiversity), on the other hand,

however, it performs important functions supporting ecosystems (especially the creation of biomass, sequestration of coal, regulation of water relations, maintaining biodiversity). The specific character of relations between agriculture and environment consists in bidirectionality of these relations, which is conditioned upon specific agricultural practices in specific local natural conditions.

The basic strategic dilemma with regard to relations between agriculture and natural environment comes down to instruments of political impact: should these instruments be preventive or compensatory. In the first case it comes to the incorporation of issues of the environment to production processes of farming (through the administrative and economic instruments), in the second case, it comes to a failure to consider the environmental issues in production processes – accepting, therefore, negative environmental effects, and funding actions compensating these negative effects.

The diversity of natural and socio-economic conditions causes the agricultural and ecological usefulness of particular areas not to be identical. As a result, a sustainable development in particular areas requires compliance with various threshold values. With regard to the whole, it is likely to occur that in some areas one sacrifices ecological goals in favour of business goals (production), which will be justified, if the total result is positive. So we need to seek a balance point (saddle point).

2.5. Countryside

The industrialization initiated mostly in the cities was gradually expanding to the countryside, eroding its economics. Driving forces of the farming development were moving outside the countryside (means of production of industrial origin, innovations, deepening agricultural and food processing). Industrial products were gradually replacing traditional rural craft and handicraft goods, in this way depreciating the workplace and source of creation of income in the country by moving them to the cities. It had economic justification, as the efficiency of work in off-agricultural sectors – factory production of great scale – as well as in large scale of agricultural production was significantly higher than in small scale family farming and rural craft. Additionally, cultural changes, including the change in the consumption model, directed rural demand to goods and services generated outside the countryside. In the country operations of lower efficiency remained – newly created values. Money obtained by the inhabitants of the countryside was creating to a decreasing degree a demand for goods and services generated in the country, namely an increasing part of it went to entities outside the rural areas. Also agriculture, engaged in the technological treadmill, typical of industrialization of agriculture and despite the increasing productivity and work

efficiency, did not expand the implementation of added value – mainly due to changes in relation of production factors and relations of agricultural prices. Such circulation of money undermines, of course, the economics of rural localities – the local economics at the expense of the local communities.

At the same time, transformations of special importance for the further development of rural areas took place. These concerned deagrarianisation of the rural areas, demographic changes, the growing commercialization of an increasing number of aspects of rural life and the development of the technical, social, educational and cultural as well as financial infrastructure. The changes do not constitute some Polish peculiarity – they are the effect of a general trend in development of civilization and at the same time, an element of this development.

The accession of Poland to the European Union was a significant impulse for changes in the country. In particular, it comes to infrastructure which is of critical importance to alleviate major problems of the rural areas: economic underdevelopment, high unemployment, small mobility of manpower, high dependence on agricultural income, depopulation of some rural areas. Technical infrastructure development increases the comfort of life in the countryside and creation of new development opportunities for operations traditionally existing in the country (agriculture and craft) as well as new activities. The development of means of broadly – understood communication increases the availability of jobs, markets or other outlets and facilitates contacts with other rural localities and above all, with municipal centres. Electronic communication makes information for possible and perfectly reduces its costs as well as the financial capital, releasing them from barriers created by distance. The technological progress in communication gives rural communities an opportunity to overcome geographic and informational isolation. Social infrastructure creates the material basis for satisfying needs with regard to the school system, science, culture, health protection, education, social aid, leisure, physical culture – it is an important factor of sustainable development of rural areas and generally of civilization progress.

In the relations between the city and the countryside, there are new phenomena which can reverse the secular or even millennial tendency to depreciate the rural areas. First of all, in the last twenty five years of the 20th century in the USA and Europe there was a reversal in migration trends – also from capital [Marini, Money, 2006]. Those migrants are not only retired persons but more and more often representatives of freelance professions and management personnel, and, therefore, also the creators of innovations, added value and entrepreneurs[9].

[9] Jerzy Bański [2014, p. 24] aptly concludes that "The improvement in transport accessibility or the opportunities to work at home (teleworking) extend expressly the scope of residential districts beyond the suburban zone. The choice of a place of residence will be decided by its

To a considerable extent this is a result of a progressing deconcentration of industry and services (however so far except for agriculture, trade and entertainment). Also the demand for new goods and services generated by the country and in particular by agriculture is increasing. Along with moving to the knowledge-based economy, the meaning of innovations is growing, which are admittedly created in research-scientific institutions normally located in large cities, but their transfer has been significantly facilitated because of the development of technical infrastructure and new communication means (especially Internet). The value created in non-agricultural sectors of rural economy can be increased by basing on assets of the rural areas – by creating new jobs and sources of income based on farming (rural tourism, healthcare, recreation), use of rural resources (natural resources, landscape). The countryside is no longer passé.

It would be a cliché to state that rural towns are highly diverse. Therefore, the paths of further development will be different for various rural areas. There is no one universal approach to all rural localities. A different way will be the right one for peripheral rural areas – normally highly agricultural, which may result in depopulation, another for a communal village (with its registered office in the commune) and yet another for suburban rural areas. With regard to peripheral rural areas, the dilemma consists in leaving them to their own devices, which means depopulation and gradual disappearance of such rural localities, or making an attempt at saving some of them.

In the case of rural localities in suburbia, some of them are being absorbed by cities, some of the others, however, gain benefits by intensifying multifunctionality with economic benefits, but in general at the expense of agriculture. Rural towns in suburbia may also be subject to an intense extraction of work resources, and deprecation one of basic assets, namely natural values. In this case, the reduction in the participation of food functions takes place for the benefit of other functions, especially extra-production functions (a place of residence, leisure, services, social, natural and cultural). Rural towns in suburbia are in danger of becoming the city bedrooms and becoming similar to the city (district of the city). Meanwhile, the countryside should not be a copy of the city and should maintain its autonomy in the economic terms (agriculture along with agricultural activities, fine industry and craft, the sphere of services, related above all to environmental and landscape values, infrastructure), but also maintain its culture and lifestyle. "The village as a «mini-city» with its small potential is not an al-

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natural advantages (vicinity of a forest, water reservoir, attractive landscape, etc.), cultural qualities (e.g. aesthetic value and architecture of the rural areas, customs, interesting historical facilities) and technical qualities (the presence of high quality technical infrastructure and social one, shops, basic services, etc.)".

ternative to the city life. It is an alternative when, adapting to the requirements of the contemporary times, it remains a depository of unique resources which comprise the quality of life inaccessible in cities" [Wilczyński, 2003, p. 9].

Sustainable development of the rural areas requires rational spatial development of the rural areas, which in Poland can be considered an Achilles heel. It is one of these issues which seem to be unsolvable against obvious needs and its justified character. Meanwhile, spatial order in which there is a place for business operations, human settlements, open areas (ecological sites, flood lands/polders, etc.), formations by nature and man (manor houses, public buildings, parks, paths, mills, wind turbines, field patchwork) gives each town its unique character [Wójcik (ed.), 2014]. Spatial planning should force the building concentration, integrity of rural settlement units, enrich and protect the landscape. The method of space management transfers into the effectiveness of business operations (as in farming, patchwork of land and a farm layout) and costs of functioning of infrastructure and maintenance costs (infrastructure costs, costs of transport, the costs of using public institutions, etc.). The costs of faulty management can be seen even on the example of the construction of roads and motorways.

The problem with spatial economy also consists in using significant transfers from the European Union budget on agriculture and rural areas but also on infrastructure and environment. Suburbia does not have to be a nightmare, similarly not all rural towns need to exist.

2.6. Family farms

Family farms are the dominant form of social organization of agricultural activity both in developed and in the developing countries. For thousands of years until the industrial revolution, a basic form of family farm constituted peasant farms. Specific characteristics of peasant farms, ignoring cultural layer, is the orientation of the production for feeding their own family (normally multigenerational) and basing on one's own and family's work. This model still dominates in most of the developing countries. In developed countries, on the other hand, the form of goods farming dominates – in the Anglo-Saxon countries known as farmer agriculture. The main goal of this form of farming is the orientation of the production on the needs of the market, while as compared to the workload – it bases mainly on resources of family's work or on hired labour. In the first case we are dealing with family farms. In the second case, with family farming enterprises. In the Polish farming, in terms of numbers, self-supplying farms are dominant – in this sense peasant farms. On the other hand, in terms of production potential and volume of agricultural production, the advantage belongs to family farms of agricultural type

– i.e. oriented on commodity production (on the market). Family agricultural enterprises occupy a marginal position so far.

With regard to family farms, I am going to raise three strategic dilemmas. The first is concerned with the organizational form – the orientation on family agricultural farms or on family agricultural enterprises (excluding a great ownership). The second applies to the method of compensation for loss of income caused by market mechanisms depreciating agriculture. The third applies to competitiveness.

Family agricultural farms or enterprises? Agricultural enterprises have an unquestionable advantage over family farms with regard to market competitiveness, thanks to lower unit costs of production and higher commercial quality of manufactured products. This is accomplished as a result of specialization and production scale. Scale benefits along with the lower unit costs of production translate into higher income. The production and economic success of agricultural enterprises is burdened with the necessity of continuous growth resulting from growing costs of agricultural technology and costs of hired labour. Additionally, it is necessary to add the negative environmental effects, weakening of vitality of the rural areas and undermining social consistency. The specialization in plant manufacturing leads to monocultures and this is not beneficial to soil fertility. On the other hand, in the case of animal production specialization with a large scale production, it is accompanied by increasing difficulties with faeces utilization. The weakening of the vitality of the rural areas in the case of specialization, results from the production orientation on large recipients located outside the countryside, loss of permanent jobs in favour of odd jobs, the weakening of rural economics. With regard to social consistency, a natural tendency is created consisting in increasing profit at the expense of lowering hired employees' pay.

Market mechanisms depreciating agriculture are an issue which does not have just one explanation. Possible strategies consist in leaving the matters to their own devices (market) or undertaking intervention. The history of farming since the Great Crisis of the 1930s advocates to choose the second strategy, though some part of neoliberals question such an option – more in theory than in practice, which was proven in the 1st decade of the 21st century. Interventionism for the compensation of the market effects regarding income turned out to be defective, because it led to overproduction disregarding the breaching of the market rules. On the other hand, relying on the acceleration of industrialization of agriculture cannot also cope with relatively decreasing income and in addition it leads to conflict with balance. Thus, subventions remain that can be involved in the environmental and social functions of farming.

Competitiveness in the market economy is an objective phenomenon – it is the categorical imperative. Possible options consist in focusing on competitiveness on the global market, regarding mass products or niche products and the orientation on the local market, and what to remove from the market competition.

2.7. Summary

The market independently does not ensure the implementation of the concept of sustainable development of agriculture and rural areas. The market contributes to the fact that agricultural production is accompanied by the creation of negative external effects in surplus and positive effects in deficiency.

Materializing the concept of sustainable agriculture and rural development therefore requires such a policy that does not spoil matters which the market handles well (is functional) and expresses social preferences. The issue of social preferences is highly complex.

In programming and managing sustainable development a systemic and holistic approach is necessary.

A SARD includes four social goals. Two of them – food security and protection of ecosystems – can be considered as existential, and two others – vitality of the rural environment and family farms – origin from the definition (features, characteristics) of socially sustainable farming.

SARD strategic dilemmas relate to the determination of balance:

- In the case of the food security goal between the global system and local system as well as between industrial technology and agri-environmental technology.
- In the case of the environmental protection goal between prevention and compensation (i.e. the use of preventive and compensatory instruments) and allocation of agricultural production in: equal or diverse space.
- In the case of vitality of the rural areas goal between globalism and locality options as well as "rural" and "city".
- In the case of the family farms goal between the options of an enterprises and farm, the way to compensate the effects of the market and field of competition.

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3. Social cohesion, changes in rural society and the stability of the agricultural sector in the Czech Republic[1]

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Abstract

The paper is focused on assessing the stability of the agricultural sector, depending on the social cohesion and structural socio-economic changes of rural society. Since 2001, rural areas have been showing a higher population growth than cities in the Czech Republic. This change is reflected not only in the agricultural sector, but also in the structural characteristics of the present countryside. The number of small municipalities with up to 200 inhabitants has been decreasing for a long period. However, this is not only caused by their decline, but also by an increase in their population figures to more than 200 inhabitants. Traditionally shown indicators, such as specific features of rural families, cohesion of rural communities, lower educational level, fewer job opportunities, lower purchasing power or rural interconnection with the agricultural sector, could recently be evaluated within the context of current megatrends. The article is based on the analysis of secondary data focused on the socio-economic characteristics of the countryside.

Keywords: rural development, social cohesion, agriculture, Czech Republic, socio-economic analysis

JEL codes: A13, O18, N5

3.1. Introduction

The role of the agricultural sector varies, depending on the political, economic and social changes in the Czech Republic. The EU membership of the Czech Republic was associated with structural changes. This meant mainly a significant reduction of persons permanently active in the primary sector and agriculture. There was a strengthening of the secondary and especially tertiary sectors in rural areas. The European quota system, on the one hand, was based

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on the logic of the Common Agricultural Policy (CAP) which, together with the possibilities for drawing on Structural Funds, helped to restructure the national economy. However, on the other hand, the entire working and living conditions of the rural population were significantly affected.

The relationship between employment in agriculture and living conditions in the countryside is not only a relationship of two variables, but a complex of many factors. Some of these have their roots in the past and recent past (traditions, customs, local and regional identities, family relationships, etc.). In 19th and 20th century in Czechoslovakia, and later in the Czech Republic in the 21st century, agriculture played an important but not decisive role in employment for the rural population. This was caused by the inferior quality of land in a large part of the border areas of the Republic and, above all, the social structure of the rural population. There was a significant predominance of landowners whose families were unable to support the economy. The term "metallic peasant" expressed a double parallel job – in the factory and in an own farm/enterprise (of course, with the assistance of wives and older children). The outflow of labour from agriculture after World War II had other causes (political and economic). The formation of the current agricultural labour force and the social fabric of rural areas in many respects imitate the trends of European rural development. However, the Czech specifics are not overlooked and the logic of the whole development of the rural territory is logically reflected in them.

3.2. Characteristics of rural areas in the Czech Republic

Czech rural areas cannot be considered as a homogeneous area. There are many types of rural spaces [Klufová, 2015]. Apart from the socio-cultural and cultural-economic aspects, which include structured indicators [Perlín et al., 2010], seemingly simpler criteria based on statistically measurable indicators do not occur unambiguously. For example, the difference between the CSO (Czech Statistical Office) and the OECD methodology is as follows. According to the OECD, there are 5362 rural municipalities in the Czech Republic, inhabited by 30% of the population of the Czech Republic. However, according to the CSO, there are 5566 villages classified as rural, but the share of their population does not exceed 27% of the Czech population. A similar problem can be encountered in typing by the NUTS3 level (there are 14 regions of this type in the Czech Republic). According to the OECD methodology, one region is predominantly rural (PRR) and predominantly urban (PUR), while, according to Eurostat methodology it is 7x PRR and 2x PUR, the rest being an intermediate region (IR) [OECD, 2011; CSO, 2014; Eurostat, 2015].

Nevertheless, individual authors agree that an unequivocal definition of the countryside is difficult, precisely because individual rural sites bear the characteristics of their varied historical, economic, social and cultural development. Binek et al., [2011] emphasise the purpose of delineation rather than universal search and recommend the following points:

- Definition of rural areas for application of development tools.
- Definition of rural areas for statistical purposes.
- Specific definitions (classification) of rural areas.

From the point of view of the monitored context (the influence of the agricultural sector in the Czech Republic on the changes in rural society), the first aspect is important. The use of development tools is related to the redistribution of public funds, so the types have to be relatively simple and logically unifying. However, Binek draws attention to related paradoxes – unambiguous criteria suppress the logic of natural development entities and the direct relationship between the increasing refinement of the definition and the decreasing possibilities of this definition to reflect rural reality [Binek et al., 2011].

In rural regions of the NUTS3 PRR level, employment in the agrarian sector is 2-3 times higher than in the IR and PUR regions. The structure of the countryside is not uniform, because it depends on the size of the village according to the population and its location. Generally speaking, the smallest municipalities with up to 200 inhabitants suffer from a population decline, especially the newer ones. This is reflected in the aging population, as well as in the low quality of life here. In the long run, population numbers in these communities are reduced or become disappear.

The opposite situation occurs in the case of municipalities that have managed to start their own development. These municipalities, due to the population increase, more into the category of municipalities with a size of 200-500 inhabitants. The statistically reported trend of population decline in municipalities with up to 200 inhabitants, including the decrease in the number of such municipalities, cannot be considered only negatively, but also as a positive example of good practice in rural development.

Migration processes have also undergone changes over the past 25 years. At a global level, the migration trend of the 1990s proved to be beneficial to the countryside. However, it is important to note that the distance from a larger centre plays an important role here. The closer a village is to the centre, the larger is the number of inhabitants, and vice versa. Municipalities in suburban zones do not play as important role in the lack of civic amenities, as in the more remote municipalities. Even though there is a discussion about the functions that small municipalities should perform [Bernard, 2011], it can be concluded from suburban development

that greater multifunctionality of every rural settlement is advantageous to their subsequent development. However, it remains a question of whether municipalities meeting the statistical criteria for the designation as rural, but which are completely dependent on the proximity of a larger centre, can indeed be considered as rural. Therefore, the data presented in Table 1 offer only a more general idea of the distribution of the rural population in the Czech Republic.

Table 1. Population in rural areas 2001-2015

Population in village/Year	2001		2008		2014		2015	
	Villages	Citizens	Villages	Citizens	Villages	Citizens	Villages	Citizens
Up to 99	548	38 881	518	36 512	458	32 649	453	32 259
100-199	1 113	166 214	1 048	155 578	997	148 036	995	147 834
200-499	2 041	663 416	2 024	660 126	2 001	651 677	2 006	654 936
500-999	1 280	893 592	1 312	922 543	1 369	962 432	1 365	962 262
1000-1999	652	903 757	692	962 615	745	1 038 124	747	1 041 459
Total rural	5 634	2 665 860	5 594	2 737 374	5 570	2 832 918	5 566	2 838 750
Total for the CR	6 258	10 230 060	6 249	10 381 130	6 253	10 512 419	6 253	10 538 275
Share rural/the CR (in %)	**90.00**	**26.10**	**89.50**	**26.40**	**89.10**	**26.90**	**89.00**	**26.90**

Source: CSO, 2016a – number of inhabitants in municipalities.

3.3. Contemporary economic conditions of rural areas in CR

When comparing the economic activities of rural and urban areas, it is possible to find that rural areas are gradually offsetting urban areas – 47.9% to 49.0% of the active population. Problems again occur in municipalities with up to 200 inhabitants, where the share of the economically active population is the lowest, i.e. 46.7% [CSO, 2016b].

Unemployment reached 6.1% at the end of 2015 for the whole of the Czech Republic, with only 5.2% in the rural areas (municipalities with up to 2000 inhabitants). On closer analysis, it is clear that the country is suffering from a lower unemployment rate, but it is also clear that the proportion of job vacancies is only 17-21% and that, for every one workplace, there is an average of 6.3 jobseekers compared to cities – 3.8 jobseekers. The reason for this discrepancy is the high share of commuting and the low rate of new job creation in rural areas. This fact also corresponds to data on income structure of rural households. Revenue from social payments is 30% and from dependent activities 55% of the total income in rural areas. Their share is growing faster than the average of the Czech Republic and, on the other hand, revenues from business activities account for only 8%, while they are growing more slowly compared to the Czech Republic [CSO, 2016b] – see Table 2.

Table 2. Incomes in the Czech Republic and rural areas

Type of Income	Increase by		Share in rural areas
	Czech Republic	Rural areas	
Wages	3.2 %	5.4 %	55 %
Incomes from entrepreneurship	7.8 %	5.2 %	8 %
Social incomes	2.1 %	3.6 %	30 %
Others	x	x	7 %

Source: CSO, 2016b, Employment, unemployment and economic activity of the Czech population.

Business environments in the countryside, and in particular the agrarian sector, affected over the last two years by the embargo on Russia, when individual entities exporting to this country had to find other locations for their products and services. Furthermore, the rise in prices of chemical fertilisers has had a negative effect. Green Reports from the Ministry of Agriculture have repeatedly highlighted the ever-increasing consumption of this type of fertiliser. Last but not least, from 2015 onwards, long drought occurred, whose impacts on farming were not covered by farmers' insurance contracts. On the other hand, a good macroeconomic indicator of the state of the Czech economy is also reflected in the reduction of interest rates for entrepreneurs and in the countryside [Ministry of Agriculture, 2014, 2015].

As far as the business structure in rural areas is concerned, these changes can be observed in the long term. A lack of jobs in the countryside leads to higher commuting rates, as well as to the pressure to set up trades that are partly abused in what is called the Svarc System[2] (employers hire tradesmen to work to the same extent as if they were employees but, because they are not legally employed, employers do not have to pay compulsory contributions). In rural areas, there is a higher share of companies without employees than in urban areas – 90% to 88.6%. Vice versa, most of the larger companies with more than 250 employees (80%) are in urban areas. These large businesses, however, only address part-time unemployment in the countryside, as they require better qualified workers than the rural population can provide.

According to the Green Report, the overall productivity of agriculture is increasing. Although prices of agricultural products declined (by 6.0%), the prices of inputs to agricultural production decreased (by 7.1%). However, other sectors increased their productivity and, therefore, the share of agricultural production in GDP fell from 0.97% in 2014 to 0.83% in 2015. However, in the structure of exports, its share increased from 4.97% in 2014 to 5.2% in 2015.

[2] Named after Miroslav Švarc, an entrepreneur in construction, who operated this system in the 1990s and was convicted and one of the first to be prosecuted. Since 1994, this system has been illegal in the Czech Republic.

Since the Czech Republic's self-sufficiency in agricultural production is only covered by some commodities, the import of agricultural products from abroad is also increasing. Its share of the overall import structure increased from 6.25% in 2014 to 6.41% in 2015.

One of the factors influencing the above indicators is also the good economic performance of the Czech Republic in general. Customers can afford to buy more expensive foodstuff, because their share of food expenditure on total spending dropped to 20% in 2015 [Ministry of Agriculture, 2014, 2015].

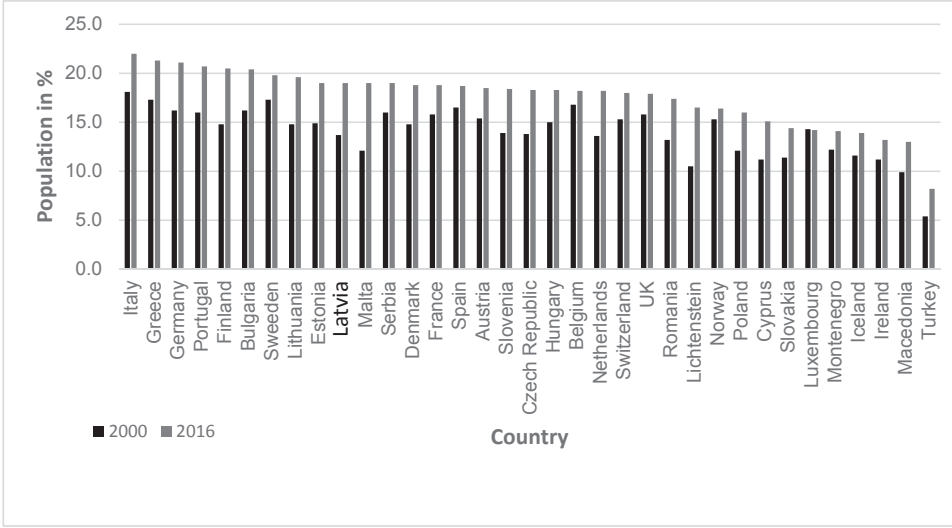
3.4. Social situation in rural areas

The diversity of rural space has historical roots. Typologies can form a framework in which potentials are emerging, determining the further development of the site and territory. Very briefly, we can define the most important aspects, such as the size of the site, its geographical location, the nature of the landscape, soil fertility, the intensity of use of natural resources and the social structure. However, the determinants of social stability – human and social capital and the existence (including density and quality) of social networks – are equally important. To put it briefly and simply, it can be stated that Czech and Moravian villages differ in terms of the size of municipalities; suburban zones are the fastest growing in all types of rural areas, and the determinant of development potential of the countryside is the age and educational structure of its inhabitants

Population aging (including rural) is a pan-European trend. Between 2000 and 2016, it increased in all European countries (see Figure 1). In this respect, there are no significant differences between old and new (and developed and less developed) the EU Member States. With 18.3% of the population older than 65 years, the Czech Republic is ranked roughly in the middle.

The aging trend implies the need to address many different but related tasks. These do not just concern rural space, but are important for different types of rural communities. Everyone ages in a different way and in another time span. On average, the lower education of the rural population means lifelong employment in physically demanding professions, with a high probability of occupational accidents and occupational diseases. This affects the state of health in old age and the possibility of a good retirement age. The stereotypical view of a senior person as a lonely, senile, inflexible, sick and, above all, passive individual, dependent on the help of others, applies to a part of the population only. In general, we can divide the age group into three categories: young seniors (65-75 years), old seniors (76-84 years) and very old seniors (85 and over). Each group faces different age-related problems.

Fig. 1. Percentage of the population aged 65 and more in individual European countries in 2000 and 2016



Source: CSO, 2016c, Percentage of the population aged 65 and more in individual European countries in 2000 and 2016.

Young seniors refer to retirement, leisure, hobbies, self-realisation, family support, and other activities. However, their economic involvement in the life of the municipality is also present, in particular where young people leave or do not reach the educational level and experience of the older generation. At present, seniors are an important part of the workforce in the Czech economy, on average making up about 5%. Senior employment is most affected by education. In some fields, they are a very important part of the workforce. Senior college employment is rising, currently averaging approximately 19%. About 42% of seniors work in highly qualified professions (such as scientists, technical specialists, doctors, educators, etc.). Finding compensation for them is sometimes very difficult because, in addition to education and lifelong experience, they are willing to work under less favourable conditions than the young generation. They are more likely to adapt to inferior amenities of communities, and their primary concern is not a progressive career, but maintaining the career grade for which they have the physical and psychological abilities.

For manual workers, the situation is slightly different. On average, about 14% are employed, mainly in unqualified and auxiliary professions. Therefore, the workload is physically more demanding, and it is impossible to count on longer-term intense work engagement.

Seniors are also among entrepreneurs and are able (and often willing) to fill an empty place in rural services. Nevertheless, even in this case, their economic activity depends primarily on their state of health and preferences for quality of life.

The overall aging population places higher demands on the social security system. Seniors over 75 years of age mostly need some external assistance, either in the form of institutional care, long-term hospitalisation or subsistence. In the Czech Republic, we may mention three levels of care for the elderly:

1. Basic care
   At this level, senior care is provided by the family. Assisting an elderly person in a family requires a considerable degree of social cohesion in the family. This care is often costly, physically and emotionally demanding for the whole family. This model, when it works in an ideal form, is the most efficient. However, the family often fails to provide sufficient healthcare or, alternatively, fails to care for the elderly, and therefore they move to the next level of care for the elderly.
2. Field/Outpatient Care
   This is the care in which the senior stays in his/her natural environment while receiving healthcare. The combination of family care and field care (provided by the public or private sphere) is an economically and socially viable option to provide senior citizens with good old age. The most commonly used types of social services in this category are personal assistance, nursing services and relief services.
3. Partial constitutional and complete institutional care
   Day-care centres and homes for the elderly are included at this level.

Care allowance is granted to persons dependent on the assistance of another person. The cost of the contribution is covered by the state budget. The amount of the contribution is determined by the degree of dependency. The amount of the allowance for persons over 18 as at 14 June 2017 ranges from CZK 880 to CZK 13 200 per calendar month [§ 11, Act No. 108/2006 Col., on social services]. Based on this contribution, what is called a "customer approach" emerges, giving the client the ability to choose what service to use.

In rural communities, the status of seniors is different from that in cities. In some ways, care for the elderly is easier, in other ways more difficult. In rural areas, housing in own family homes or restored farmhouses prevails. There is usually no pressure to free the apartment for the younger generation. In the construction and reconstruction of houses, housing for the older generation in the same house or nearby is often considered. The garden, orchards, a small person-

al income, the proximity of family and relatives and permanent neighbours create a set of assurances with which the difficulties of aging are easier to handle. The possibility of physical activities linked to the natural environment is clearly a positive contribution. On the other hand, the absence or decreased availability or quality of health and social services is a difficult problem, because their cost would have to be balanced by an adequate clientele. However, in the aging of the population, this does not reach the number of clients on such a scale that services are economically advantageous for both the state and private entrepreneurs. For this reason, the rural population must necessarily take into account "family care". The state is gradually trying to make this more financially attractive to family members on whose shoulders this care rests. However, the number of unsuccessful applicants for placement in retirement homes is still very high (see Table 3).

Table 3. The number of inhabitants per retirement home in the Czech Republic

Region (NUTS 2)/Type	**Number of inhabitants per retirement home**
Central Bohemia	2 512
City of Prague	6 485
Hradec Králové	1 204
Karlovy Vary	5112
Liberec	3 418
Moravian-Silesian	2 661
Olomouc	2 904
Pardubice	3 167
Pilsen	3 709
South Bohemia	2 564
Southern Moravia	4 015
Ústí	2 947
Vysočina	3 448
Zlín	2 605
Total	**3 133**

Source: Ministry of Labour and Social Affairs, 2013, Own Processing.

3.5. Transport exclusion and scarce infrastructure in rural municipalities

The Czech Republic is characterised by a relatively dense transport network, but this does not adequately cover the needs of rural areas. The current Czech countryside is in what is called a "vicious circle of public transport in the countryside". The small population size of the countryside is a condition for the low profitability and efficiency of transport links. Subsequently, this transport is necessarily subsidised by the public fund. This is followed by efforts to increase the economic efficiency of connections and, for this purpose, a reduction in the offered connections is introduced. At the time when the offer is reduced, the quality of the service is simultaneously reduced. Some users move to a different mode (mostly a car), reducing the number of users and further reducing the profitability of the links.

Within the social dimension, public transport is seen as a "social service", but not in terms of ensuring the most uniform availability of opportunities and as a possible support tool for regional development. Actual public transport is regarded in the sense of how to provide a basic service for commuting to schools for people without access to a passenger car. This conception is the reason for the emergence of impermeable regional boundaries and, therefore, the territorial division of the state. Transport exclusion affects persons who do not have the right to obtain a driving licence. This group also consists of low-income people, students, elderly or physically disabled people, women and single mothers [Knowles et al., 2008].

The quantity of bus and train connections offered in the countryside increases with the population size of municipalities. In small municipalities, the population demand for public transport is not reflected. This is due to the efforts to provide transport services in different transport directions and at different time intervals. Public transport links have a problem of adequate timetable coordination. The number of passenger cars is higher in municipalities with fewer inhabitants [Marada, Květoň, 2006].

The effort to standardise public transport in the country is demanded by the state, regional and municipal authorities, because it is not certain whether the financially demanding system will be sufficiently competitive against individual transport and will equally ensure the mobility of the population, regardless of age, health or social status. In the Czech Republic and in other post-socialist countries (such as Poland, Romania and Hungary), there is a marked increase in passenger cars. The increasing number of cars in these countries is due to the fact that this free choice was previously suppressed by state policy. At the same time, the price of cars is higher. Ownership of a car becomes an indicator of the standard of living and a certain lifestyle of the population in the Czech Republic [Kraft, 2011]. In rural areas, however, it is also an indicator of the quality of life, because without a car (whether owned by an individual or a family), some basic living needs are difficult to access or economically unattractive.

3.6. Conclusions

Changes in the socio-economic characteristics of the rural areas have direct impact on the agrarian sector. The aging of the rural population, which threatens the stability of agriculture and reduces the rural development potential, arises from the fact that the young population moves into cities and, on the contrary, the older generations move to rural areas. Younger generation, who received higher education in the cities, does not find appropriate employment in rural areas. The agricultural sector, although modernized, is not so much de-

pendent on a skilled workforce as compared to industry and services. And less qualified work is also less awarded. Further, the fragmentation of rural communities does not allow for sufficient transport service, which is another factor driving the young generation into cities. This situation is typical especially for small municipalities with less than 500 inhabitants.

However, the stability of agriculture is not only threatened by socio--economic factors within the region but also by external factors. The international situation in trade of agricultural commodities or national and European subsidy policy have a considerable impact on this sector.

To solve the problems of rural areas, it is necessary to approach them in a comprehensive way. Besides the stabilization of the agrarian sector, it is necessary to develop related fields in the tertiary sphere, which will be more aimed at economic profitability and efficiency. Not to waste human capital related to the older generation it can only be done with the support of increasing the cohesion of rural society.

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4. Assessment of territorial cohesion in terms of technical infrastructure of rural areas in comparison with cities[1]

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Abstract

The paper assesses territorial cohesion in terms of technical infrastructure of rural areas in 2005, 2010 and 2015 and their implications in making up for the development distance compared to urban cities. Based on statistics from the GUS Local Data Bank, the synthetic technical infrastructure development indicator was calculated for all gminas in Poland (2476), using the Z. Hellwig method. The studies showed that the spatial structure of Poland was subject to significant changes associated with the development of technical infrastructure. Characteristic of this process are the growing disparities between dynamically developing units and regional facilities. Polarisation of the technical infrastructure development level is strong and persistent in the city-countryside arrangement while it is definitely lower in the West-East of Poland arrangement.

Keywords: technical infrastructure, territorial cohesion, spatial cluster, rural areas, cities

JEL codes: H54, 012, 018, R12.

4.1. Introduction

The considerations on territorial cohesion in the aspect of the spatial development have been ongoing for many years. From these considerations it results that territorial cohesion applies to the issues related to integrated management of the territory, which mitigates and prevents its polarisation. In accordance with this idea, for the purposes of the studies it was adopted that technical infrastructure is an important factor of the territorial cohesion process, as it is closely associated with the territory for which it performs certain tasks. Therefore, it is a specific territory-related resource, which affects the socio-economic development of this territory.

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The importance of infrastructure in the development of the territory is stressed in many theories of spatial development (e.g., growth poles theory, centre-periphery theory, local development theory), as well as in the empirical studies by, e.g. Ratajczak, 2002; Kołodziejczyk, 2014. The empirical studies prove that important is not only the fight for the largest budget for an infrastructure investment project, but also proper management.

The purpose of the studies was to delimit the phenomenon of territorial cohesion, in terms of technical infrastructure in rural areas in comparison to cities, as well as to indicate the areas affected by polarisation of development in terms of technical infrastructure (clusters). The following study assumptions were adopted:

- Change in one element of technical infrastructure induces changes in other elements, and a connection among them increases mutual interactions – according to the principle of circular and cumulative causation by Myrdal [Myrdal, 1958].
- Deep transformations taking place in local structures, when it comes to infrastructure of certain areas, sometimes result in difficult to reverse local inequalities (divergence) leading to the marginalisation of these areas.
- Development level of rural infrastructure and the diversity of their socio-economic conditions make the susceptibility of rural areas to new forms of land use selective. In particular, large cities have a considerable influence on spatial changes in areas located in their range of impact.

The spatial range of the studies includes the urban gmina (306), urban-rural gmina (601) and rural gmina (1,569), in 2005, 2010 and 2015.

4.2. Material and methodology of the studies

The study on territorial cohesion of gmina in terms of the development of technical infrastructure refers to its measurement in terms of its spatial accessibility (100 km^2 of the gmina area) and social accessibility (per number of inhabitants). Important in these terms is to achieve the level of access to services provided by individual infrastructure facilities at a level acceptable by the local community. A prerequisite to assess this approach is, therefore, to associate infrastructure with the population and spatial arrangement.

In general, infrastructure is defined as basic equipment and institutions necessary for the functioning of the economy and society [New Lexicon PWN, Warsaw 1998, p. 679]. Assessment of the development of technical infrastructure is based on fundamental elements, such as: the length of the water supply, sewage and gas networks per 100 km^2 and the percentage of the population using water supply, sewage and gas networks. Because technical infrastructure is a multifac-

eted phenomenon the authors used the synthetic indicator. The Z. Hellwig method was used [1968) to assess the technical infrastructure development level. Synthetic infrastructure level development indicators were calculated for 2005, 2010 and 2015. The obtained values, assessing the technical infrastructure development level, are shown in relation to the average for the analysed area, adopted as 100. Synthetic infrastructure level development indicators allowed to divide the analysed community of gminas into five groups, based on the average value of the synthetic indicator and standard deviation from the average:

- very low level: $x_i < \bar{x} - 0.9\delta_x$;
- low level: $\bar{x} - 0.3\delta_x > x_i \geq \bar{x} - 0.9\delta_x$;
- medium level: $\bar{x} + 0.3\delta_x > x_i \geq \bar{x} - 0.3\delta_x$;
- high level: $\bar{x} + 0.9\delta_x > x_i \geq \bar{x} + 0.3\delta_x$;
- very high level: $x_i \geq \bar{x} + 0.9\delta_x$.

The division of gminas into five groups in terms of the technical infrastructure development level allowed to determine the relations among them, i.e. to assess their cohesion. In contrast, to delimit the areas of polarisation of technical infrastructure (spatial clusters) the spatial statistics methodology and tools – spatial autocorrelation – were used. In spatial autocorrelation, "the occurrence of one phenomenon in one spatial unit results in increasing or decreasing the probability of the occurrence of this phenomenon in neighbouring units". To determine its strength and direction, Moran's I statistics was used, its global value (referred to the entire set), and local value (referred to individual units/gminas). Local Moran's I statistics measures both whether the unit/gmina is surrounded by other neighbouring gminas with similar or different values of the analysed variable and the statistical significance of this relation [Kopaczewska, 2007]. The phenomenon of spatial autocorrelation is, therefore, a consequence of the spatial dependency. GeoDa^{TM} 0.9.5-i software was used to calculate the spatial autocorrelation statistics.

The verification and quantification of the study objectives were based on the materials from the GUS Local Data Bank.

4.3. Territorial cohesion as a spatial development category in the European and national policy

The territorial dimension is one of the fundamental issues in the European Union development policy. It is stressed in Article 2 of the Treaty of Rome – on

the occasion of creating the EEC in 1957[2]. It is written there that the Community should develop harmoniously, with the aim to strengthen its economic and social cohesion. This also applied to rural areas. Similar provisions were continued in other primary law acts (e.g., the Single European Act and the other adopted EU treaties).

The provision of the Treaty of Lisbon, in which economic and social cohesion was completed by territorial cohesion is important for the European regional policy (cohesion)[3]. It stresses that the achievement of territorial cohesion should be implemented at all levels: European, national, regional and local level, with due respect for the subsidiarity principle and for the achievement of the general objective of the cohesion policy. From the European perspective, the concept of territorial cohesion applies rather to equalising the level of development among the individual countries/regions, i.e. convergence, which is associated with financial support from the EU in terms of cohesion (with the use of cohesion funds). Thanks to this, the EU countries, and in particular the regions with the lowest level of development, use these funds. Some rules of distribution of the funds and mechanisms to coordinate actions supported by the individual funds were adopted.

The importance of integrated actions for the spatial development at the EU level was pointed out in the *Cohesion Reports* (since 2005), *Community Guidelines for Cohesion* (2006), as well as the *Green Paper on territorial cohesion, Turning territorial diversity into strength* (2008) and the *Territorial agenda of the European Union Towards a More Competitive and Sustainable Europe of Diverse Regions* (2011). The most profoundly, the issue of territorial cohesion in the context of the space was considered in the *Green Paper*, which has defined the objective of territorial cohesion as "to promote the harmonious and sustainable development of all areas, by reference to their territorial characteristics and resources"[4]. This document also stressed the role of infrastructure in that process. Unfortunately, no common definition was adopted for territorial cohesion, for the issue of implementing based on the EU and national policies and for the regional indicator which should be striven for.

The territorial perspective on economic and social cohesion was highlighted in the cohesion policy for 2014-2020. The focus was on a more integrated approach to the implementation of the objectives presented in the Europe

[2] *Treaty on the creation of the European Economic Community (EEC),* Rome, „Collection of Documents" 1957, No 5, p. 950.
[3] Protocol No 28 on economic, social and territorial cohesion, Treaty of Lisbon.
[4] European Commission, *Sixth progress report on economic and social cohesion* (COM (2009)295), Brussels 2009, p.13.

2020 Strategy in cooperation with regional and local self-governments. Also, three long-term strategic objectives of the EU rural development policy were formulated, e.g. the balanced territorial development of rural areas.

On the other hand, territorial cohesion in the internal policy of the country is treated ambiguously and it refers primarily to the spatial dimension. The point is to prevent excessive spatial variations (within and among the regions). As indicated by the documents of the Ministry of Economic Development, this is a policy oriented towards the use of the endogenous potential, territorial resources and knowledge and allowing to implement interventions focused on development challenges, and, at the same time, precisely adjusted to local conditions. Thus, success of the cohesion policy depends on building the territorial development on the endogenous potential and on strengthening it with the Community dimension. In the literature of the subject, it is called *the neo-endogenous mechanism*, using a combination of internal and external resources, as well as scientific, management and local knowledge [Adamski, Gorlach, 2007].

However, the achievement of territorial cohesion requires the construction of a development strategy (for the country, region, gmina) in such a way so as to accurately and realistically identify the endogenous potential and development opportunities, as well as to determine investment priorities and instruments supporting these areas. This will allow for the consistent implementation of the designated development path in the ever-changing socio-economic conditions. In the case of rural areas, it is also important to coordinate intervention instruments of the rural development policy and cohesion policy.

4.4. Territorial dimension of the technical infrastructure development level in rural areas in the context of cities in Poland – results of studies

In analysing the rural development, it should be stated that each area has its unique territorial potential, which should be used for development purposes by means of a policy adjusted to the needs of this territory. Given that technical infrastructure is a basic element of spatial management, it is worth presenting disparities in the infrastructure development between rural areas and cities in Poland. The point is to answer a basic question: how to control the location of infrastructure equipment so as to contribute to territorial cohesion and thus to ensure economic and social cohesion of rural areas and to prevent the depopulation of rural areas.

The development of technical infrastructure – as public services – is the own task of gminas (Journal of Laws No 16, item 952 as amended). Owing to

the high costs of infrastructure investment projects, not every gmina may finance expenses from its own income. That is why gminas apply for external financial resources (mainly from the EU) as additional support for the infrastructure development. In the budget period 2014-2020, it was planned that the share of own funds of a self-government should be about 37% of the value of an investment project. Unfortunately, the individual indicator applicable since 1 January 2014 and determining the upper limit of gmina debt prevents many gminas from applying for additional funds, which would help in supplementing the own share. It should be added that the investment value of the self-government sector in Poland in relation to GDP is the highest among the EU Member States. In 2009-2015, this indicator exceeded 3%, while the EU average was about 1.5%.

In analysing changes in the development of individual technical infrastructure elements in 2005-2015, it can be concluded that there were favourable changes both in the network density and in the number of people using services provided by these facilities. The greatest changes occurred in the sewage network; for example, its density in the case of urban gminas increased by about 43%, in urban-rural gminas – by 96%, and in rural areas – by 126%; percentage of the population using these services in rural gminas increased by about 90%, in urban-rural gminas – by about 33% and in urban gminas – by about 11%, whereby the annual growth rate in the sewage and water supply networks was higher in 2005-2010 rather than in 2010-2015. This was due to the fact that in 2005-2010 the possibilities to obtain funds for the development of technical infrastructure were greater, so was the need to develop those facilities in rural areas. Still, the disparities between the development of the water supply network and the sewage network are high. The length of the sewage network in relation to the water supply network in rural areas is about 45%, in some gminas these disparities are 1:8. Unfortunately, still there are gminas without basic technical infrastructure. In 2015, the water supply network was absent in 0.6% of rural gminas, the sewage network in 10.6%, while the gas network was absent in 50.2% of rural gminas and in 23.2% of urban-rural gminas.

Using the variability of basic elements of technical infrastructure regarding spatial and social accessibility, the Z. Hellwig method was used to assess the technical infrastructure development level in the analysed gminas in 2005, 2010 and 2015. The development level and the variability of infrastructure in individual types of gminas by their population is presented in Table 1.

Table 1. Technical infrastructure development level vs population of gminas

Type and size of gminas in thousands of residents	Technical infrastructure					
	development level			variability coefficient		
	2005	2010	2015	2005	2010	2015
urban	203.4	199.7	202.5	33.2	34.1	30.1
< 10	136.2	134.3	142.6	36.9	35.8	40.6
10 – 20	186.3	178.9	187.8	32.6	33.3	30.2
20 – 50	228.5	221.2	220.5	28.3	30.9	25.0
50 – 100	228.2	230.2	228.1	25.9	26.3	22.9
> 100	229.4	226.4	224.5	18.3	17.3	16.7
rural	82.2	83.4	82.8	26.9	29.1	31.5
< 2.5	64.8	65.0	62.0	23.5	15.9	26.0
2.5 – 5	76.7	74.5	73.9	19.3	17.6	21.8
5 – 10	81.6	82.3	81.9	24.8	24.5	27.6
10 – 15	96.3	103.0	102.0	29.3	32.0	32.9
> 15	111.8	118.1	115.9	36.4	34.8	34.5
urban-rural	94.0	92.7	93.0	20.4	26.2	24.5
< 5	79.7	78.8	74.9	12.1	20.0	16.6
5 – 7.5	82.6	79.3	80.4	13.9	13.5	15.6
7.5 – 15	90.1	88.3	88.7	16.4	19.3	18.1
15 – 30	101.2	100.1	101.0	17.6	23.4	21.9
> 30	126.1	130.1	130.2	17.9	30.8	23.5

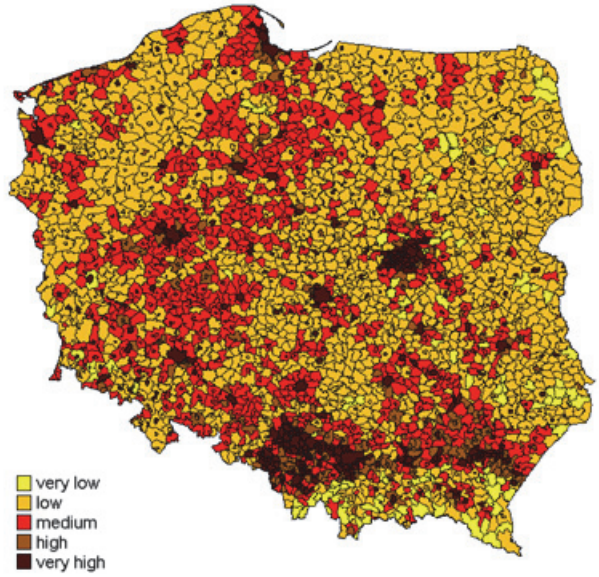
Source: own calculations based on the GUS LDB data.

The highest technical infrastructure development level was in urban gminas and gminas with the higher population, regardless of the type of gmina. This shows that from the point of view of the development and functioning of these facilities, the population of the gmina is important. On the other hand, greater differences in the technical infrastructure development level were noted in case of urban gminas rather than urban-rural and rural gminas, as evidenced by the variability coefficient. In urban gminas, along with an increase in the population, those differences decreased, while in rural and urban-rural gminas they increased. Comparing the variability coefficients in the analysed years, in individual types of gminas we may see a small increase, this proves the persisting differences in the development level. This can result from too diverse financing opportunities for these facilities (higher activity in acquiring non-budget funds), as well as from larger needs in this regard.

The most diversified in terms of the infrastructure development level were the Małopolskie, Podkarpackie and Śląskie Voivodeships, while the least – the Kujawsko-Pomorskie and Warmińsko-Mazurskie Voivodeships. Taking into account the average value of the synthetic indicator and standard deviation, in the analysed area five main groups of the technical infrastructure development level in gminas were identified (very high, high, medium, low and very low). It

must be noted that in 2015, the very low and low level was observed in 52.1% of the analysed gminas. The highest share of gminas with this level was in rural gminas (65.1%) and urban-rural gminas (39.3%) in relation to the overall number. In this respect, the situation was most advantageous in urban gminas, as much as 75.9% of gminas had the very high technical infrastructure development level. In assessing the changes in the development level in 2005-2015 we may notice that in the years 2005-2010 gminas with the high and very high level were subject to polarisation, while since 2010 this polarisation has remained at the medium to low level.

Fig. 1. Technical infrastructure development level in gminas in 2015



Source: own calculations based on the GUS LDB data.

On the other hand, from the analysis of spatial autocorrelation it follows that in the analysed years the global Moran's I statistics showed the values (2005 I-0,3012, 2010 I-0,2874 and 2015 I-0,2635) suggesting the presence of spatial clusters, i.e. units with similar values and spatial relations among them in terms of the technical infrastructure development level. However, these values indicate the decreasing strength of this relation and the randomness of spatial distribution. This means an increase in the spatial diversity of gminas with the similar technical infrastructure level.

Table 2. Size of gminas by value of the local Moran's I statistics

Type and size of gminas in thousands of residents	2005				2010				2015			
	HH	LL	LH	HL	HH	LL	LH	HL	HH	LL	LH	HL
< 10	14.3	0.0	100.0	28.1	10.4	0.0	100.0	20.6	14.6	66.7	100.0	12.5
10 – 20	16.3	100.0	0.0	28.1	14.6	50.0	0.0	29.4	12.2	33.3	0.0	34.4
20 – 50	28.6	0.0	0.0	28.1	31.3	50.0	0.0	32.4	31.7	0.0	0.0	34.4
50 – 100	18.4	0.0	0.0	15.6	20.8	0.0	0.0	17.6	19.5	0.0	0.0	15.6
> 100	22.4	0.0	0.0	0.0	22.9	0.0	0.0	0.0	22.0	0.0	0.0	3.1
urban	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
< 2.5	0.0	8.2	1.9	0.0	0.0	8.4	2.1	0.0	0.0	9.9	0.0	0.0
2.5 – 5	4.7	50.9	25.0	60.0	5.4	53.9	23.4	75.0	5.9	59.9	11.9	0.0
5 – 10	39.1	33.9	48.1	0.0	37.8	32.0	48.9	25.0	23.5	27.6	33.3	0.0
10 – 15	32.8	4.7	17.3	40.0	31.1	5.1	19.1	0.0	41.2	2.6	33.3	0.0
> 15	23.4	2.3	7.7	0.0	25.7	0.6	6.4	0.0	29.4	0.0	21.4	0.0
rural	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0
< 5	0.0	6.3	4.3	0.0	0.0	8.4	2.1	0.0	0.0	10.5	0.0	0.0
5 – 7.5	0.0	25.4	21.7	0.0	3.4	26.6	20.0	0.0	0.0	31.6	0.0	0.0
7.5 – 15	25.0	28.6	43.5	16.7	24.1	31.3	40.0	16.7	20.0	36.8	57.1	0.0
15 – 30	37.5	34.9	13.0	0.0	37.9	31.3	10.0	0.0	30.0	21.1	28.6	0.0
> 30	33.3	1.6	4.3	16.7	31.0	0.0	5.0	16.7	50.0	0.0	14.3	0.0
urban-rural	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0				

HH – high surrounded by high

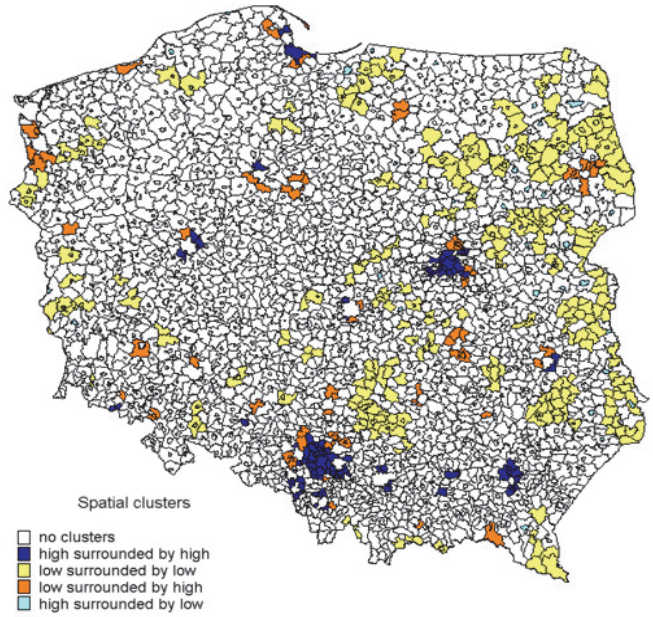
LL – low surrounded by low

LH – low surrounded by high

HL – high surrounded by low

Source: own calculations based on the GUS LDB data.

Fig. 2. Types of spatial dependency based on local Moran's I indicators in 2015



Source: own calculations based on the GUS LDB data.

The spatial distribution of the values of the local Moran's I statistics confirms the ever-changing distribution of clusters of spatial dependency. In the analysed period, one relatively constant area of concentration of gminas with high technical infrastructure development levels surrounded by high values (HH) are gminas around large cities. On the other hand, in other spatial arrangements such as: gminas with low values surrounded by low values (LL); gminas with low values surrounded by high values (LH) and gminas with high values surrounded by low values (HL) the spatial range changes – clusters are subject to "stratification". Gminas of this type appear mainly in the voivodeships with the low technical infrastructure development level, such as the Podlaskie, Lubelskie and Warmińsko-Mazurskie Voivodeships.

4.5. Conclusions

The studies conducted in 2005-2015 lead to the following conclusions and recommendations for the regional policy:

- Spatial structure of Poland was subject to significant changes associated with the development of technical infrastructure. At the same time, char-

acteristic of this process are the growing disparities between the dynamically developing units and regional facilities. Polarisation of the technical infrastructure development level is strong and persistent in the city-countryside arrangement. On the other hand, polarisation was definitely lower in the West-East of Poland arrangement.

- Persistence and increase in the variations in the technical infrastructure development level (polarisation) means that this phenomenon is not incidental and transitional but reflects the permanent trends in the development of gminas. In these areas, territorial cohesion was weakened in the field of technical infrastructure.
- Delimination of infrastructure diffusion areas – carried out with the use of the spatial correlation method – at the level of gminas revealed that Warsaw, Poznań, Gdańsk and the Upper Silesian agglomeration are the strongest development diffusion centres on a scale of their regions. At the same time, the Mazowieckie Voivodeship remains the only region in which significant polarisation is observed between gminas in the metropolitan area and those situated directly outside them.
- Particularly disadvantageous, in terms of development prospects, is the situation of gminas on the outskirts of large voivodeships. These gminas do not have any strong functional links with the metropolies in their regions. This situation applies to gminas from northern Mazowsze, South-Eastern Wielkopolska and Eastern Małopolska.
- The technical infrastructure development diffusion process from major cities virtually does not occur in the voivodeships of Eastern Poland.

In the light of the presented conclusions of the studies, we may formulate certain recommendations for the regional policy (cohesion) geared towards stimulating the development (both the policy at the central and regional level) and they should apply to:

- Enhancing the development potential of larger (subregional) cities in Poland.
- Active regional policy addressed also to poorer subregions, giving them chances to use the endogenous development potential.
- Strong support for the regional policy by special instruments or intervention. The selection of support instruments should be spatially diversified and closely adjusted to the specificity of conditions prevailing in the region, and even in the gmina.
- Strengthening the institutional system in terms of coordination of actions and ensuring cooperation among various institutions for the infrastructure development – both at the programming stage and at the stage of implementing specific actions.

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5. Economic importance of the Common Agricultural Policy in terms of agricultural production in Hungary and its implications after 2020[1]

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Abstract

The development of agricultural production and structures is of high importance in the context of the Common Agricultural Policy (CAP). Our research is based both on evidence from former research, and on assessments obtained by simulating the functioning of the different direct support measures of the CAP in the period from 2014 to 2020. The impacts of voluntarily coupled support schemes and compulsory greening, as well as the optional introduction of total external convergence of area based direct payments are examined, and projections by the Common Agricultural Policy Regional Impact Analysis (CAPRI) simulation model for 2020 are used for the evaluation. The results show that the different policy options have had a very moderate impact on agricultural production.

The economic impacts of the second pillar of the CAP are examined in the light of the results of the *ex post* evaluation of the Rural Development Programme (RDP) 2007-2013 and the evaluation of the RDP plan 2014-2020 of Hungary. Trends in farm structures are also presented through the changes in the context indicators during the period of 2005-2013. The results imply that no significant economic development occurred. Conclusions are drawn and recommendations are formulated to help with designing future agricultural policies.

Keywords: Common Agricultural Policy analysis, economic impact, labour productivity

JEL codes: E61, F36, F37

5.1. Introduction

The development of agricultural production and structures is of high importance in the context of the Common Agricultural Policy (CAP). The research presented in this paper is based both on evidence from earlier research, and on

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assessments obtained by simulating the functioning of the different direct support measures of the CAP in the period from 2014 to 2020.

The impacts of voluntarily coupled support schemes and compulsory "greening", as well as the optional introduction of total external convergence of area-based direct payments are examined, and projections by the Common Agricultural Policy Regional Impact Analysis (CAPRI) simulation model for 2020 are used for the evaluation.

The economic impact of the second pillar of the CAP was also examined in the light of the effects on competitiveness based on the evaluations of the Rural Development Programme (RDP) 2007-2013 and RDP plan 2014-2020 of Hungary. Trends in farm structures are presented through the changes in the main context indicators during the period of 2005-2013.

5.2. Data and methodology

The official databases, i.e. of the Hungarian Central Statistical Office for the 2004-2014 period, the Farm Structure Survey (FSS) 2005 and 2013, and the Farm Accountancy Data Network (FADN), were used to characterise the development of agricultural production in Hungary. For Single Area Payment (SAP) applicants and area, data from the Agricultural and Rural Development Agency (MVH) were obtained, while the Land Credit and Mortgage Bank (FHB) was the source for land price. For European Union (EU) Member State (MS) comparisons we also utilised FSS data of EUROSTAT, EUFADN and direct payment support data from the European Commission.

CAPRI is an EU-wide quantitative agricultural sector simulation model. Its main objective is the *ex ante* impact assessment of CAP policy instruments not only at the EU or MS level but at sub-national level (e.g. NUTS 2) as well. The simulations reported here were carried out with the CAPRI model for the simulation-year 2020 using a base year of 2008 [Britz, Witzke, 2014].

The budget data used for CAPRI includes both Pillar 1 (direct payments) and Pillar 2 (rural development) expenditure related to agriculture along with the transfers between them. It excludes parts of Pillar 2 expenditure that are not agricultural specific. To assess the impact of the absence of or changes in certain CAP 2014-2020 measures on Hungarian agriculture, four scenarios were simulated as follows:

- Scenario 1: CAP 2014-2020 (baseline scenario): It contains the implementation of the Basic Payment Scheme (BPS), Voluntary Coupled Support (VCS) schemes, greening measures (via the application of the following three conditions: Ecological Focus Area (EFA), crop diversification and permanent grassland requirements), the Small Farmers' Scheme (SFS)

and the Young Farmers' Scheme (YFS), the capping and redistribution of payments, as well as the transfers between Pillar 1 and 2.

- Scenario 2: Flat rate BPS: For countries applying the BPS, the BPS payments in their regions were levelled out to a flat rate (2019 BPS convergence model [EC, 2015]).
- Scenario 3: No greening: greening conditions were removed and the funds allocated to greening measures in Scenario 1 were channelled into the BPS instead.
- Scenario 4: No VCS: VCS was not allowed and the funds allocated to the VCS schemes in Scenario 1 were channelled into to the BPS instead.

Trends of agricultural production, productivity, farm structures, trade, and rural development and CAPRI model results are analysed from the economic viewpoint of the effects of the CAP.

5.3. Changes in agricultural production

Hungary has 42.9 and 56.5% larger shares of CAP support than its share in agricultural production. In 2014 its contribution to the EU-28 agricultural output was 2.1% and to the EU-28 Gross Value Added (GVA) was 2.3%, while its shares of the EU Direct Payment Budget and the Rural Development Budget were 3.0 and 3.6% respectively.

The relative importance of agricultural production has declined considerably in Hungary since its accession to the EU. The share of agricultural GDP fell by 37.6% and GVA by 21.8%, while the share of agricultural investment grew by 28.2% during the period of 2004-2015 (Table 1). The share of employment in agriculture essentially did not change, while labour force, the number of farms and the number of SAP applicants fell by 15.4; 40.6 and 16.8% respectively during these years. The decline is mainly the result of the unfavourable demographic process arising from the aging population. Another reason for the fast decline partly arises from the low threshold of the Hungarian definition of farm: having a minimum of 1500 m^2 of land including agricultural area, forests, reeds and fish ponds; or 500 m^2 of fruit orchards and/or vineyards; or 100 m^2 of protected area; or at least one of the larger livestock, such as cattle, pig, sheep, goat, horse, etc.; or 50 heads of poultry; or 25 rabbits; or 25 animals kept for fur production; or 25 meat pigeons; or 5 bee families.

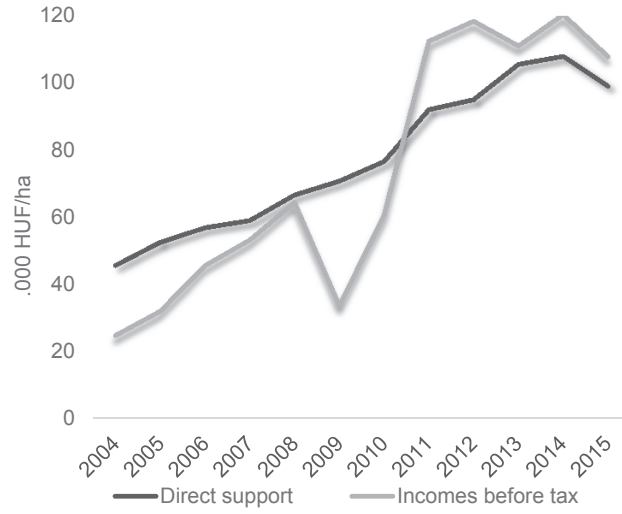
Table 1. Basic data of the agricultural sector in Hungary, 2004 and 2015

Denomination	2004	2015
Share in GDP (%)	4.8	3.0
Share in GVA (%)	4.6	3.6
Share in total investments (%)	3.9	5.0
Share in total employment (%)	4.9	4.8
No. of labour force* (000 AWU)	522.2	441.9
No. of farms** (000)	714.8	424.7
No. of SAP applicants*** (000)	208.5	173.4

Remarks: * 2004 vs 2015; ** 2005 vs 2016; *** 2004 vs 2016.
Source: KSH and MVH.

Agricultural financial support has become a key driver of agricultural development. The EU direct payments have had a positive impact on farm incomes and on access to capital (Figure 1). As an average of 2011-2015, among the major arable crops 62.4% of wheat production income, 54.0% of maize production income, 54.8% of sunflower seed production income and 62.4% of rapeseed production income originated from direct payments (i.e. SAP and greening payments). In the case of livestock farming the situation is very similar: income from milk production was based on 58.2% and suckler cow keeping income on 153.9% on direct support, while income of pig farming was based on 64.0% on specific national support in the same period.

Fig. 1. Changes in agricultural incomes and direct support in Hungary, 2004-2015



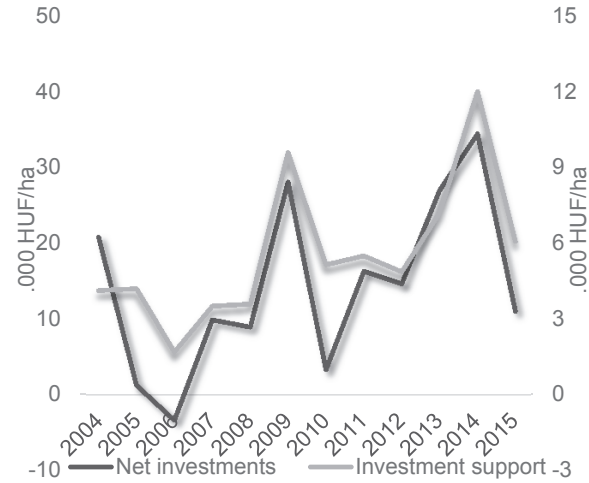
Source: FADN.

Coupled payments are negatively associated with exit rates in farming, as they increase the marginal value of farm labour and encourage farmers to remain in the sector [Tocco et al., 2013]. Direct payments have slowed down the rate of exit of the older generation from subsistence and semi-subsistence farming in Hungary. Nevertheless, an EU-wide comparison shows that the intensity of labour use (working hours/hectare) has been declining faster in the post-socialist MSs, including Hungary, since the introduction of direct payments, although it was observed in all regions of the EU, which is consistent with the general long-term decline in work force employment in the sector [Biró et al., 2016].

The decoupling of the EU direct payments has contributed to the accelerated reduction in the intensity of labour use in the post-socialist MSs agriculture [Petrick, Zier, 2011] and the reduction was bigger in countries and regions where coupled payments supported labour-intensive activities. A negative impact was also experienced on market orientation and risk management, hindering the development of resilience.

Another important impact of the CAP in Hungary is that agricultural investments are closely connected to investment support (Figure 2). There is a direct relationship between agricultural investments and incomes which, to a considerable extent, depend on direct payments.

Fig. 2. Changes in agricultural investments and investment support in Hungary, 2004-2015



Source: FADN.

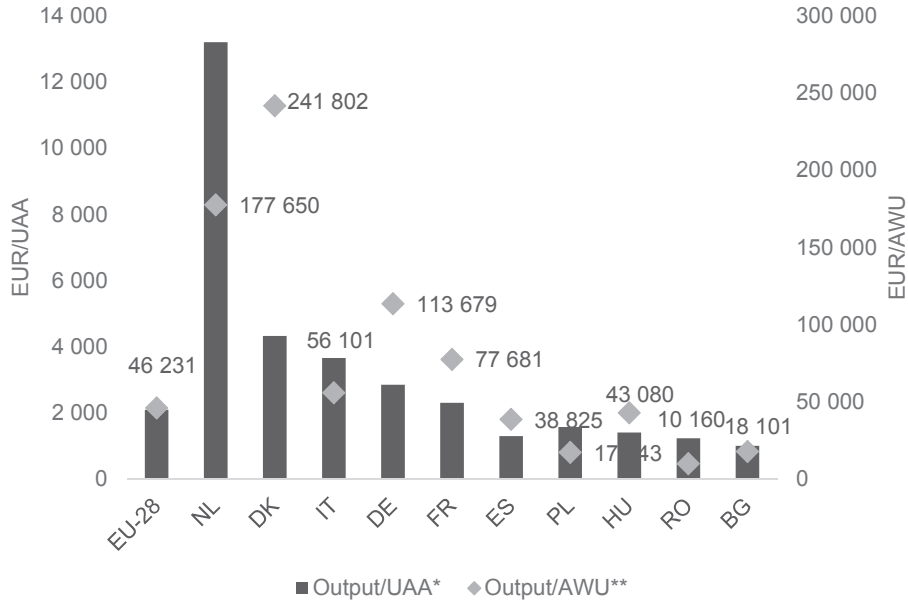
In 2004-2014, only factor incomes grew fast enough in Hungary, mainly due to the increase in land prices and land rental fees, while output only grew at

the same rate as in the most competitive MSs, so the backlog of production did not decrease.

The value of agricultural output/hectare of UAA in Hungary was EUR 1.4 thousand, 32.5% lower than the EU-28 average in 2014 (Figure 3). In the Netherlands (EUR 13.2 thousand) and in Belgium (EUR 4.9 thousand) values are 9.3 and 3.1 times higher. Agricultural output/hectare of UAA in Hungary grew 140.9% from 2004, cf. 142.7 and 134.0%, respectively, in the Netherlands and Germany.

The index of agricultural output/AWU in Hungary was EUR 43.1 thousand, 6.8% lower than the EU-28 average. The index was 9.3 and 2.8 times higher respectively in the Netherlands (EUR 177.6 thousand) and in Denmark (EUR 241.8 thousand). Agricultural output/AWU in Hungary grew 152.8% from 2004, cf. 159.0 and 188.4%, respectively, in the Netherlands and the Czech Republic.

Fig. 3. Output in agriculture in the selected EU MSs, 2014

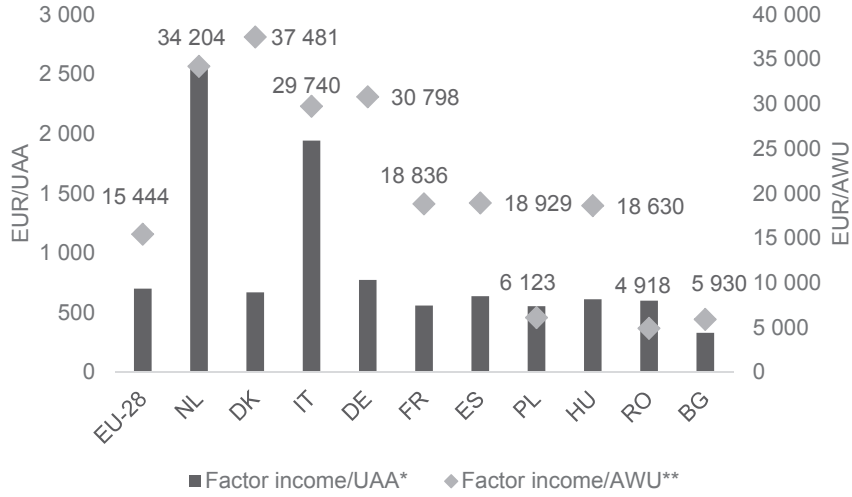


Remarks: * utilized agricultural area; ** annual work unit (full time employment).
Source: EUFADN.

The value of agricultural factor incomes/hectare of UAA in Hungary was EUR 613.2 thousand, 12.7% lower than the EU-28 average in 2014 (Figure 4). In the Netherlands (EUR 2.5 thousand) and in Italy (EUR 1.9 thousand) the values were 4.1 and 3.2 times higher, respectively. Agricultural factor incomes/hectare of UAA in Hungary grew by 227.7% from 2004, while in the Netherlands and in Italy it grew by 132.5 and 123.7%, respectively.

The index of agricultural factor incomes/AWU in Hungary was EUR 18.6 thousand, 20.6% higher than the EU-28 average. In the Netherlands (EUR 34.2 thousand) and in Denmark (EUR 37.5 thousand) the indexes were 1.7 and 2.0 times higher. Factor incomes/AWU in Hungary grew by 247.0% from 2004, while in the Netherlands and in Denmark it grew by 147.7 and 214.3%, respectively.

Fig. 4. Factor incomes in agriculture in the selected EU MSs, 2014



Remarks: * utilised agricultural area; ** annual work unit (full time employment).
Source: EUFADN.

5.4. Changes in farm structures

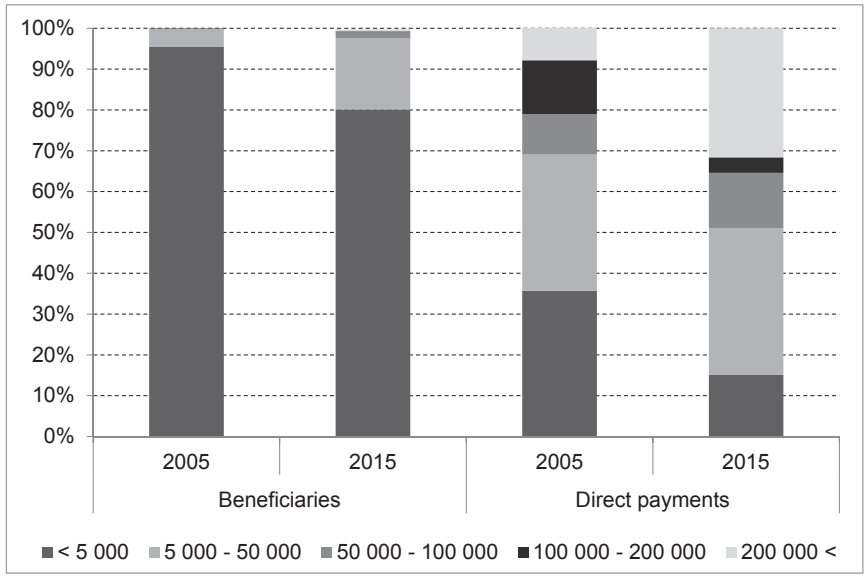
Impacts of the CAP are not uniform across the businesses: differences exist in size, concentration and specialisation. The general trend in farming is concentration because the decline of small farms and the growth of medium and large farms facilitate structural change. Concentrated land use by large farms hinders structural change through fragmented land ownership, constraining the availability of land for transaction market [Biró et al., 2016].

Concentration

Concentration of direct payments and land use are mutually reinforcing processes. In Hungary, the number of beneficiaries decreased by 14.5% between 2005 and 2015, while the amount of direct support increased fourfold. The share of beneficiaries with payments under EUR 5 thousand, declined from 95.4% to 80.1%, while their share in the total of direct payments fell from 35.7% to 15.1% in ten years.

The share of beneficiaries receiving payments between EUR 5 and 50 thousand grew from 4.3% to 17.5%, while their share in the total of direct payments remained almost unchanged. The share of beneficiaries with direct payments above EUR 50 thousand grew from 0.3% to 2.1% and the share of subsidies paid increased considerably, from 31.0% to 49.0%, during this period (Figure 5).

Fig. 5. Distribution of direct payments and beneficiaries, 2005 and 2015



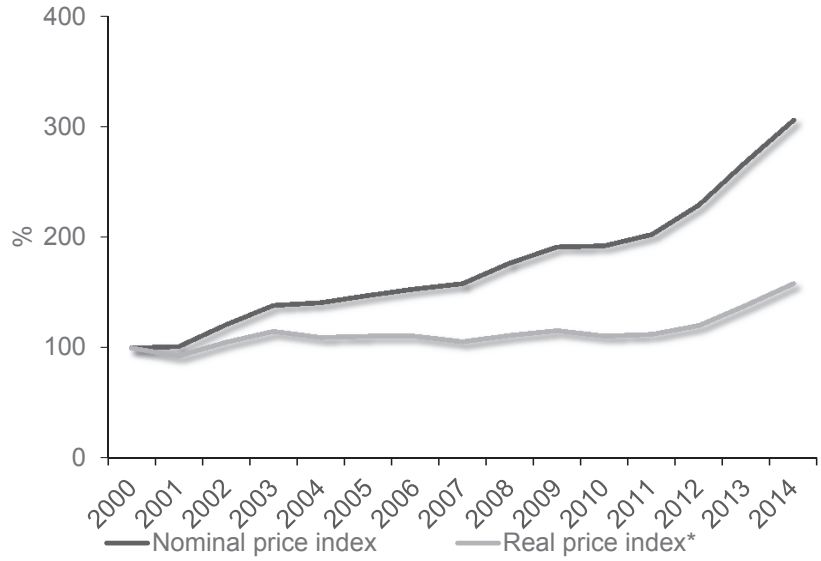
Source: EC [2006] and EC [2016].

In Hungary, land policy gives preference to the establishment and development of family farms. The number of preferred family size farms has increased by 71% since the millennium and their average area by 10%. Land concentration will continue with dynamic land use structure change in the longer term. Family farms might initiate land acquisitions. The land acquisition of owners of large, capital-intensive farms might also be realised. The acquisition and use of agricultural land is regulated by the new Land Act (No. 140/2014 Coll.).

After the introduction of the new Land Act, land turnover fell from 2.0--2.5% to 0.7% (41 thousand hectares) and arable land prices increased by 14% to EUR 3.300 per hectare in 2015.

Nominal land prices doubled in 2004-2014 (Figure 6). The impact of support policy on the land market is that land prices (and land rental fees) are positively correlated with subsidies, but the extent of the response is different. Experience showed that the capitalisation is partial, indicating uncertainty about future subsidies [Swinnen et al., 2014].

Fig. 6. Land price developments in Hungary, 2000-2014



Remark: *deflated with the Consumer Price Index.
Source: FHB.

Specialisation

As an effect of the introduction of the CAP direct payments on farm specialisation, the share of farms with field crops increased in all post-socialist MSs (except Estonia) between 2005 and 2013, and the rate of increase was higher than in the EU-15 average (2.4 percentage points) (except in Romania). Farms which were large in physical terms managed more UAA in total than farms which qualified for being large in economic terms. This hints at large farms tending to specialise in less intensive agricultural activities such as the production of field crops.

Development of land use in Hungary after the EU accession was characterised by the growing demand for agricultural land, which intensified in response to the introduction of the CAP, in particular direct support. The concentration process seems significant in Hungary since the total number of farms decreased by 31.3% (the EU-27 average decrease was 26.2%) and average physical farm size grew by 58.8% to 9.5 hectares (the EU-15 average was 28.1 hectares in 2013). The share of small farms (under 5 hectares) in total UAA decreased from 8.4% to 4.9%, while for medium size farms (from 5 to 50 hectares) total UAA increased from 20.6% to 21.0%, and for large farms (with more than 50 hectares) it increased from 71.0% to 74.0% during the period from 2005 to 2013.

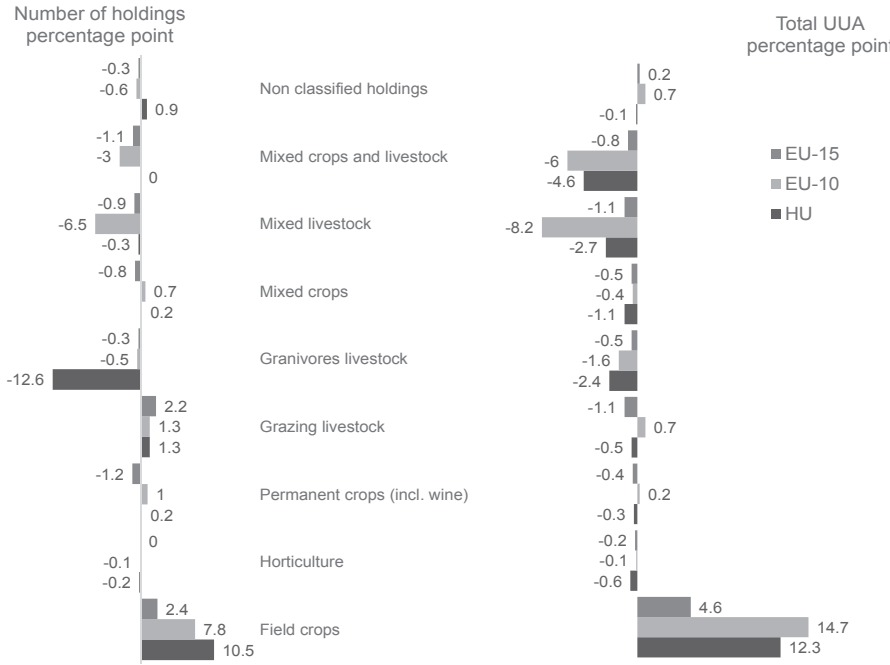
As regards the changes in farm demographics, with elderly farmers leaving their businesses, outflow from agriculture slowed down mainly due to CAP support. Only a moderate (-6.3%) decrease has occurred in the total agricultural labour force in Hungary since 2005, and the amount of farm labour was 433.7 thousand AWU in 2013. Salaried labour force, at 120.8 thousand AWU, grew by 5.5% in this period, while it declined in the EU-27 by 11.3%. Most of the non--salaried family farm labour force (76.1% of total) was employed predominantly on small farms (under 5 hectares UAA). Age structure in agriculture in Hungary is similar to the EU average: the ratio of farm managers younger than 35 to those aged over 55 is 0.1. The 31.6 decrease in the index in Hungary compared to the EU figure (-15.0%) indicates escalating hardship in the area of replacement of older farmers, which is only mitigated by the concentration process.

The rate of increase of specialised field crop farms was high both in the ratio of farm numbers (10.5 percentage points) and UAA (12.3 percentage points) in Hungary in the 2005-2013 period (Figure 7). The share of field crops was 25.2% of total farms and 63.7% of total UAA in 2013 (the corresponding EU averages were 29.7 and 42.4%, respectively). Considering the positive effect of specialisation beyond field crops, grazing livestock and permanent crops branches saw minimal growth in farm numbers and UAA ratios.

The share of permanent crop farms is also high in Hungary (14.6%), however, the figure was far below the EU-15 average (34.0%) in 2013, with only a minor change (0.2 percentage points) in farm numbers and reduction in the UAA (0.6 percentage points) as well.

Remarkable reductions mainly affecting granivores and the mixed crops and livestock farm types occurred. The ratio of granivores farms declined by 12.6 percentage points to 28.6%, while their UAA ratio fell by 2.4 percentage points to 1.7% in 2013. The ratio of the number of the mixed crops and livestock farms did not change from 15.1%, while their share in total UAA fell by 4.6 percentage points to 16.2% in this period. The share of granivores livestock farms is very high in Hungary, far exceeding the EU average (9.5%), therefore further concentration can be expected.

Fig. 7. Changing farm structures in Hungary, 2005-2013



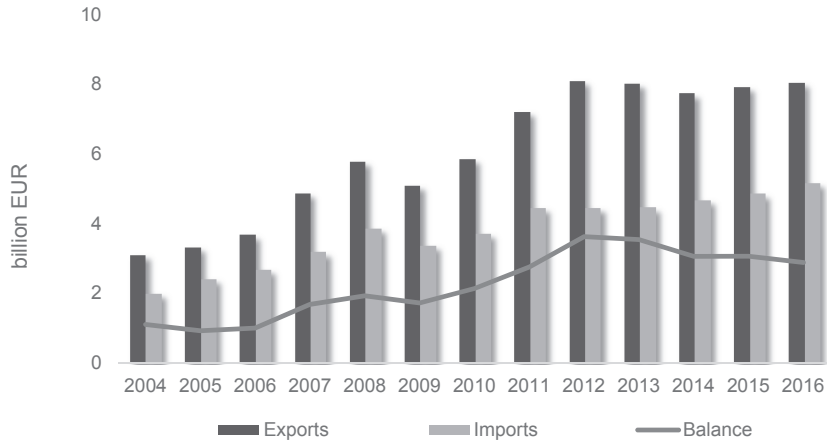
Source: KSH.

5.5. Changes in trade patterns

In Hungary, both the agri-food exports and imports increased between 2004 and 2016, which was due to the integration into the EU single market (Figure 8). The share of the EU in exports (85%) and in imports (93%) was equally high in the Hungarian agri-food trade. It is positive that the trade balance has improved; nevertheless, if we look behind the numbers the picture is not so favourable.

Exports of the Hungarian agri-food sector have essentially four "pillars": meat, cereals, oilseeds and preparations of fruits and vegetables. Between 2004 and 2007, the share of agricultural commodities increased significantly (from 47 to 78%), while the share of secondary processed products decreased dramatically from 19% to minus 3% [Jankuné et al., 2015].

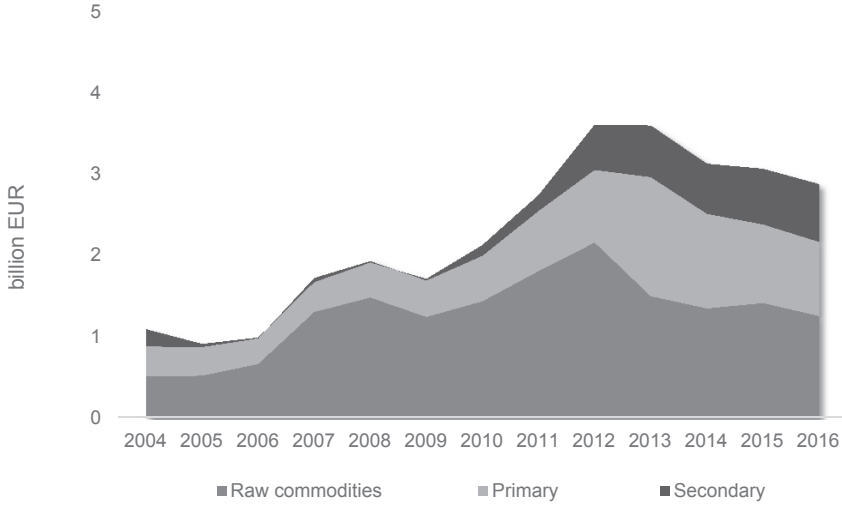
Fig. 8. The agri-food export, import and balance of Hungary, 2004-2016



Source: KSH.

In the middle of the decade the main category of cereals and oilseeds alone practically maintained Hungary's positive balance at a high level, while the share of the other main groups decreased (meat, vegetables and fruit- and vegetable-based products) or became negative (milk and dairy products). In the second half of the investigated period the trend improved, the share of agricultural raw materials decreased to 44% while the share of secondary processed products reached 25% by 2016. But this improvement was due to some special export products such as bioethanol, pet food and raw vegetable oils (Figure 9).

Fig. 9. The structure of the Hungarian agri-food trade balance according to the stage of processing, 2004-2016



Source: KSH.

5.6. Changes in rural development

As investments in agriculture in Hungary were completely connected with investment support owing to the need to comply with the EU regulations, investments were mainly required for renovating and upgrading the existing outdated and depreciated production capacities rather than for enhancing competitiveness with innovative technologies.

The greater capacity use increased value added, but labour use was also expanded, so productivity did not change due to the RDP in the former (2007-2013) programming period. In Hungary, the measures of Axis I provided financial support for:

- Modernisation of agricultural holdings purchasing machinery and technologies (this improved the age structure of the machinery and encouraged the purchase of energy-saving equipment mainly in crop production). Subsidies were granted also for the modernisation of the post-harvesting facilities.
- In the frame of the measure of modernisation of the facilities of livestock farms, livestock farmers could make use of complex infrastructural subsidies.
- In connection with the subsidies provided for horticultural facilities, horticultural activities were developed. In addition to mechanisation, the improvement of permanent crops also increased the efficiency of the sector.
- The increase in the value of agricultural products measure resulted in improved competitiveness, restructured the production structure and in developments in food safety and energy saving.
- The measure of infrastructure development included irrigation, melioration and the construction of the buildings of the regional water management and of agricultural roads.
- In the frame of development of human capital, the measures of extension, training and information activities helped farmers to access information and to receive professional training. Agricultural restructuring benefited from the support to young farmers.

The rather modest results of the earlier RDPs were that over the last ten years their application contributed to reducing out-migration from rural areas. The rural development subsidies created opportunities for developing the rural economy, environment and society, assisted in preserving environmental values, induced community initiatives and mobilised rural society [Biró et al., 2017].

The rural development subsidies in the current 2014-2020 programming period will mainly support the improvement of the competitiveness of small and medium size enterprises in agriculture and forestry.

Regarding the priority sectors, in the cases of investment subsidies for horticulture the basic objective is to improve resource efficiency, to use geo-

thermic energy as well as to encourage post-harvest activities through joint investments. Employment and resource efficiency in the development of the livestock sector are also priority objectives. As for the latter, the developments focus on the energetic upgrading of the existing buildings, modernisation of the building technologies and on the development of the old technologies.

In addition, investments supporting the reduction of greenhouse gas emissions are supported. Investment resources for arable crop production can be spent in a more targeted way than before (such as water retention, melioration, modernisation of irrigation, development of small grain silos and dryers, upgrading equipment as well as technology developments aiming at improving resource efficiency).

In order to optimise the management of water resources the RDP 2014--2020 will provide subsidies for water retention and melioration as well as for improvement and development of the irrigation systems by putting a great emphasis on supporting joint investments.

5.7. CAPRI model results for Hungary

Based on the CAPRI model, results for Scenario 2 (Flat rate BPS) had no visible effect on the Hungarian agriculture, since the country applies SAP Scheme instead of the BPS. Scenarios 3 and 4 had the largest impact on the sectors for which the relevant CAP measures would not be implemented.

In case of Scenario 3 (No greening) the decrease of the area of set aside, fallow land and pasture was offset by the increase in the area of cereals and oilseeds, which was caused by the abandonment of the greening conditions (Table 2).

Table 2. Changes in area and livestock numbers in Hungary (percentage changes as compared to the baseline scenario)

Activity	Scenario 3 (No greening)	Scenario 4 (No VCS)
Cereals	3.1	2.5
Oilseeds	5.0	-0.8
Other arable crops*	0.7	-12.0
-of which pulses	-6.5	-40.2
Fodder activities	-5.3	-4.1
Set aside and fallow land	-32.2	5.0
All ruminants	-0.2	-4.5
Beef meat activities	-0.1	-8.7
Pasture	-6.3	0.0

Remarks: *other arable crops: pulses, potatoes, sugar beet, flax and hemp, tobacco, other industrial crops.

Source: based on the CAPRI model.

In Scenario 4 (No VCS) the area under other arable crops, mainly pulses decreased significantly (-40.2%) and a notable decrease (-4.5%) in the ruminant herd would be observed (Table 3).

Table 3. Net production changes in Hungary (percentage changes as compared to the baseline scenario)

Activity	Scenario 3 (No Greening)	Scenario 4 (No VCS)
Oilseeds	4.5	-1.1
Other arable crops*	-0.8	-6.3
-of which pulses	-6.8	-38.1
Sheep and goat meat	0.0	-8.7

Remarks: *other arable crops: pulses, potatoes, sugar beet, flax and hemp, tobacco, other industrial crops.
Source: based on the CAPRI model.

The financial support provided by the VCS schemes contributes in a large part of the income of the supported sectors. Premiums significantly decline in the case of vegetables and permanent crops and all ruminants, especially in the dairy sector. In the case of Scenario 4, cereals and oilseeds premiums and incomes would increase notably (Table 4).

Table 4. Changes in premiums and incomes in Hungary in Scenario 4 (percentage changes as compared to the baseline scenario)

Activity	Premiums	Income
Cereals	14.0	13.1
Oilseeds	14.4	8.8
Other arable crops*	-9.8	10.4
Vegetables and permanent crops	-23.1	-2.2
All ruminants	-57.6	-23.8
All cattle activities	-56.0	-17.7
-of which beef meat activities	-40.3	-47.5
-of which all dairy	-61.2	-14.2
-of which pulses	-39.0	-22.0

Remarks: *other arable crops: pulses, potatoes, sugar beet, flax and hemp, tobacco, other industrial crops.
Source: based on the CAPRI model.

5.8. Conclusions

Based on the changes in Hungarian agriculture after the accession to the EU, the following trends are likely to continue. The role of agriculture in the national economy will decline further. Large numbers of uneducated and elderly farmers will leave the sector. Demand for land will intensify and land concentra-

tion will accelerate. Specialisation of farms will continue, also driven by the CAP and the segmentation of a matured EU food market. Concentration and specialisation, as well as the EU requirements foster investments in modernisation, strengthen horizontal and vertical cooperation, and increase the demand for labour force with high skills. GVA and labour productivity will improve further.

Direct payments are subject to the provision of public and private goods (cross compliance, greening) for society. Decoupling changed the relationship between direct payments and productivity increases from negative to positive. In the case of large farms, the policy is well targeted in the direction of structural change; they can use concentrated sources of direct support for extending their operation, modernisation and for investment purposes.

In the case of small farms, the effect of direct payments was only to supplement incomes. This line of policy development for enhancing the structural change effect of direct payments could be intensified by providing for actual services and not historical compensation, and by mitigating the imbalances in financial support between the regions and the businesses. For enhancing structural change, the strengthening of the environmental and/or social aspects of farming of the greening measures may be considered, and VCS could be focused differently on sectors creating employment opportunities, and even produce processed and consumed locally.

The CAPRI results show that the different policy options would have different impacts on agricultural production. In case of Hungary, it would be important to maintain the VCS schemes in particular for the vegetable and the ruminant sectors, mainly the dairy sector. Greening, however, poses an economic disadvantage by favouring extensive arable crop production methods.

The core of stimulating specialisation is enhancing competitiveness with the increase of productivity which can be expanded through the utilisation of economies of scale. In order to reduce technological backlog, the qualification of human resources must be targeted adequately. The process of specialisation could also be stimulated by the production of labour-intensive, high value added products, and by the motivation of acquiring a high market share.

Rural development should target a more competitive farm structure and encourage more efficient production with farm and infrastructure modernisation, and farm advisory services. It seems that large farms benefited from the development resources because the enhancing of competitiveness by the small farms required resources in excess of their financing capacity, since labour productivity development would require a change to more intensive production and increasing the size of operation supplemented by considerable technical advancement. The future rural development policy should further increase value added,

innovation and cooperation to support structural change. R&D and innovation needs to take into consideration the tension between further farm modernisation toward structural change and the employment demand of agriculture on the skilled labour force.

The challenge for rural development in the current programming period (2014-2020) is to achieve a simultaneous increase in productivity with value added and job creation, as well as to enhance the development and rejuvenation of human resources.

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6. Investment supports to the Czech farms and their expected future under the CAP 2020+[1]

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Abstract[2]

Investment supports to the Czech farms as grants under the measure 4.1.1. Investment to agricultural holdings of the Rural Development Programme 2014--2020 represent about 70% of all investment supports to farms. Under the grant system, the government is seriously responsible for a proper allocation of public sources on individual farms – applicants for supports. A special model ("calculator") is applied as the main instrument for calculation of the criterion (payback period of the investment) for the allocation. The aim of the paper is to discuss problems linked with the grant system (and the "calculator") and to reveal its risks and bottlenecks as moral hazards of the state, dead weight losses and leakage of supports to suppliers. From this, financial instruments for credits, already successfully applied in the Czech Republic (activities of the Support Guaranty Farm and Forestry Fund), could be a better solution to be used under the Common Agricultural Policy 2020+ for supports to "productive" investments on the Czech farms.

Keywords: agriculture, dead weight, investment

JEL codes: H23, H43, H54

6.1. Introduction

The Czech agriculture has several specifics. One of them is an extreme dual structure of land use. On the one hand, there are many smaller farms that are managing relatively little share of agricultural land. On the other, there is a small number of large farms which are using a large share of the land (as the Utilised Agricultural Area eligible for supports). There is an important share of extra-large and large farms in land use and production versus the structure and

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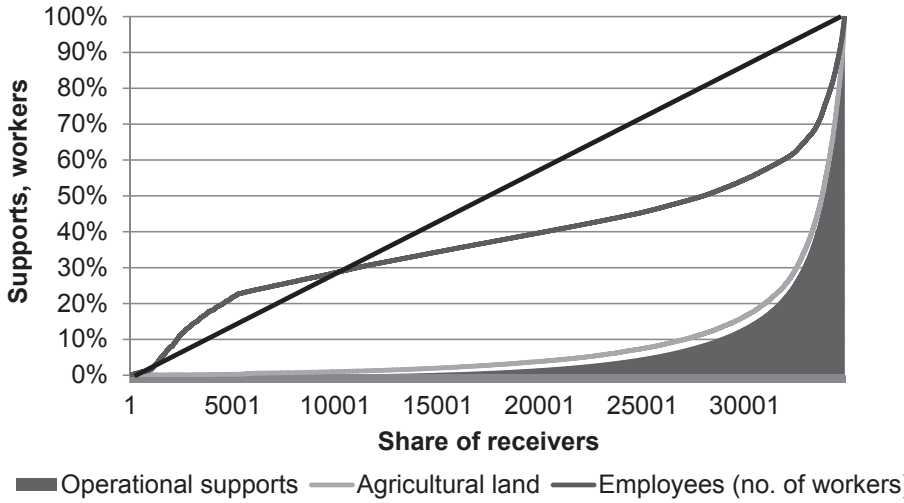
share of smaller family farms [Doucha, 2000] that may result in a problem of a fair distribution of financial supports from public sources among different categories of farms. There are also differences between the size of agricultural holdings owned by legal persons (mostly they utilize much over 100 ha) and physical persons (majority of farms is in the size up to 20 ha). Agricultural land use concentrates on legal persons, i.e. 70.9% of land was used by them in 2010 [Hannibal, 2010]. The number of employees differs too. Distribution of operational supports in relation to the use of agricultural land and the number of employees in the Czech Republic is showed at Figure 1. It is clear, that operational supports, as consequence of their payment conditions, are strongly correlated with the use.

Fig. 1. Distribution of agricultural land use, employment and operational supports in the Czech agriculture



Source: own calculation.

6.2. Present forms of investment support to the Czech farms and conditions for their allocation

The largest source of public support to the Czech agriculture are subsidies provided under the Common Agricultural Policy (CAP). Under its second pillar almost EUR 3.5 billion (more than CZK 96 billion) are going to be granted to the Czech agricultural holdings in the coming years. Investment supports are now provided in the Rural Development Programme (RDP) 2014-20 under priority 4. Subsidies to operation 4.1.1 amount to 11 889 CZK billion. The allocated finances enable to subsidize 60% of costs of the farmer's investment project.

Investment projects in food sector are subsidized from 40% and there is 2.647 billion allocated for this measure 4.2.1.

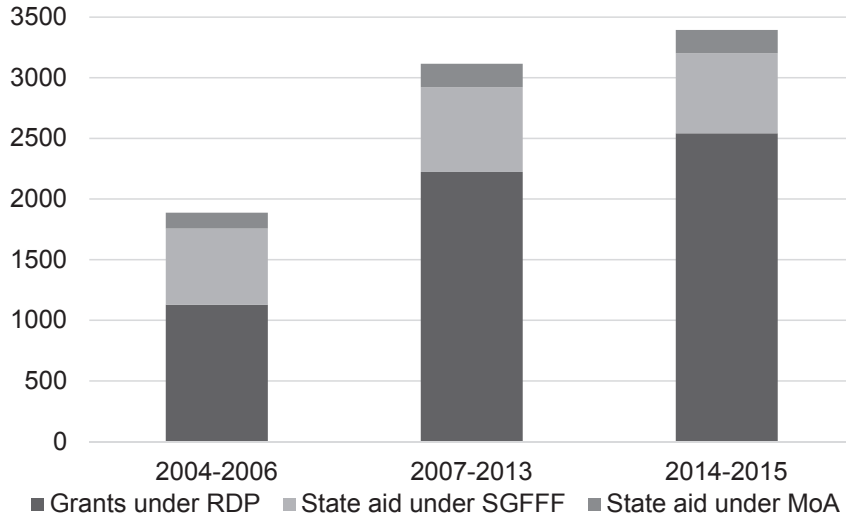
Therefore, the goal of the Czech Ministry of Agriculture is to allocate public finances in the most effective way to farm projects in terms of the viability of farms and sustainability of farming systems. The projects must fulfil certain level of financial effectiveness. Evaluation system developed for the first three "calls" applied a simplified system based on intensity of sales (sales for 10 years divided by total investment costs) that did not fully consider the costs of the project. The criterion was that the intensity of sales shall be higher than set "marginal percentage". Under this criterion almost all submitted requirements for supports of farms fulfilled this limit.

Hence, a new system was proposed for the 5th call for operations 4.1.1. and 4.2.1. It is based on financial plan and criterion represents the payback period that should be shorter than the lifetime of the investment. Payback period is calculated by the model, elaborated by the Institute of Agricultural Economics and Information (IAEI).

Investment subsidies to the Czech agriculture are also provided from national sources as state aid under activities of the Support Guaranty Farm and Forestry Fund (SGFFF). It provides interest subsidies and guaranty for bank credits. Main criterion for grant allocation is financial health assessed by banks. The SGFFF also offers returnable loans with the application of *de minimis* principle. Besides, there is also state aid of the Ministry of Agriculture which provides 100% subsidies as grants.

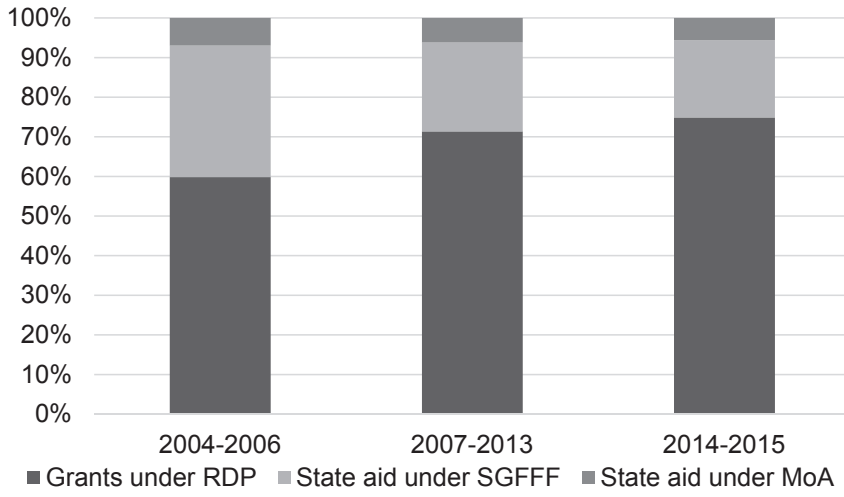
The overview of investment supports to Czech farms by sources is displayed on Figure 2 in CZK million and on Figure 3 in percentage of the total investment supports. It is evident that grants under RDP are prevailing. More than CZK 1129 million were provided already in 2004-2006. Afterwards, the RDP 2007-2013 supported investments to agriculture by CZK 2224 million and RDP 2014-2020 by CZK 2542 million. On the other hand, finances from SGFF ranged from one third to one fourth of total supports. The share of investment state aid is marginal.

Fig. 2. Investment supports to the Czech farms by sources (in CZK million)



Source: own elaboration.

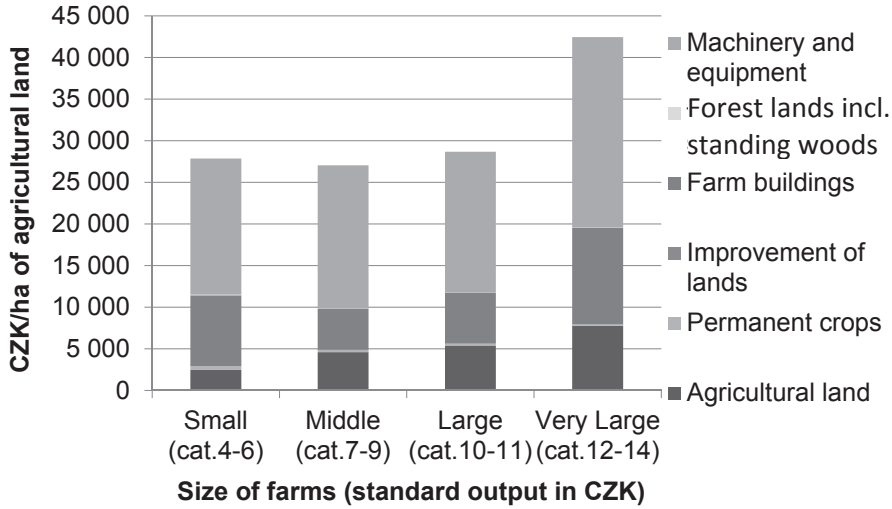
Fig. 3. Investment supports to the Czech farms by sources (in%)



Source: own elaboration.

Investment activity of agricultural holdings is also influenced by their size. It is supposed that larger ones (in terms of the economic size measured by standard output) have more convenient conditions for investing.

Fig. 4. Investment activity and structure of investments on Czech farms by their economic size 2011–2015

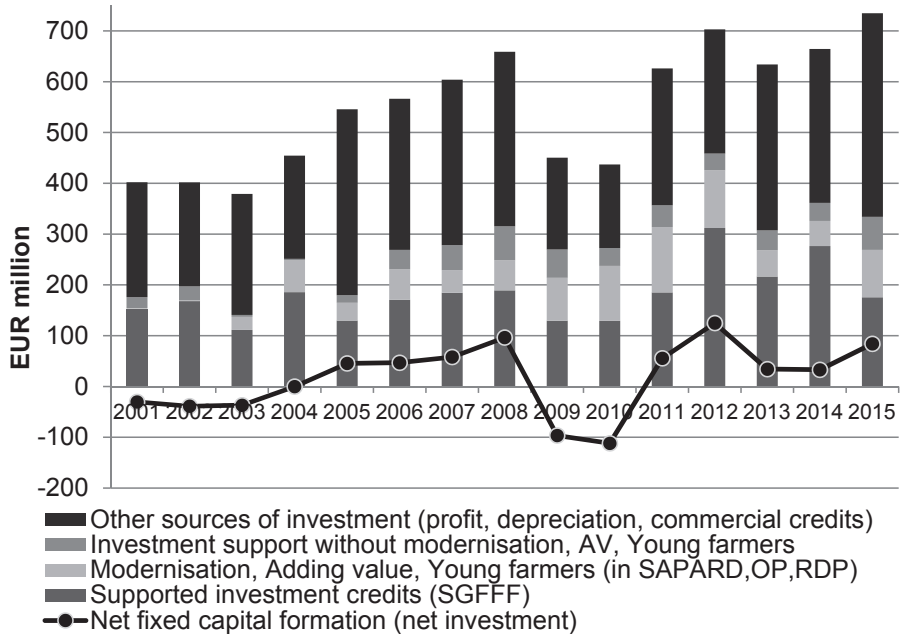


Source: own elaboration.

It can be seen from Figure 4 that very large farms invested over CZK 40 000 CZK per ha of agricultural land in 2011-2015. On the contrary, other size categories of farms invested much less (see e.g. small and larger farms with around CZK 27 000 or 28 000 per ha of agricultural land, respectively. Mostly, the farms of all size categories invested into machinery and equipment, followed by investments to buildings. However, it should be noted that investments in agriculture is very rapidly growing in the last two-three years.

Considering the total sources of investments in the Czech agriculture as a whole, other (mainly) own sources are important. It evidently also reflects the fact that operational supports have almost three times increased after the EU entry. Figure 5 shows development of investments by sources (colours are lighter until 2007 to distinguish the period before the new RDP has started). Other sources of finances (profit, write-offs, non-supported credits) accounted for almost half of all sources in almost all years; they prevailed only in 2005 and 2015, and were the lowest after the economic crisis in 2009-10. Other investment sources (such as national subsidies) were negligible before the EU entry in 2004. Other subsidies (from SAPARD, Operational Programme Agriculture and RDP since 2007) were less important than support provided by SGFFF for investment credits. Those finances were the most important in the period of 2012-2014.

Fig. 5. Total investments in the Czech agriculture and their sources



Source: own elaboration.

6.3. Materials and methods

The aim is to critically assess the current CAP instruments of distribution of investment supports in the form of grants under the RDP and to discuss possible solutions for the future. It discusses problems linked with the grant system and reveals risks and bottlenecks as moral hazards of the state, dead weight losses and leakage of supports to suppliers. Shortcomings of the current system of the assessment and selection of the projects for investment support is illustrated on projects supported under measure 4.1.1. Investment to agricultural holdings in the 1st and 3rd calls of farms for applications for subsidies (further referred as "call").

The chapter concerning the results describes the actual situation and deals with problems of investment supports as grants under the RDP 2014-2020. First, it describes past and current evaluation system of investment projects. Second, it assesses potential risks of the grant system.

6.4. Evaluation of investment projects supported by the RDP

The evaluation will be based on the 3E criteria – efficiency, effectiveness and economy. Only economically viable and efficient projects will be selected for support. Requests for subsidies are subdued to an assessment with the appli-

cation of a special model – calculator that was elaborated by the IAEI under the requirements of the Payment Agency (the State Agricultural and Intervention Fund – SAIF).

The RDP calculator – model is used as a tool to assess efficiency of investment projects from economic point of view. The model is a system in the Microsoft Excel spreadsheet, version 2010. It follows the structure of the general financial plan of the projects, it means it calculates the revenues (based on acreage and yield, or number of animal lots, respectively) and costs, and based on this also cash flow, and payback period. It is a simplified version of the cost benefit analysis (CBA), because it does not consider monetary valuated externalities related to the project, discount rate (revenues and costs are calculated only for 1 year) and shadow prices of financial costs and benefits. Of course, the CBA approach enables to compare all costs and benefits of each in monetary terms and to determine the projects that are the most beneficial for the society [Pechrová, 2017].

Contrary to the first version of the model – calculator, the actual (current) version[3] applies normative values of farm-gate prices costs and other indicators as the Czech averages. It is by the requirements of the SAIF, reflecting its limited capacities for assessment, monitoring and control activities. The main disadvantage of this approach is that it does not consider different conditions for farming, climate, etc. This simple normative version of the calculator will be used for the 5th call for application for supports under the measure 4.1.1. Investments to agricultural holdings and 4.2.1. Processing and marketing of agricultural products.

The evaluation system applied for the first two calls was very simple, based on "Investment intensity of sales" and did not consider the costs of the project. "Investment intensity of sales" was calculated as follows:

$$\text{investment intensity of sales} = \frac{\text{sales for 10 years}}{\text{total investment costs}} \geq \text{"marginal percentage"} \quad (1)$$

Under such approach almost all projects fulfilled this criterion. Current version calculates the payback period of investments that has to be lower than lifetime period of the investment:

$$\text{payback period} = \frac{\text{Cash Flow or Profit}}{\text{Investment costs}} \geq \text{lifetime period} \quad (2)$$

[3] The first (original) version of the model – calculator included the projections of future values of revenues and costs, and minimum and maximum thresholds of values. This version of the model was presented by the authors in June 2016 on IERiGŻ-PIB conference. System of price prediction was described in [Chaloupka, Pechrová, Doucha, 2016b].

The lifetime periods do not reflect generally applied write-offs categories, but tries to follow "real" lifetime of different types of investments. Table 1 shows the categories and lifetime limits set by the SAIF in Table 1.

Table 1. Lifetime categories (set by SAIF)

4.1.1. Type of the investment	**No. of years**	**4.2.1. Type of the investment**	**No. of years**
Purchase of the real estate	30	Real estate	50
Building costs	30	Building costs	25
Technology/technological costs	15	Technology/technological cost	15
Machine	10	Machine	10
Project documents	30	Project documents	25
Costs related with the preparation of the project	3	Costs related with the preparation of the project	25

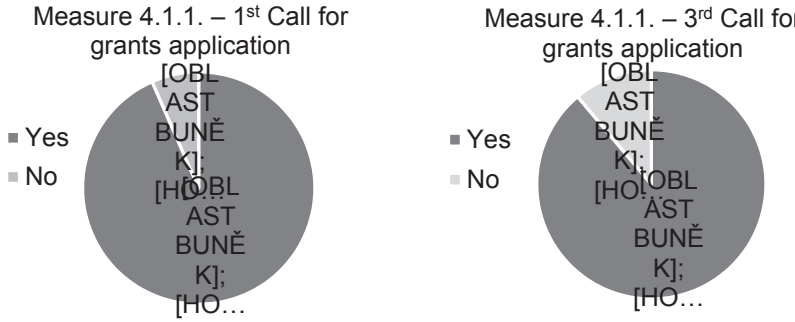
Source: SAIF [2017].

If the projects from the first calls were evaluated by the payback period, their success would have been lower. The efficiency of many projects would not be proved. It is obvious from Figure 6 that applications for subsidies from 4.1.1. would have been successful only from 93.4% in the 1st call and from 88.9% in the 3rd. It is still high percentage, but it would help at least to eliminate the most inefficient projects.

Regarding the measure 4.2.1. (Fig. 7), the success of the projects would have been even lower: only 70% of the projects in the first call would have passed and about 80% in the third call. This points out that the more supported projects were not, according to the given data and criteria, efficient.

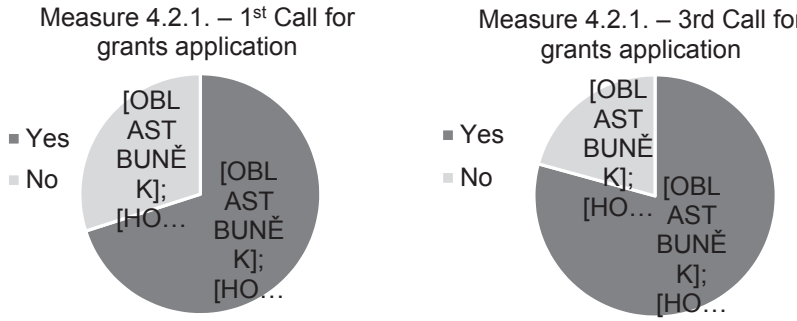
However, multi-criterial (cost/benefit) evaluation approach is needed to differentiate various goals of investments. Beside the goal of increasing the economic efficiency (that is still prevailing in comparison with other criteria), there are other objectives for the investment supports. The projects can be more oriented on "non-productive" objectives (e.g. improvement of soil quality and water regime, biodiversity and other public goods), to increase animal/human welfare, to substitute insufficient labour capacities with machinery or even contribute to the attraction of young generation to the sector.

Fig. 6. Efficiency of projects for 4.1.1. from the 1st and the 3rd calls if evaluated by payback period



Source: own elaboration.

Fig. 7. Efficiency of projects for 4.1.2. from the 1st and the 3rd calls if evaluated by payback period



Source: own elaboration.

6.5. Problems related to investment supports to agriculture

When the private investments are supported by public finance, and especially by grant instruments, there are more risks as a moral hazard of the government:

- Higher opportunity costs of the finances allocated to agriculture to be invested in other sectors of the national economy.
- Improper allocation of supports inside of agriculture itself on individual commodities or groups of commodities.
- Particularly in the Czech agriculture inadequate allocation of supports among farm categories (large farms have better position to gain more public finance than smaller ones).
- Leakage of supports to investment suppliers (e.g. producers/dealers of machinery, construction companies, etc.).

Small agricultural holdings have usually barriers resulting from complexity of the application process. Above it, the distribution of subsidies is also costly, high transaction costs are caused by high administrative requirements.

Dead weight losses

There can be also dead weight losses because some investments could have been realized even without public (grant) support from other sources. Results of counter-factual analyses show that selected investment measures of the RDP 2007-2013 (I.1.1. Modernization of agricultural holdings and III.1.1. Diversification of non-agricultural activities) really improved the performance of supported farms (which are larger and more stable over time). Significant benefits of investment support included mainly business expansion (output and GVA growth). However, labour productivity, total factor productivity (TFP) (also owing to increase of depreciation in the share of total costs) were affected less significantly.

Investment support helped farms improve the availability of funding sources and mobilized additional sources of funding (increased credit indebtedness) compared to unsupported farms, but this difference in credit indebtedness decreases over time. The policy had lower effect, because the conditions on credit markets improved. The dead weight effect appears rather small but increases over time.

It is also linked to the question of whether structural support was to be provided several times over the duration of the programme to one applicant. A distribution problem should be pointed to once again, as 60% of enterprises received only one project under I.1.1. Modernization of agricultural holdings and I.2.1. Modernization of food production holdings, which accounted for roughly one third of all projects, but accounted for only 21% of the total public expenditures on the measure. Contrary, enterprises with more than three projects accounted for only 19% of the beneficiaries, but they used more than half of the public money (57%). Partial solution of this discrepancy lays in the distribution of financial envelopes for projects by their size, that is already applied in the RDP 2014-2020. However, in this period the upper limit of the project expenditures from CZK 30 million to CZK 150 million was applied. However, at the same time, it is necessary in the given period to apply the limit in the numbers of drawn projects per enterprise.

6.6. Conclusion

Despite that the dead weight losses effect was not statistically significant and could not be proved, it is evident that the grant systems in investment supports, particularly for investments oriented on improvements in efficiency of

farms, have many drawbacks and risks. The current system does not ensure that only efficient or socially desirable projects are selected for supports.

The current system can be more applied to the so-called non-productive investments only (such as pits for manure, investments related to agro-environmental measures, etc.), oriented on public goods or eco-system services. The so-called productive investments shall be funded much more from private resources being supported by financial instruments. Those financial instruments can be applied e.g. under the SGFFF activities that have experience with providing such supports (credit guaranty, interest subsidies). Such approach enables to shift larger part of risks and administrative and/or transaction costs on private sector (banks). Activities of the SGFF seems to be a good solution for next programming period after 2020, but with a caution not to convert the SGFFF into a "state bank".

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7. Implementation of "blue ocean" strategy in Poland and Ukraine agricultural sectors: current status, opportunities and growth prospects[1]

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Abstract

The article is devoted to the research of issues related to the analysis of the "blue ocean" strategy joint implementation opportunities in the rural areas of Poland and Ukraine in order to minimize global competition consequences at agrifood markets. The Author discusses ways of resolving issues that slowdown innovative and inventive activities, make impossible the practical use of tools, methodologies and models of innovations implementation in agriculture, and, as a result, allow transfer of relative economic activity beyond "red ocean" strategy and additional returns receipt. Perspective ways of choosing the path of developing agriculture search on the principles of "blue ocean" strategy will allow to solve typical for Poland and Ukraine issues: rural unemployment, low-level innovative development, lack of know-how, etc. As a result, ecological innovations, that could be realized, will allow to swim out of the "red ocean" and increase overall production of food and economic security.

Keywords: "blue ocean" strategy, "red ocean" strategy, agriculture of Poland and Ukraine, economic security, food security

JEL codes: D24, Q12, Q18, L1

7.1. Introduction

Agriculture is the risk activity, which requires adequate and effective strategies that minimize negative influences of low price flexibility in the market of agricultural products and natural, social and personal- factors. We agree with opinion that "Risk management strategies usually come down to avoiding, stopping, controlling or transferring the risk. As the risk is an integral part of achieving economic success, of importance for the farmer remains its proper definition, indication of its sources of origin and the level of risk. Existing experience

[1] Article prepared for International Scientific Conference "Strategies for the agri-food sector and rural areas – dilemmas of development"organised by IAFE-NRI, 19-21 June 2017, Stary Licheń, Poland.

shows that no risk elimination tool is fully efficient. Therefore, risk management puts an emphasis on the production diversification while implementing, to the broadest possible extent, a risk-sharing strategy...” [Risk in the food economy, 2017, p. 11]. However we believe that perspective ways of choosing the path of developing agriculture search on the principles of “blue ocean” strategy will allow to solve typical for Poland and Ukraine issues: rural unemployment, low-level innovative development, lack of know-how, drought, floods, excessive precipitation, occurrence of spring frosts, etc.

Analysis of key research publications proves the actuality of the “blue ocean strategy” [Kim, Mauborgne, 2003] development for various sectors of the domestic national economy were disclosed by T. Repich [2007], M. Malik and H. Huch [2015], N. Kochkina and I. Medvedeva [2015] and others. As a result of their research, a number of contradictory hypotheses were formed. Thus, T. Repich states that “the issue of creating «blue oceans» is not so relevant for Ukrainian markets, as for the West. In most food markets in Ukraine, manufacturers do not feel much pressure from competitors, as it happens on developed, formed, saturated western markets” [Repich, 2007].

The article’s objective is to formulate the theoretical preconditions for estimation of efficiency transformation of rural economy, programming of agricultural politics and rural spaces on the basis of blue ocean strategy; to represent the formation of scientific grounds for the new model of rural spaces and agriculture development; to present examples of effective blue ocean strategies.

7.2. Evolution of theories of economic development strategies formation

In the scientific community, there is no single approach of determining the specific stages of formation strategies, but a systematic analysis of the most leading research centres in Poland, Ukraine, the USA, Switzerland, and France and Germany allows for the allocation of 13 bifurcation points (Table 1).

We fully agree with the opinion of Agnieszka Zakrzewska-Bielawska regarding “the changes that occurred at the beginning of the century are connected primarily with the rapid pace of development of technics and technology, civilized progress and concentration on innovations, entrepreneurial savings and the processes of globalization. Often hypercompetition entailed emergence of new strategies. Among them, an innovative entrepreneurial approach should be replaced on the main stages” [Krupski, 2014, p. 18]. The first of them establishes that the business logic is rocky concerning innovation and characterizes the entrepreneurial entities and defines the strategy as a general action that allows to create changes in the innovation character generating value in order to obtain profit (arising from Schumpeter’s definition of innovation) [Niemczyk, 2013, p. 124].

Table 1. Evolution of strategies: an overview of the main approaches and concepts

Year	Name/Author of Strategy	Brief description
1920	Comprehensive Strategy for the development of the "Brown" and "Red" Economy	Mass industrialization of production, irregular development of basic branches of the national economy. Changing relationship between industry and agriculture.
1984	B. Wernerfelt "Resource Theory"	The company's competitive advantage is based on its ability to build and use the right combination of resources.
1987	Brundtland Commission "Strategy for sustainable development"	The report "Our Common Future" outlines the foundations of sustainable development, which forecast the integration of the social, economic and environmental components.
1989	D. Pearce, A. Markandi "The Green Economy Concept"	The development of the green economy promotes people's well-being, provides social and gender justice, minimizes the costs of environmental resources and thereby significantly reduces the risks to the environment.
1994	P. Senge "Fifth discipline"	Creation of an effective organization that can be taught is possible only if there is a combination of 5 disciplines: Shared Vision, Mental Models, Personal Mastery, Team Learning and Systems Thinking – are each made up of a set of tools and practices for building and sustaining learning leadership capabilities in organizations.
1994	G. Mintzberg "5 Ps strategy"	5 Ps strategies: Plan, Ploy, Pattern, Position, Perspective are interconnected, none of these concepts cannot be considered the only true one. These definitions are independent, but each of them is impossible without the rest.
1995	I. Nonaka H. Takeuchi "Organization that learns"	The main task of the enterprise is the gradual transformation of informal knowledge of individual employees into the general array of formalized knowledge of the enterprise.
1996	H. Hamel, K. Prahalad "Competition for the future"	Sectoral leadership and the creation of competitive advantages in the markets of the future through the creation of competencies.
1998	J. Quinn "Strategy changes"	An effective formal strategy should include the main chains, the most significant elements of restrictive policies, and the sequence of key actions. Effective strategies evolve around a few key concepts and directions. In a complex organization there should be a hierarchy of supporting strategies.
2004	K. Chan, R. Moborn "Blue ocean strategy"	A business entity must create its own unique product or service, fill those niches that are empty and be a unique enterprise that will ensure unconditional survival and positioning under conditions of severe competitive pressure.
2006	S. Anthony, M. Eyring, L. Gibson "Plan innovation game"	The key to success is blasting innovation. In order to create successful innovative products on a regular basis, you need to understand what needs of customers are not satisfied yet and examine the proposals that were successful in the past.
2008	C. Montgomery	Approach: 1) traditional – strategy as a ready-made solution; 2) modern - strategy as a dynamic process.
2009	D. Logan, H. Fischer-Wrigh "Microstrategies"	Microstrategies are built into a system of more or less important plans. Instead of planning all future steps in advance, it is best to break them into microstates. This will allow enterprises to learn and adjust their actions in the process of achieving a global goal.
2013	J. Niemczyk	Innovative and entrepreneurial approach and human nature of participants in decision-making processes, unit of analysis and its key attributes, economic rent, acceptable strategies.

Source: compiled by the authors on the basis of [Risk in the food economy, 2017; Kim, Mauborgne, 2005; Repich, 2007; Malik, Hudz, 2015; Kochkina, Medvedeva, 2015; Krupski (ed.), 2014; Niemczyk, 2013].

7.3. Key materials presentation

Rephrasing the famous management principle "If you can't measure it – you can't manage it", we can state that managerial science and research always starts with estimation, or assessment. And one of the most precise ways of estimation is integral one, since it allows to radically minimize the level of subjectivity by means of the optimal set of indicators. Algorithm of economic activities' development for agricultural enterprises taking into account opportunities and needs of the local territorial community covers the individual setting of top priorities for further development.

Taking into account that the larger share of rural population is traditionally rather passive, selection of strategically important directions in entrepreneurship development must be initiated at the level of local self-governing authorities. Active business diversification, in turn, has promoted further development of local social infrastructure. For example, now the local area has its own servicing cooperative "Agrowelfare". This cooperative is responsible today for timely garbage disposal and it is also providing such services as ploughing of backyard gardens and other lands, transportation of agricultural products and construction materials, etc. A good example in this regard is the activity of one of the local village heads – from the village Fursy. The budget of this village used to be strongly dependent on several large enterprises operating relatively nearby, namely: the plant "Termo-PACK", Bilotserkivske forestry, a state enterprise and an experimental base "Oleksandriya", the Institute of Crop Protection (affiliated to the National Academy of Sciences of Ukraine), LLC "BilotserkivMAZ", one large fuel-filling station and finally a local station of "Kyivstar" (one of the three leading national mobile providers). Despite these significant factors of influence upon the local budget, the village had still managed to motivate the fellow villagers to be more active in the development of small and medium businesses, thus increasing the overall quantity of businesses in the area to the level of 400 (more details can be obtained from [Zalizko et al., 2017]).

If for Ukraine such a development of medium-sized businesses in the villages is a unique case, then for Poland it is a norm that small farmers process 5-10 hectares of land and diversify their economic activities. But is it then optimal size? Can it provide food safety of the country? What strategy to use for development of agriculture of our countries? In case of agrarian economy of Ukraine – it should find an alternative for the large agroholdings, as we can repeat the negative agrarian experiments of Brazil and Argentina.

The scientific and technical progress requires changes to the strategy for the development of agricultural and rural development. In monograph by prof. J.N. Sheth entitled "Marketing Theory: Evolution and Evaluation" it is said that

marketing strategies should be embedded in two pillars: the first is a deep understanding of customer needs and behaviours, the second is critical analysis of the opportunities for competitive advantage. But Chan Kim and Rene Moborn argue for concrete examples for the expediency of using the blue ocean strategy, where, in particular, in studying more than 150 blue ocean creations in over 30 industries, the authors observed that the traditional units of strategic analysis – company and industry – are of limited use in explaining how and why blue oceans are created. The most appropriate unit of analysis is the strategic move, the set of managerial actions and decisions involved in making a major market-creating business offering. Creating blue oceans builds brands. So powerful is blue ocean strategy, in fact, that a blue ocean strategic move can create brand equity that lasts for decades [Kim, Mauborgne, 2017]. What matters during the time of the Single Market Expansion to the Current and New Member State [Maliszewska, 2004].

Henceforth, we will understand that the "blue ocean" is all the non-existent industry today, the undeveloped kind of entrepreneurial activity, for which there is no characteristic struggle for survival, since demand for products must be created, not competed for, and the "red ocean" is today the economy, an existing market that has clear limits and rules of the game, established by competition. Examples of agricultural and non-agricultural enterprises that have chosen the blue ocean strategy (Table 2).

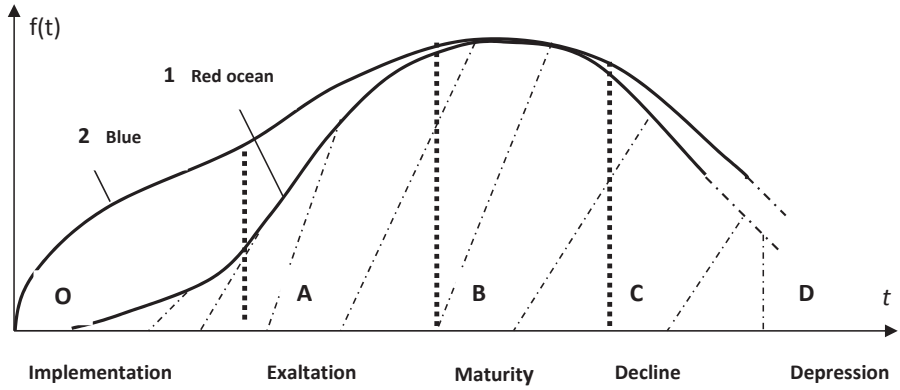
Table 2. Systematization of agricultural and non-agricultural enterprises that have chosen the blue ocean strategy

Examples of non-agricultural enterprises that have chosen the blue ocean strategy	
Echo Bay Technology Group	Formula 1 Accor hotels
T-model (Ford)	Circus du Soleil
CNN	Discovery
Southwest Airlines	The Body Shop
Examples of agricultural enterprises that have chosen the blue ocean strategy	
Artificial Intelligence	
Tractors without a driver	Automated farms
BoniRob	Farm bot
Enterprise resource planning	Farming management system (FMS)
Reinforcement learning	Generative model
Tetra	Argo
E-farmer	Agrilab
Robotization and automation of agricultural and management processes	

Source: compiled by the authors.

On the basis of integrated assessment methods of these innovative products (Table 2), we give an economic efficiency characteristic of the life cycle (Fig. 1).

Fig. 1. The product life cycle (PLC)



Source: constructed by the author.

We will calculate the economic effect of the PLC using the following properties (1-4) of a Riemann integral (with variable time parameter *t*):

$$\int_O^D kf(t)dt = k\int_O^D f(t)dt,\ k = const \tag{1}$$

$$\int_O^D f(t)dt \geq 0,\ \ if\ \ f(t)dt \geq 0 \tag{2}$$

$$\int_O^D f(t)dt = \int_O^A f(t)dt + \int_A^B f(t)dt + \int_B^C f(t)dt + \int_C^D f(t)dt \tag{3}$$

$$\int_O^D (f_1(t) \pm f_2(t))dt = \int_O^D f_1(t)dt \pm \int_O^D f_2(t)dt \tag{4}$$

$$f_2(t) - f_2(t) \geq 0 \Rightarrow \int_O^D f_2(t) - f_2(t)dt \geq 0 \Rightarrow \int_O^D f_2(t)dt \geq \int_O^D f_1(t)dt. \tag{5}$$

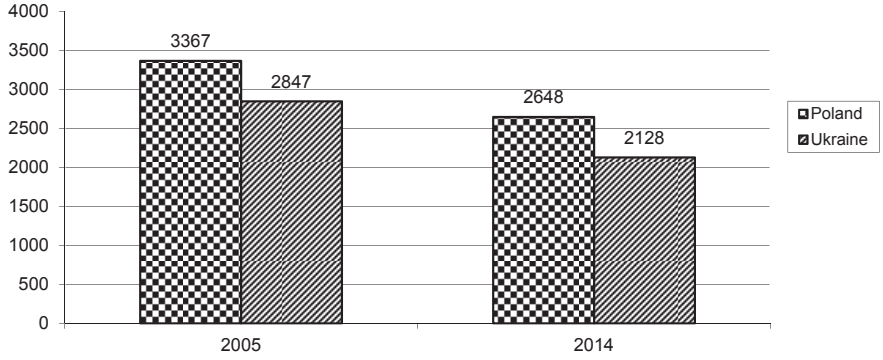
This proves that the life cycle of the classical goods of the purple ocean at all intervals is less than the corresponding values of the life cycle of the innovative product of the blue ocean, apart from the interval [B; C], where:

$$\int_B^C f_2(t) - f_2(t)dt \approx 0 \Rightarrow \int_B^C f_2(t)dt \approx \int_B^C f_1(t)dt.$$

That is, at the maturity stage, the effectiveness of these two types of development strategies is roughly the same, and for the remaining stages the blue ocean strategy is more effective.

However, the innovations of agriculture have a negative social effect, which manifests itself in reducing the number of jobs. Moreover, in Ukraine and Poland, these negative trends are the same (-719 thousand persons, Fig. 2).

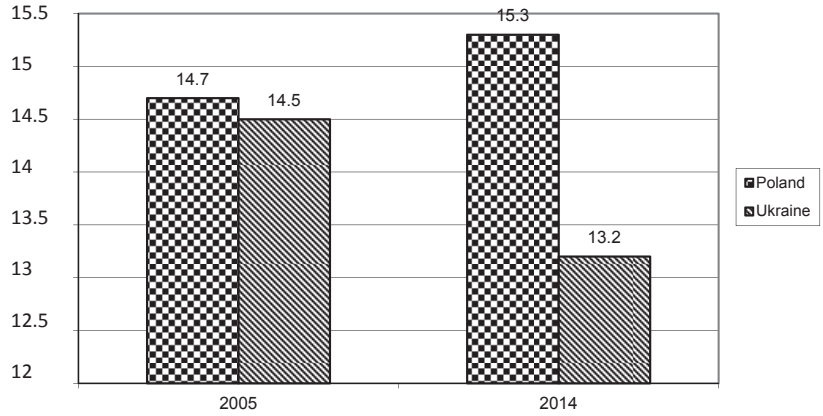
Fig. 2. Activity population in agriculture (thousand persons)



Source: compiled by the author on the basis of GUS data.

It should be noted that there is a Poland's paradox, as the rural population is constantly increasing (Fig. 3), what is not typical of most European countries.

Fig. 3. Dynamics of rural population (thousand persons)



Source: compiled by the author on the basis of GUS data.

Expediency of implementation of "blue ocean" strategy in Polish and Ukrainian agricultural sectors indicates different directions of agricultural production. In particular, Poland produces – apples, cabbage, carrots, onions, mushrooms, sugar beets, tomatoes, tobacco, potatoes; poultry, dairy products (milk, cheese, butter), but Ukraine – sunflower, oil products, nuts, cereals, barley, rape, corn, soybeans, wheat, honey.

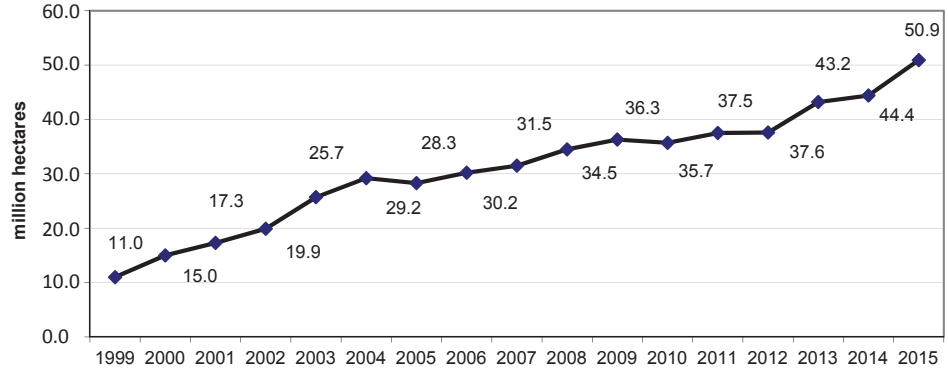
The rivalry between the red and blue oceans of the agricultural sector now points to the advantage of the latter, but the blue ocean strategy gives a better view of economic processes and also focuses on threats to the social and environmental factor in the formulation of rural economics.

So we have two patterns of the blue ocean strategy on agricultural farm:

- Robotizations, GMOs, additive production (Unemployment in the countryside, destruction social traditions, cultural and ethnic, but strengthen the safety food and fight hunger in the world);
- Gradual transition to organic (biodynamic) agriculture.

The prospect of the second vector of agricultural development in Ukraine and Poland is confirmed by the global dynamics of the organic sector development (Fig. 4).

Fig. 4. Dynamics of organic sector



Source: compiled by the author on the basis of FIBL [Research Institute of Organic agriculture, 2017].

Table 3. Systematization of grants for the implementation of the blue ocean strategy in Agriculture of Ukraine and Poland

1	UNDP
2	COSME
3	USAID
4	Horizont 2020
5	Global Innovation Found
6	Grants from the Embassy of Sweden, the Kingdom of the Netherlands (Matra-Kap), Germans and others.
7	The "Small Grants" Competition of the Republic of Poland
8	SSC Association, HTI et al.
9	Western NIS Enterprise Fund
10	Center for International Single-Person Business

Source: compiled by the author.

It is obvious that organic and biodynamic agriculture is innovative compared to traditional types of economic activity. But the organic sector needs to attract significant financial resources. In connection with this we propose to intensify cooperation with international organizations (Table 3).

7.4. Conclusions and propositions

Thus, the suggested methodological grounds necessary for integral estimation of the decision to introduce robots in agriculture determines the long-term development path of agriculture, but in this case the main place of work of the rural population should be organic agriculture or not rural activities, where human capital is an important determinant in building the predominance of blue ocean strategies.

Poland and Ukraine have a chance to create a common blue ocean with organic products for all of Eurasia, which now needs more and more organic production. Automation of all agricultural processes will lead to increased crop capacity and all economic indicators, but it entails a social problem. Polish and Ukrainian scientists should work together on existing and new programmes, in particular of grants for the introduction of the blue ocean strategy for the development of our country's farming economy.

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8. Potential of landscape features for implementation of green direct payments in Czech farmed landscape[1]

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Abstract

One of the major changes to the architecture of Pillar 1 of the CAP[2] in the 2014--2020 period is the inclusion of three measures providing payments for agricultural practices, beneficial for the climate and the environment, known as "green direct payments" or shortly "greening". These practices are crop diversification, the maintenance of permanent grassland, and Ecological Focus Areas (EFAs). Landscape features are included in EFAs. Ministry of Agriculture (MoA) in Czechia allows farmers to fulfil their EFAs obligations on arable land through the landscape features and choose eight from nine specified landscape features which are eligible for the EFA obligation. The study analysed the current state of landscape features in the selected territory of the Czech Republic. The aim was to identify landscape features covered by the Land Parcel Identification System (LPIS) and to identify the potential of landscape features, which are not currently registered in the LPIS, but are based on nature and express the potential for future plots and eligibility for EFAs. Investigation of the causes to implement landscape features as the EFAs by farmers was supplemented by short survey with questionnaire, where respondents were farmers.

Keywords: landscape features, Ecological Focus Areas, acceptance and potential

JEL codes: Q15, Q58, G28

8.1. Introduction

Landscape pattern is national heritage which was devastated in socialist times due to collectivisation. The MoA developed a strategy[3] for the next 13 years containing information about significant disappearance of landscape fea-

[1] Article prepared for International Scientific Conference "Strategies for the agri-food sector and rural areas – dilemmas of development"organised by IAFE-NRI, 19-21 June 2017, Stary Licheń, Poland.
[2] Common Agriculture Policy.
[3] Strategy of agriculture 2013.

tures from agricultural land. This fact gets even worse for some functions of the landscape e.g. water retention, floods, drought, wind and water erosion. Landscape features were created in history due to many reasons mostly as borders of ownership, sources of wood and forms of protection against flood and drought. Landscape features are being created in the countryside again due to the Land Consolidation. The process has started in 1990 and it is proceeding very slowly. Fundamental reasons for building new features are regulations on the hydrological regime and an increase in biodiversity. Agro-environmental functions with positive influence on water retention, soil degradation and biodiversity are needed in the Czech agricultural land.

Landscape features are protected by law according to their importance and localisation. Basic Payment Scheme (the so-called greening) especially the EFAs and landscape features may protect sustainable stability of the countryside as one of the few instruments of the agricultural policy.

Farmers who participate in the Basic Payment Scheme must implement the three following standard greening measures:

- Crop diversification;
- Ecological Focus Area (EFA);
- The protection of permanent grassland.

The purpose was to provide a basis for political decisions regarding the setting of greening in the EFAs. The aim was to determine the potential of landscape features for implementation of green direct payments and make a survey of the exact numbers and areas in the case area.

8.2. Methods

The study aims to analyse the pilot area of the current state of the Czech register of landscape features and the potential of landscape features that are not currently registered in the LPIS.

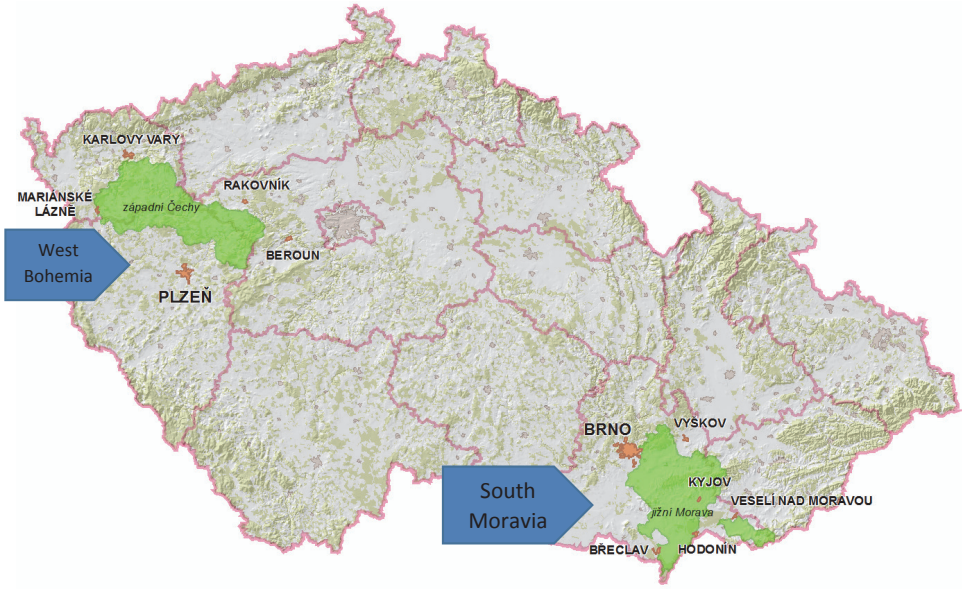
Area of interest was chosen on two different areas with the following conditions:

- Different geographical location in Czechia (region South Moravia and West Bohemia),
- Different altitude,
- LFA composition,
- Climate condition,
- Different terrain condition (lowland, highland),
- Different historical tradition for creation of landscape features.

The study investigated landscape features in the pilot area of 4171km^2.

- The South Moravia has an area of 2039 km^2. Its characteristics are as follows: lowland with warmer climate, in terms of classifying the area into LFA, South Moravia is only 6% LFA; therefore, 94% of the area is favourable for farming.
- The West Bohemia region has an area of 2132 km^2. Its characteristics are as follows: highlands, cold to slightly warm climate, in terms of classifying the area into LFA, the 95% of the West Bohemia area is within one of the LFA categories and only 5% of the area is not included in the LFA. The position of both surveyed lands is shown in Figure 1

Fig. 1. Geographical location of two pilot areas



The main tool of the analysis was geographic information system (GIS), which provided geographic analysis and comparison between created and observed data of landscape features with coefficient of ecological stability.

Three sets of landscape features came into the analysis:

- Landscape features registered in the LPIS and plotted per the methodology of the MoA (recognized number 4244, total area 329 ha);
- Landscape features not registered in the LPIS but available to be accepted according to the methodology of the MoA, (number of new drawing 16 954, total area 2149 ha);

- Landscape features not used yet, they are based on natural elements and expressing the potential for future drawings and acceptance, for example buffer zones (recognized number of water buffers 4688 and 2929 forest buffers).

The occurrence of landscape features was assessed using coefficient of ecological stability (KES)[4]. The method of calculating KES is based on the Corine Land Cover (CLC) and is the ratio of stable and unstable areas in the surveyed area.

$$KES = \frac{LP + VP + TTP + Pa + Mpo + Sa + Vi}{OP + AP + Ch} = \frac{Stable\ ecosystems}{Unstable\ ecosystems}$$

At the same time categories of ecosystem are:

Stable ecosystems	Unstable ecosystems
LP – forest	OP – arable land
VP – water areas and streams	AP – anthropogenised areas
TTP – permanent grassland	Ch – hopper
Pa – pastures	
Mo – wetlands	
Sa – orchards	
Vi – vineyards	

Table 1. Five categories for the assessed ecological stability of the landscape according to KES

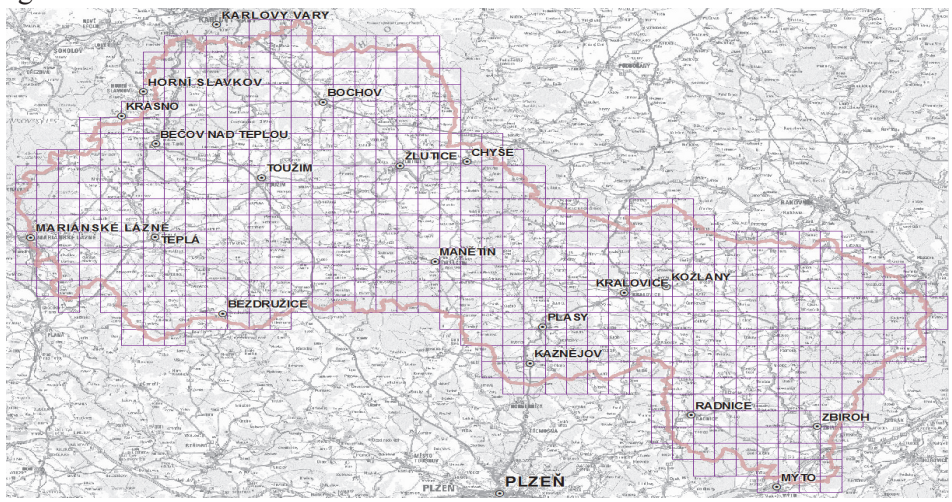
grid		
1	KES ≤ 0.1	disturbance of natural structures, basic ecological functions must be intensively and permanently replaced by technical interventions
2	0.1 < KES ≤ 0.3	basic ecological functions must be systematically replaced by technical interventions
3	0.3 < KES ≤ 1.0	intensively exploited areas, especially agricultural large-scale production, weakening self-regulation processes in ecosystems
4	1.0 < KES ≤ 3.0	quite balanced landscape.
5	KES > 3	stable balanced landscape

A coherent dataset of landscape coverage was created for the purpose of this study, covering the whole area of interest and containing all the above-mentioned stable and unstable ecosystems. The area of interest was divided by

[4] According to Míchal I. (1994).

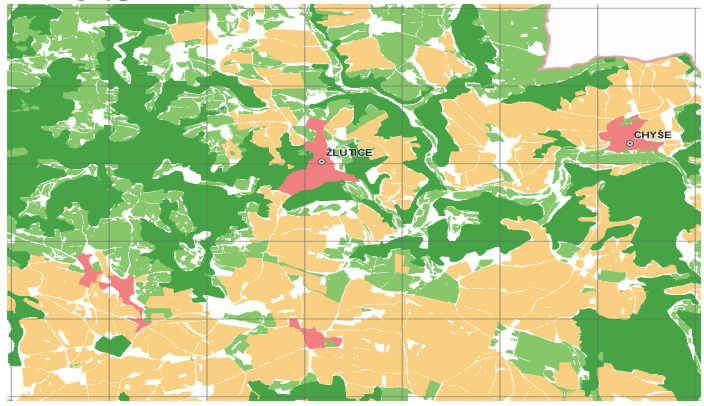
a square reference grid of 2 x 2 km; 1240 grids were created, of which 624 are located in South Moravia and 616 in West Bohemia. The grid example is shown in the Figures 2, 3 and 4. The coefficient of ecological stability was calculated in each square.

Fig. 2. Area of West Bohemia



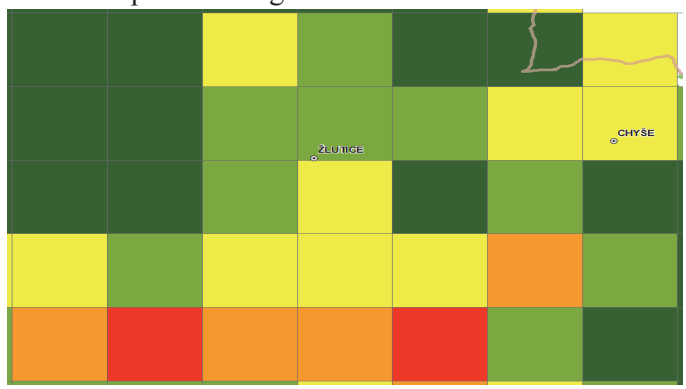
The Figure 2 shows an example of a working layer of the landscape cover in squares of 2 x 2 km. Red are the anthropogenised areas of the Corine land cover (CLC) data, an unstable orange culture from LPIS data, a light green, stable culture from the LPIS data, a dark green area from CLC data (mostly it is forest).

Fig. 3. Converting types of cover areas to CLC



An example of the resulting KES displayed in five categories is shown on Figure 4 (dark green grids are natural and nature-related areas = 5, red squares are areas with maximum disturbance of natural structures = 1). The site and the minimum area in the grids were excluded. The relevant value of the ecological stability coefficient was set at 966 of 1240 grids. These 966 grids were further processed statistically.

Fig. 4. The average value per grid of five categories for the assessed ecological stability of the landscape according to KES



8.3. Results

Identified and plotted landscape elements in the interest area according to these three categories are shown in Table 2. Further, the results are again presented per the types of landscape elements as was mentioned in methods and they have the following characteristics:

- Landscape features registered in the LPIS and plotted according to the methodology of the MoA;
- Landscape features not registered in the LPIS, but available to be accepted according to the methodology of the MoA;
- Landscape features not used yet, they are based on natural elements and expressing the potential for future drawings and acceptance, for example buffer zones.

Table 2. An overview of identified landscape features in the survey area, 2016

	Landscape feature	Registered in the LPIS		Not registered in the LPIS but available to be accepted		Buffer zones		Total
		ha	number	ha	number	ha	km	ha
1	Country lane	128	701	962	4581			**1090**
2	Terraces	2	31	364	982			**366**
3	Grassy valley	46	51	124	194			**170**
4	Trees in groups and field copses	125	2205	427	5910			**552**
5	Trees in line	22	111	232	561			**254**
6	Isolated trees (standalone)	4	1142	35	4711			**39**
7	Ditches	2	3	0	6			**2**
8	Wetland	0	0	6	7			**6**
9	Buffer strips (along forest edges)					2110	2344	**2110**
10	Buffer strips (along water bodies)					1427	1585	**1427**

Landscape features registered in the LPIS

The least represented group of landscape features is a group registered in the LPIS and also registered with EFAs. The total of 4244 landscape features in the interest area were recognized. These have a total area of 329 ha. Overview of landscape features in the category "Registered in the LPIS" is given in Table 3.

Table 3. The overview (a) of the number, area and percentage of the total number of LF for case area in (a) category

		All LF	Country lane	Terraces	Grassy valley	Trees in groups	Trees in line	Isolated tree	Ditches	Wetland
Whole area	number	**4244**	701	31	51	2205	111	1142	3	0
	ha	**329**	128	2	46	125	22	4	2	0
	%	**100%**	17%	1%	1%	52%	3%	27%	0%	0%
South Moravia	number	**934**	220	23	10	267	48	363	3	0
	ha	**91**	47	2	9	14	16	2	2	0
	%	**100%**	24%	2%	1%	29%	5%	39%	0%	0%
West Bohemia	number	**3310**	481	8	41	1938	63	779	0	0
	ha	**238**	82	1	37	111	5	2	0	0
	%	**100%**	15%	0%	1%	59%	2%	24%	0%	0%

Landscape features not registered in the LPIS but available to be accepted

The mapping of this group has shown that it is a significant group in both area and number of features. The total of 16 954 landscape features were unregistered and recently mapped. These have a total area of 2149 ha. Details can be found in Table 4.

Table 4. The overview (b) of the number, area and percentage of the total number of LF for area

		All LF	Country lane	Terraces	Grassy valley	Trees in groups	Trees in line	Isolated tree	Ditches	Wetland
Whole area	number	**16 954**	4581	984	194	5910	561	4711	6	7
	ha	**2149**	962	364	124	427	232	34	0	6
	%	**100%**	27%	6%	1%	35%	3%	28%	0%	0%
South Moravia	number	**7413**	2202	984	34	1647	312	2230	2	2
	ha	**1231**	514	364	14	108	206	20	0	5
	%	**100%**	30%	13%	0%	22%	4%	30%	0%	0%
West Bohemia	number	**9541**	2379	0	160	4263	249	2481	4	5
	ha	**918**	447	0	110	319	27	14	0	1
	%	**100%**	25%	0%	2%	45%	3%	26%	0%	0%

Buffer zones

Buffer zones were necessary to plot and these features are still not accessible for registration in Czechia. The MoA still weighs the pros and cons of this group of landscape features. Buffer zones were chosen as the only possible option for implementation of the landscape features[5] considered. Buffer zones are unregistered in the Czech Republic and are not included in the drawing according to the methodology of the Ministry of Agriculture. However, the EU allows buffer zones for the EFAs and Czechia to have a quite important area in these features. Buffer zones are, therefore, an opportunity for future implementation in the Czechia.

The case area showed that it was 3.9% areas on agricultural land. Buffer zones were detected in total potential of 4688 strips along watercourses with a total length of 1585 km and 2929 bands along the edges of forest with a total length of 2344 km in the area of interest.

There is much greater relative potential for the establishment of protection belts around watercourses in South Moravia than in Western Bohemia. On the

[5] Landscape features not technically compatible with soil blocks exist in the landscape but do not comply with the EU methodology for EFA. There was a total of 404 of these landscape features in the whole area of interest. These landscape features exist, but cannot be counted in the registry of the LPIS, although they can also form some function. In this respect, the EU's recommended methodology is imperfect.

other hand, there is a greater relative potential in Western Bohemia for the establishment of protective belts along the edges of forests than in South Moravia.

Buffer zones along watercourses with a total length of 1585 km were converted to 6 m per m^2 and a weighting factor of 1.5, representing a potential of 1427 hectares of EFA.

Buffer zones along the edges of forests with a total length of 2344 km, with a conversion factor of 6 m per m^2 and a weighting factor of 1.5 (in the case of unprotected safety belts), the stripes along the forest represent a potential of 2110 hectares of EFA.

The total area of potential EFA of each type of buffer zones in the area of interest is 3536 ha. Of the total area of unstable soil, the predominant arable land is only 0.92% for both territories. These results are summarized in Table 5.

Table 5. Plotted line of delimitation of buffer strips

	Buffer strips (water)		Buffer strips (forest)		EFAs buffer strip	
	km	ha	km	ha	km	ha
Whole area	**1585**	**1427**	**2344**	**2110**	**3929**	**3536**
South Moravia	1242	1118	894	805	2137	1923
West Bohemia	343	309	1450	1305	1792	1613

Landscape features viewed in LPIS, in KES grids 2 x 2 km

The state of ecological stability is evident from Table 6 and Figures 5 and 6. In brief, West Bohemia has a higher stability than South Moravia.

Table 6. Grid representation overview in KES

KES	whole area			South Moravia			West Bohemia		
	number	ha	%	number	ha	%	number	ha	%
1	209	83 600	22%	186	74 400	40%	23	9200	5%
2	125	50 000	13%	93	37 200	20%	32	12 800	6%
3	186	74 400	19%	100	40 000	21%	86	34 400	17%
4	160	64 000	17%	42	16 800	9%	118	47 200	24%
5	286	114 400	30%	47	18 800	10%	239	95 600	48%
total	966	386 400	100%	468	187 200	100%	498	199 200	100%

Fig. 5. Map of West Bohemia with KES

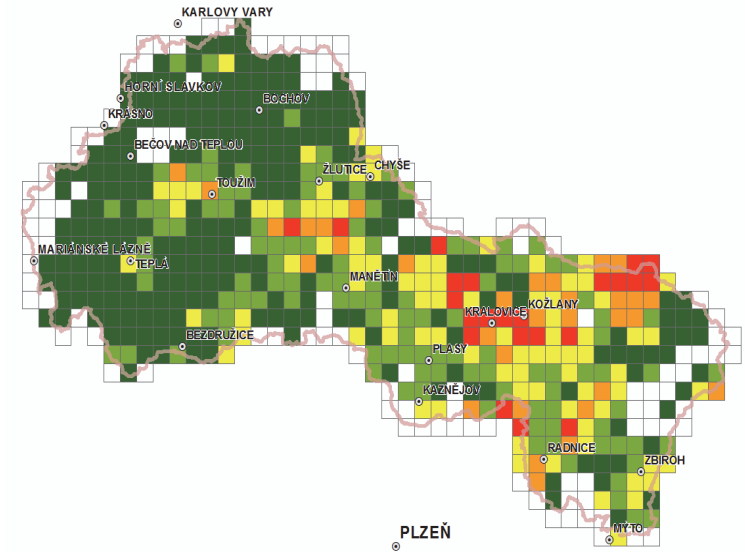
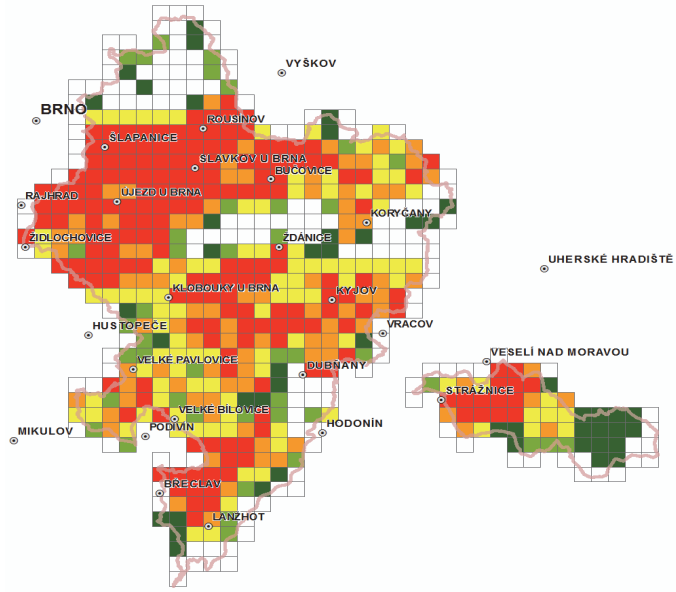


Fig. 6. Map of South Moravia with KES



The following Tables 7, 8 and 9 show the numbers of individual types of landscape features that are currently registered in the LPIS in the categorization of individual KES categories. The tables also distinguish the position of landscape features on arable land and outside arable land.

Landscape features registered in the LPIS

Landscape features were assigned per their geographic location in the grids for which the KES classified into one of the five KES categories. The same was done for another group of landscape features (not registered, buffer zones).

The landscape features of the LPIS for each KES category have the following results:

- West Bohemia – field balks are mostly outside arable land,
- South Moravia – field balks are more on arable land,
- West Bohemia – grassy valleys have 4 times more occurrences than in the South Moravia,
- West Bohemia – grids of category 5 have trees in groups mostly outside arable land,
- Trees in line (alley) occur more on arable land than elsewhere,
- Ditches are without a question the rarest landscape feature of the listed ones.

Table 7. Landscape features registered in the LPIS in hectares

whole	**Field balks**		**Terraces**		**Grassy valley**		**Trees in groups**		**Trees in line**		**Ditches**	
	arable	other	arable	other	arable	other	arable	other	arable	other	arable	other
1	28	1	0	0	8	0	2	0	13	0	2	0
2	6	0	0	0	13	0	3	2	2	0	0	0
3	10	4	0	1	8	0	5	5	2	0	0	0
4	7	7	0	0	6	0	7	15	1	1	0	0
5	2	58	0	1	9	1	3	79	0	1	0	0
total	54	71	0	2	44	1	19	101	19	3	2	0
SM	arable	other	arable	other	arable	other	arable	other	arable	other	arable	other
1	26	1	0	0	6	0	2	0	13	0	2	0
2	6	0	0	0	0	0	1	1	2	0	0	0
3	9	1	0	1	2	0	1	1	1	0	0	0
4	2	0	0	0	1	0	0	1	0	0	0	0
5	0	1	0	0	0	0	0	6	0	0	0	0
total	43	3	0	1	9	0	4	8	16	0	2	0
WB	arable	other	arable	other	arable	other	arable	other	arable	other	arable	other
1	1	0	0	0	2	0	1	0	1	0	0	0
2	0	0	0	0	13	0	2	1	0	0	0	0
3	1	4	0	0	6	0	4	4	1	0	0	0
4	6	7	0	0	5	0	7	14	1	1	0	0
5	2	**57**	0	1	9	1	3	74	0	0	0	0
total	10	68	0	1	**35**	1	16	93	2	3	0	0

SM – South Moravia, WB – West Bohemia.

Landscape features not registered in the LPIS, but available to be accepted

The group of not registered landscape features is the most numerous group of landscape features. The average feature area of this group is lower than that of the registered, but the importance is almost the same. For example, 22% of area landscape features is in category KES 1, 13% of area is in category KES 2, 19% of area is in category KES 3, 17% of area is in category KES 4 and 30% of area is in category KES 5. The same result of share is in registered and unregistered features. There is a great potential for recording and increasing the area for EFAs.

The landscape features of the LPIS for each KES category have the following results:

- West Bohemia and South Moravia – field balks have an average significantly larger area on arable land (0.26 ha) than the field balks on other crops (0.16 ha).
- West Bohemia – no new terraces.
- Standalone trees are most commonly found in squares in KES category 5 in both areas (very small area).
- Most trees in lines are in KES category 1 in South Moravia. Trees in line is the most important type of elements there.

Table 8. Landscape features unregistered in the LPIS, but existing in landscape in hectares

whole	**Field balks**		**terraces**		**Grassy valley**		**Trees in groups**		**Trees in line**		**Ditches**	
	arable	other	arable	other	arable	other	arable	other	arable	other	arable	other
1	170	4	55	11	13	0	24	1	116	0	0	0
2	126	8	46	23	16	0	21	8	54	0	0	0
3	168	54	66	82	13	5	39	24	31	3	0	0
4	74	68	34	33	20	6	34	48	8	5	0	0
5	30	236	5	8	4	45	15	196	5	5	0	0
total	567	371	206	157	66	57	133	278	214	15	0	0
SM	arable	other	arable	other	arable	other	arable	other	arable	other	arable	other
1	160	3	55	11	8	0	19	1	**114**	0	0	0
2	108	5	46	23	3	0	11	4	47	0	0	0
3	119	21	66	82	2	0	10	6	29	2	0	0
4	27	13	34	33	0	0	3	5	6	2	0	0
5	7	39	5	8	1	0	2	42	3	0	0	0
total	421	82	206	157	14	0	45	57	199	4	0	0
WB	arable	other	arable	other	arable	other	arable	other	arable	other	arable	other
1	9	1	0	0	5	0	4	0	2	0	0	0
2	18	3	0	0	13	0	10	5	7	0	0	0
3	49	33	0	0	11	5	29	19	2	1	0	0
4	47	55	0	0	20	6	32	43	3	4	0	0
5	23	198	0	0	3	45	13	154	2	5	0	0
total	145	289	0	0	52	57	88	221	15	11	0	0

Buffer zones

Buffer zones were classified according to their location in individual squares into the relevant KES categories. Details of the results are shown in Table 9.

Buffer zones for each KES category have the main following results:

- Buffer strips along water courses and streams have huge potential, especially in KES category 1, 22% of the area of interest contains 44% of all the water buffer strips.
- Buffer strips along forests have the highest potential in the KES category 3 and 4. This trend is more obvious in the WB than in the SM area.

Table 9. An overview of potential landscape features for the EFAs in km and %

Buffer strips (along water courses									
KES	whole area			SM			WB		
	Share of the KES	buffer		Share of the KES	buffer		Share of the KES	buffer	
		km	% km		km	% km		km	% km
1	22%	693	44%	40%	636	52%	5%	57	17%
2	13%	340	22%	20%	270	22%	6%	71	21%
3	19%	341	22%	21%	239	20%	17%	102	30%
4	17%	139	9%	9%	55	4%	24%	83	24%
5	30%	53	3%	10%	25	2%	48%	28	8%
total	100%	1566	100%	100%	1225	100%	100%	341	100%
Buffer strips (along forest edges)									
KES	whole area			SM			WB		
	Share of the KES	buffer		Share of the KES	buffer		Share of the KES	buffer	
		km	% km		km	% km		km	% km
1	22%	268	12%	40%	208	25%	5%	60	4%
2	13%	316	14%	20%	198	23%	6%	118	8%
3	19%	743	33%	21%	266	31%	17%	477	33%
4	17%	663	29%	9%	114	13%	24%	549	38%
5	30%	289	13%	10%	61	7%	48%	228	16%
total	100%	2279	100%	100%	847	100%	100%	1432	100%

Interview with farmers

One of sources of information for study about landscape features and their implementation in green payment scheme was a questionnaire. The questionnaire was completed by 451 enterprises. The survey was rejected by 173 respondents. Farmers replied for example to the following questions:

- Do you register all the landscape features you have in the LPIS as an area of ecological interest?
- What are the reasons why farmers do not choose landscape features to fill greening on farmland they use?
- What another area of ecological interest do you declare to meet greening conditions?

Approximately one-third of respondents stated that they earmarked all landscape features as an area of ecological interest. The remaining two thirds of farmers allocate only a fraction of them. A small area of landscape features is not important and farmers saw it like obstacle to registration in greening. Administrative burden is another prominent reason for not registering landscape features to carry out greening. Over half (55%) of surveyed farmers reported that they declare a different area of ecological interest (EFA) rather than landscape features. The reason is to avoid complicated situations that occur in the event of damage or destruction of the landscape features through other person or extreme weather.

8.4. Conclusion

Landscape features have important influence on many functions including biodiversity and degreasing risks of water management.

Registration of landscape features brought some problems for farmers. It is a significant reason why farmers refuse registration and implementation of landscape features for EFAs. Solution could be the opening of discussions among the MoA, farmers and relevant experts.

Besides supporting the registration of landscape features we can also deal with the promotion of their creation and support of targeted management. This requires an intensive discussion with the participation of experts and responsible departments (MoA and MoE). Good practices were land consolidation with responsible actors.

Education of farmers and the public about environmental function of landscape features is still very needful and important topic.

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9. Development of rural areas based on rational agricultural land use: a case study of Ukraine

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Abstract

As a result of research, an assessment of the development of rural areas of different regions of Ukraine was made and a role in this process of rational use of agricultural land was determined. Land degradation was identified as one of the major threats to the European agriculture. Ukraine is particularly vulnerable to the effects of land degradation with one of the highest rates of soil erosion in Europe. Land degradation, due to irrational land use, hinders development of agricultural sector and rural areas. This paper estimates the losses from land degradation on the value of agricultural production in Ukraine. The strategy for development of rural areas and adaptation of agricultural enterprises of Ukraine to global warming proposes to put a number of strategic measures that would allow to prevent soil degradation processes on the one hand, and on the other – that would contribute to the reduction of greenhouse gas emissions during cultivation and increase carbon sequestration, i.e. humus in the soil, thus ensuring rational land use. Strategic priorities of development of low-carbon agricultural land use are proposed. Practical implementation of these activities may contribute to the development of rural areas of Ukraine and adaptation of agriculture to climate change.

Keywords: rural areas, development, rational agricultural land use, land degradation, soil fertility, agricultural enterprises, Ukraine

JEL codes: Q01, Q15, Q18, Q56

9.1. Introduction

In agriculture the decisive role belongs to the land. Of the 60.4 million ha of total area of Ukraine, 42.7 million ha (70.7%) are agricultural lands. Soil cover of Ukraine is very diverse and has up to 1000 kinds of soil. It consists of chernozems soils on 2/3 (about 25.3 million ha). At the same time, chernozems ordinary cover an area of 10.5 million ha, typical – 5.8, southern – 3.6, podzo-

lized – 3.4 and chernozem-meadow soils – 2.0 million ha [Baliuk et al., 2017]. Ukraine's land resource potential is one of the most powerful in Europe.

Agricultural lands are located mainly in rural areas and are the main source of income for rural population. Thus, land resources are the most valuable component of the national wealth of Ukraine and one of the main factors in the development of rural areas.

Analysis of recent research and publications shows that scientists are investigating various aspects of the development of rural areas. For example, in the article by Prokopchuk and Usyuk [2016] the authors summarize the European experience of the investment support of rural development policy. The authors consider inclusive policy implementation of rural areas as important direction of investment activity. They proved that the priorities of investment policy of rural development support of Member States of the EU promotes social integration, rural economy development, eradication of poverty and innovative communication technologies implementation. Also, the article analyses the dynamics of financial flows, especially their distribution and use in Member States of the EU in the scope of the European Agricultural Fund for Rural Development [Prokopchuk, Usyuk, 2016].

The thesis of Ruban [2017] is devoted to the development of social and economic principles of rural development, which involves the simultaneous existence of positive trends in the production subsystem and rising living standards. Therefore, the strategy for development of rural territories should include strategies development of production subsystem, social services and also managing the implementation of this strategy. The strategy for production subsystem on rural areas through a combination of extensive and intensive factors was justified [Ruban, 2017]. The article by Alieva [2016] defined and justified priority directions of state regulation of social and economic development of rural areas. It also proved that the socio-economic development of rural areas is an important component of social and regional public policy. Alieva found as well that state regulation of socio-economic development of rural areas is at four levels: national, regional, local and grassroots [Alieva, 2016].

In connection with the authority decentralization in the management of agriculture in Ukraine, there is a need for forming scientific centres of development of the agricultural sector and rural areas in each region of the country. The paper by Sabluk [2017] highlights the basic directions of organization and content of authority decentralization in agriculture and their impact on results of economic activity of administrative structures in entities. Methodical support of specific areas according to the calculations has to be relied on scientists [Sabluk, 2017].

However, up to the present the problem of the development of rural areas based on rational agricultural land use in Ukraine's regions is not being sufficiently covered, thus there is a need for determining the topicality of this research issue and its deeper study.

9.2. Methodology

The purpose of the research is to evaluate the development of rural areas of different regions of Ukraine and to determine the role in this process of rational use of agricultural land.

The following practices were used in the process of the research: system analysis and logical generalization – to determine the role of rational use of agricultural land in the process of development of rural areas; settlement-analytical – to evaluate the indicators of development of rural areas of different Ukraine's regions; induction and deduction – to generalize the research results; abstract-logic – to make conclusions and suggestions.

The methodology for a comprehensive assessment of the socio-economic development of the regions of Ukraine involves determining the results of the development of regions in 32 indicators. Initially, input data are generated for the standardization of indicators for a comprehensive assessment. On the basis of these data, standardization of each of the 32 indicators is carried out.

To estimate the standardized value of the indicator (*S*), whose growth has a positive effect, use the following formula (1):

$$S = \frac{\mathrm{X}_{max} - \mathrm{X}_i}{\mathrm{X}_{max} - X_{min}},$$

where:

X_i – the actual value of the indicator;

X_{min} – the minimum value of the indicator;

X_{max} – the maximum value of the indicator.

To estimate the standardized value of the indicator (S), whose growth has a negative effect, the following formula is used (2):

$$S = \frac{\mathrm{X}_i - \mathrm{X}_{min}}{\mathrm{X}_{max} - X_{min}},$$

To determine the integral index, calculate the amount of ratings of a specific region (*R*) for each of the standardized indicators (x1–x32) with the following formula (3):

$$R = \Sigma S$$

The average value of the sum of ratings for each region (R_{sr}) is determined by the following formula (4):

$$R_{cp} = \frac{R}{n},$$

where: n – number of indicators for which the calculation was made.

According to the calculation results, each region's place in the overall ranking is determined. The best estimate of socio-economic development is given by the region whose average value of the sum of ratings (R_{cp}) has the lowest value.

The study is based on source materials obtained from the database of the State Statistics Service of Ukraine.

9.3. Assessment of the state and trends of development of rural areas in different regions of Ukraine.

The analysis of the results of the comprehensive assessment of the socio--economic development of the regions of Ukraine (Table 1) shows that: (a) among the regions with a relatively high level of socio-economic development are Kharkiv (0.322), Kyiv (0.334) and Poltava (0.347) regions; (b) among the outsiders are Donetsk (0.747), Lugansk (0.772) and Zakarpattya (0.500) regions; (c) the rest of the regions can be conventionally referred to a group of middle peasants.

Analysing the current state of socio-economic development of rural areas of Ukraine, it should be noted that it is characterized by the following main negative trends:

- Reduction in the rural population, which occurs at a higher pace than in Ukraine in general;
- Reduction in the number of workers employed in agriculture, relatively low wages, high unemployment in the countryside;
- Deformation of the sectoral structure of agriculture in the direction of reducing labour-intensive industries (livestock, potatoes, vegetable growing, etc.);
- Low efficiency of land use, degradation of soils.

Table 1. Comprehensive assessment of socio-economic development of Ukraine's regions, 2015*

Names of regions	*R* (Sum of ratings of each region)	*Rcp* (Average value of the sum of ratings of each region)	Place of region
Vinnytsya	11.93	0.373	6
Volyn	15.22	0.476	17
Dnipropetrovsk	12.67	0.396	7
Donetsk	23.91	0.747	21
Zhytomyr	12.69	0.397	8
Zakarpattya	15.99	0.500	19
Zaporizhya	14.09	0.440	13
Ivano-Frankivsk	15.86	0.496	18
Kyiv	10.69	0.334	2
Kirovohrad	13.97	0.437	12
Luhansk	23.27	0.727	20
Lviv	13.77	0.430	10
Mykolayiv	11.46	0.358	5
Odesa	13.93	0.435	11
Poltava	11.12	0.347	3
Rivne	14.39	0.450	14
Sumy	13.97	0.437	12
Ternopil	15.12	0.472	16
Kharkiv	10.31	0.322	1
Kherson	14.08	0.440	13
Khmelnytskiy	13.91	0.435	11
Cherkasy	11.28	0.352	4
Chernivtsi	14.86	0.464	15
Chernihiv	13.33	0.416	9

* Here and below – excluding the temporarily occupied territories of the Autonomous Republic of Crimea, also excluding the part of the anti-terrorist operation zone.

Source: author's calculations and presentation based on the data of the State Statistics Service of Ukraine.

Among the social problems of the development of rural areas, the tendency to reduce the number of workers employed in agriculture should be highlighted in the first place. Only in 2010-2016 the average number of people employed in agrarian enterprises of Ukraine decreased by 203.8 thousand people or by 33.2% (Table 2). At the same time, in terms of dynamics of development in the regions in 2010-2016, the reduction in the number of employees was at different rates: the lowest in the Sumy and Vinnytsia regions (respectively, by 10.8% and 15.1%), the highest of all – in the Donetsk and Volyn regions (respectively, 61.8% and 58.1%).

Table 2. Average annual number of employees in agricultural enterprises of Ukraine's regions, thousand persons

Names of regions	Year							2016 in% to 2010
	2010	2011	2012	2013	2014	2015	2016	
Ukraine	614.1	600.3	593.1	559.2	528.9	417.1	410.3	66.8
Vinnytsya	40.4	41.8	43.3	38.5	42.0	35.7	34.3	84.9
Volyn	13.6	11.6	10.3	9.5	8.8	6.2	5.7	41.9
Dnipropetrovsk	38.2	38.7	39.3	37.7	33.8	30.4	26.0	68.1
Donetsk	37.4	38.3	35.4	30.6	19.3	14.8	14.3	38.2
Zhytomyr	19.1	15.3	14.2	12.7	12.5	10.8	10.4	54.5
Zakarpattya	3.2	2.8	2.4	2.4	1.9	1.1	1.5	46.9
Zaporizhya	28.6	29.4	30.1	27.9	26.7	19.0	19.9	69.6
Ivano-Frankivsk	5.3	5.8	7.6	5.4	7.0	3.1	4.1	77.4
Kyiv	48.3	45.9	43.3	43.2	41.9	29.6	31.0	64.2
Kirovohrad	26.1	29.3	29.3	27.4	27.1	21.3	21.0	80.5
Luhansk	19.4	18.6	17.3	17.0	11.3	9.8	9.5	49.0
Lviv	12.0	10.1	9.3	8.4	8.3	5.7	6.2	51.7
Mykolayiv	22.0	22.0	22.3	21.1	20.5	14.9	14.4	65.5
Odesa	37.2	35.6	34.1	32.3	30.1	21.7	22.2	59.7
Poltava	48.7	50.4	51.4	46.2	47.6	35.5	35.2	72.3
Rivne	11.9	10.9	10.0	9.1	8.2	6.5	5.9	49.6
Sumy	21.2	21.4	20.8	20.2	19.8	17.8	18.9	89.2
Ternopil	13.7	13.0	13.5	13.5	13.3	10.3	9.2	67.2
Kharkiv	34.0	32.0	32.3	31.0	29.4	24.6	25.2	74.1
Kherson	23.6	25.1	24.0	22.6	21.3	17.5	16.7	70.8
Khmelnytskiy	23.6	21.8	22.6	23.0	23.2	21.7	19.2	81.4
Cherkasy	38.9	35.9	34.9	35.4	33.2	29.9	32.2	82.8
Chernivtsi	6.5	6.0	5.9	5.9	5.6	3.5	3.3	50.8
Chernihiv	30.5	29.6	29.2	27.6	26.5	24.0	21.4	70.2

Source: author's presentation and calculations based on the data of the State Statistics Service of Ukraine.

One of the key indicators of the development of rural areas is the monetary income of the rural population. The current problem is the relatively low wages in agriculture in relation to other industries. An analysis of the dynamics of the average monthly wage per worker shows that in 2010-2016 in agrarian enterprises of Ukraine it increased by 2.7 times (Table 3). At the same time, in terms of regions dynamics in 2010-2016, the growth of wages of employees was at different rates: the lowest in the Donetsk and Dnipropetrovsk regions (respectively, 2.2 and 2.3 times), the highest of all – in the Zakarpattya and Volyn regions (respectively, 4.9 and 4.2 times).

Table 3. Average monthly wage of agricultural workers in agricultural enterprises of Ukraine's regions

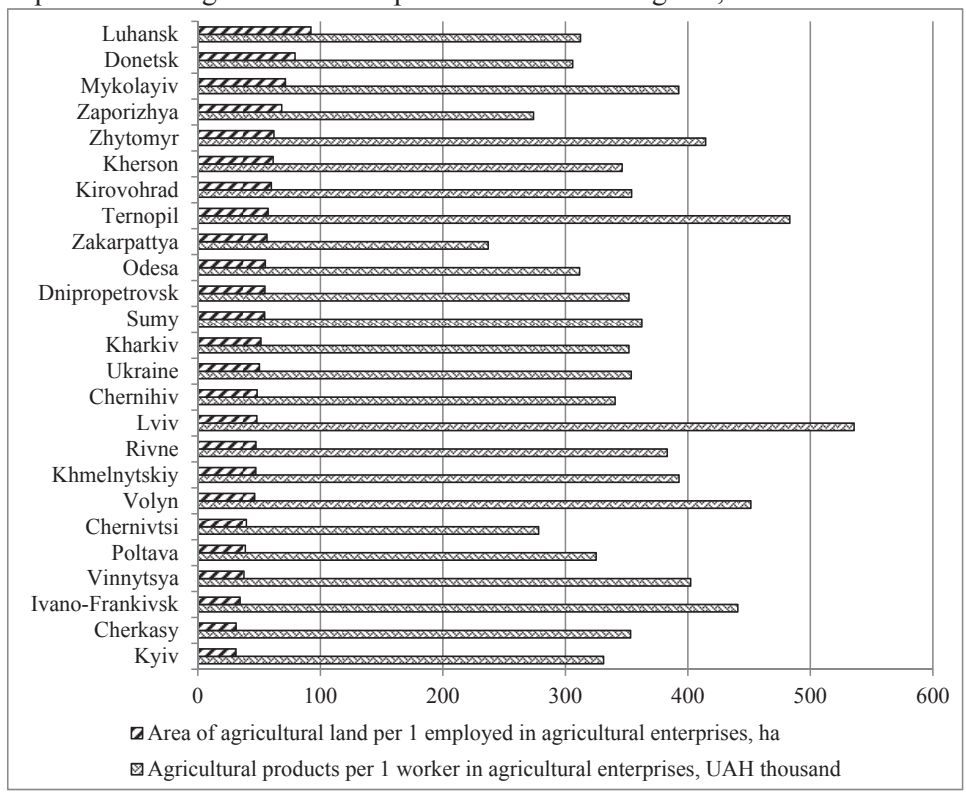
Names of regions	2010			2016			2016 in% to 2010
	Average monthly wage		Average wage per work hour, UAH	Average monthly wage		Average wage per work hour, UAH	
	UAH	in% to average level of economy of the region		UAH	in% to average level of economy of the region		
Ukraine	1430	63.9	9.34	3916	75.6	25.66	273.8
Vinnytsya	1307	73.4	9.04	4101	97.9	27.05	313.8
Volyn	827	48.9	6.73	3456	85.4	23.33	417.9
Dnipropetrovsk	1577	66.6	9.82	3669	72.3	23.94	232.7
Donetsk	1742	68.4	10.79	3777	63.1	24.91	216.8
Zhytomyr	1032	57.8	7.35	3798	94.9	24.83	368.0
Zakarpattya	1010	54.7	7.37	4940	114.9	33.20	489.1
Zaporizhya	1375	62.9	8.73	3250	64.0	21.33	236.4
Ivano-Frankivsk	1586	82.3	10.95	4803	114.3	32.33	302.8
Kyiv	1820	79.3	11.72	4347	83.1	28.67	238.8
Kirovohrad	1272	70.1	8.28	3788	95.3	24.71	297.8
Luhansk	1497	65.9	9.29	3923	84.6	25.04	262.1
Lviv	1517	78.1	10.28	4724	103.6	30.59	311.4
Mykolayiv	1399	65.9	9.14	3645	74.6	23.53	260.5
Odesa	1075	52.6	7.23	2824	58.7	18.43	262.7
Poltava	1547	73.6	9.84	4424	95.7	28.62	286.0
Rivne	1051	53.6	7.60	3071	70.4	20.48	292.2
Sumy	1305	70.0	8.60	3724	90.1	25.01	285.4
Ternopil	1278	77.0	8.54	3966	107.3	26.09	310.3
Kharkiv	1484	72.1	9.28	3596	80.8	23.30	242.3
Kherson	1399	80.8	9.00	3748	92.7	24.07	267.9
Khmelnytskiy	1317	73.8	8.61	3823	94.6	24.97	290.3
Cherkasy	1608	87.6	10.15	4128	99.5	27.19	256.7
Chernivtsi	1154	65.1	8.28	2796	73.0	19.27	242.3
Chernihiv	1216	71.1	8.29	4144	103.6	27.54	340.8

Source: author's presentation and calculations based on the data of the State Statistics Service of Ukraine.

Analysis of the dynamics of the ratio of average monthly wages per worker to the average level in the economy in the context of the regions of Ukraine gives grounds for concluding positive trends. However, under such conditions, in 2016, the wage ratio in agriculture compared with the average in the economy was 75.6%. Another problem is the significant differentiation in the remuneration of labour within the industry between individual regions. Thus, in 2016, the difference between the maximum wage in the Zakarpattya region (UAH 4940) and the minimum in the Chernivtsi region (UAH 2796) is nearly double.

Significant variation was also found in the productivity of labour among agrarian enterprises at the level of regions of Ukraine (Fig. 1). Thus, in 2016, the difference between the maximum productivity of labour in the Lviv region (UAH 536.6 thousand of gross agricultural production at constant prices in 2010) and the minimum in the Zakarpattya region (UAH 236.9 thousand) is 2.3 times. The results of pair correlation analysis demonstrated that between the labour productivity and average monthly wage of agricultural workers in agricultural enterprises of Ukraine's regions there is a direct weak correlation (r = 0.236). It indicates weak material incentives for increasing labour productivity. This is especially true since the productivity of agricultural labour of Ukraine is significantly inferior to the EU countries (for example, in the EU-28 in 2015 the production of agricultural products per one employee was EUR 42 thousand, in Poland – EUR 8 thousand, in Germany – EUR 83 thousand) [Zinchuk, Dankevych, 2016].

Fig. 1. Land capacity (*zemlemistkist*) of workplace and labour productivity of personnel in agricultural enterprises of Ukraine's regions, 2016



Source: author's calculations and presentation based on the data of the State Statistics Service of Ukraine.

The area of agricultural land per one employee characterizes the land capacity (*zemlemistkist*) of workplace. On average in Ukraine in 2016 the land capacity of workplace was 50.1 ha. At the same time, in terms of regions, it widely varies: from 31.0 ha in the Kyiv region to 79.2 ha in the Donetsk region. From the perspective of employment of the rural population, the lower land capacity of workplace, the better. The relatively low land capacity of workplace and high productivity of personnel were found in the Ivano-Frankivsk, Vinnytsia, Volyn and Lviv regions. However, in the Zakarpattya and Zaporizhzhia regions, it was an opposite situation that requires appropriate measures.

In the EU-28 countries in 2015, the land capacity of workplace was 16 ha, in Poland – 7 ha, in Germany – 13 ha [Zinchuk, Dankevych, 2016], which means that, in Ukraine, it is much higher than in Europe. However, as regards the labour productivity and productivity of land, Ukraine stays behind which negatively affects the development of rural areas.

The high level of availability of land (*zemlezabezpechenist*), according to the research of Diesperov, resulted in the steppe agriculture during the reformation processes causing significant destruction compared with the production of the northern regions. Workers were satisfied by rents for land parcels, which allowed the new owners of the reformed enterprises to get rid of disadvantageous and labour-intensive livestock breeding. It led to low land recourse, reduced soil fertility, rural unemployment [Diesperov, 2012].

The implementation of the Concept of Rural Development in Ukraine envisages to reach the following goals by 2025 [Concept..., 2015]:

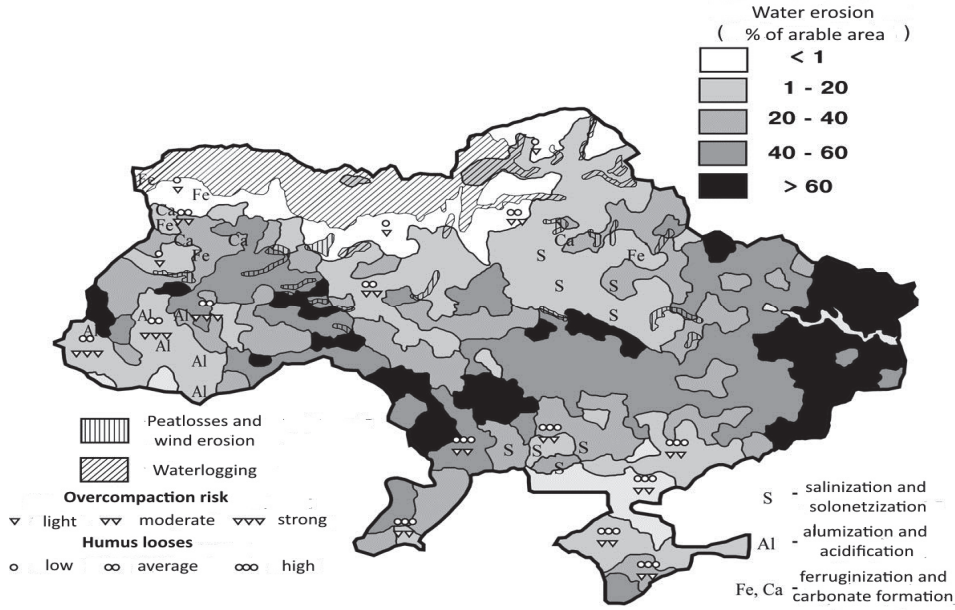
- Increase in the number of rural population and a decrease in the mortality rate of rural population to the corresponding indicator in cities – 13.1 persons per 1000 inhabitants;
- Higher level of wages in agriculture;
- Increase in the number of jobs in villages to 1 million;
- Increase in the number of employed rural population by 1.5 times;
- Increase in the share of incomes of rural households from entrepreneurship and self-employment to 15%;
- Increase in the share of organic certified agricultural land to 7%, of which arable land – up to 5%.

9.4. Rational use of land as a factor in the development of rural areas

With significant soil-land potential, Ukraine does not use it sufficiently for the production of competitive agricultural products with high added value and the development of rural areas.

The current state of the country's soil cover is at risk due to widespread degradation processes. Figure 2 represents the spread of some types of soil degradation in Ukraine. The map was built by scientists of the National Scientific Center "Institute for Soil Science and Agrochemistry Research named after O. N. Sokolovsky" [Baliuk, Medvedev, 2017]. As well seen, loss of humus, soil-overcompaction and erosion are dominating factors on Ukrainian agro-lands.

Fig. 2. Main types of soil degradation in Ukraine



Source: Gadzalo, Baliuk and Medvedev [2017].

The economic losses from soil degradation were calculated on the basis methodology of the authors [Kucher, 2015] (Table 4). Expert assessment of economic losses (data as of 2016) from spreading soil degradation in Ukraine on the area of approx. 10 million ha has showed that the total economic loss (loss of income (revenue) from sales) due to harvest shortfall is UAH 33.6 billion, the total amount of lost profits due to shortage of harvest (in actual profitability in 2016) is UAH 6.7 billion, or 7.5% of profits from agricultural crops sales in 2016. These funds could be directed also for the development of rural areas.

Land degradation due to irrational land use hinders development of agricultural sector and rural areas. This issue becomes particularly relevant in the context of climate change. For agricultural production and the formation of economic fertility of soils in Ukraine, the effects of climate change on global warming will be both positive and negative. Taking into account the international experience of adaptation of land use processes to climate change, the basis of the

strategy for development of rural areas and adaptation of agricultural enterprises in Ukraine to global warming is a number of strategic measures that would prevent the development of soil degradation processes on the one hand, and on the other, contribute to the reduction of greenhouse gas emissions during soil cultivation and increase carbon sequestration, i.e. the humus in the soil, thus ensuring rational land use (Table 4). These measures should be considered not as self-sufficient, but as such which should be included in the general system of soil protection and low carbon development of the agrarian sector of the economy.

Table 4. Calculation of economic losses of agricultural enterprises from spreading of soil degradation in Ukraine (data as of 2016)

Indicators	Degree of soil degradation			Total
	weak	medium	strong	
Approximate area of land degradation distribution, million ha	2.8	7.0	0.2	10.0
Loss of productivity of major crops, canters/ha				
Cereals and legumes	5.0	10.0	25.0	8.9
Sugar beets	49.4	98.8	247.0	87.9
Sunflower	2.4	4.7	11.8	4.2
Rape	2.6	5.2	12.9	4.6
Soybean	2.3	4.7	11.7	4.2
Potato	21.2	42.4	106.1	37.8
Vegetables	38.3	76.5	191.4	68.1
Fruit and berries	7.3	14.5	36.3	12.9
Loss of income (revenue) from sale of agricultural products due to lower yields, UAH/ha				
Cereals and legumes	1707	3414	8535	3038
Sugar beets	4192	8384	20 960	7462
Sunflower	2001	4003	10 006	3562
Rape	2352	4705	11 761	4187
Soybean	2081	4163	10 407	3705
Potato	5582	11 164	27 910	9936
Vegetables	15 018	30 036	75 090	26 732
Fruit and berries	4251	8503	21 256	7567
Average economic losses (loss of income from sales) after harvest shortfall, UAH/ha	1915	3830	9576	3409
Total economic loss (loss of income (revenue) from sales) after harvest shortfall, UAH million				33 563
Total amount of lost profits due to shortage of harvest (in actual profitability level (24.9%) in 2016), UAH million				6691
Share of lost profits in profits from sales of crop agriculture in 2016,%				7.5

Source: author's calculations and presentation based on the data of the State Statistics Service of Ukraine.

The following strategic priorities for the development of low-carbon agricultural land use are proposed [Kucher, 2017]:

- Suspension of humus content reduction and achievement of its deficit-free balance through the use of traditional and non-traditional organic fertilizers (agrochemical direction);

- Reduction of anthropogenic load on soil cover by applying soil protective low carbon technologies, in particular, no-till (technological direction);
- Optimization of the structure of land use by the removal of unproductive soil and degraded soil with their further afforestation or meadow formation (organizational direction);
- Environmentalization of agrarian land use, in particular through the development of organic agriculture (ecological direction);
- Development of agro-insurance and ecological insurance, in particular by developing and applying the mechanism of soil fertility insurance (economic direction).

It is clear that these strategic priorities for the development of low carbon agricultural land use do not exhaust the whole arsenal of low carbon measures, but only outline our strategic vision of priority ways to solve this problem.

Table 5. Macroeconomic assessment of development potential of low carbon land use in Ukraine for 2017-2026

Measures	Projected scope of measures			The estimated cost of the measures USD million		
	units	for year	all	USD/ha	for year	all
The annual measures – running costs						
Achieving a non-deficit balance of humus content in the soil:	-	-		72.2	1380.2	
– the use of traditional organic fertilizers (2.0 t/ha)	million tonnes	38.8		20.1	388.0	
– the use of non-tradable part of crop (5.4 t/ha)	million tonnes	101.5		10.8	203.0	
– extraction and use of sapropel (2.4 t/ha)	million tonnes	46.0		40.8	782.0	
– extraction and use of peat (0.02 t/ha)	million tonnes	0.29		0.5	7.2	
Disposable measures – investment costs						
Expanding the area of application of no-till technology	million ha	0.5	5.0	64.0	32.0	320.0
Optimization of structure of land use:	-	-	-	55.5	7.25	72.5
– remove from cultivation of low productivity and degraded soils	million ha	0.5	5.0	0.5	0.25	2.5
from them: for further use in pastures	million ha	0.4	4.0	5.0	2.0	20.0
for further use in afforestation	million ha	0.1	1.0	50.0	5.0	50.0
Total investment costs	-	-	-	-	39.25	392.5
Transaction costs (30% of investment costs)	-	-	-	-	11.8	118.0
The total investment costs with transaction costs	-	-	-	-	51.05	510.5

Source: author's calculations.

We agree with the opinion of Diesperov [2016] that "3-4 thousand hectares of land owned by the peasants of a certain settlement is a sufficient economic base for community development. It will be able to keep school, kindergarten, cultural institution. But for this, it is necessary to radically reform the tax system, create conditions for the development of small-scale agrarian business in the village, cooperation. Due to this, people will stay in the village, and birth rate will increase" [Diesperov, 2016].

Developing the issues of social responsibility of agrarian business, it should be noted, that competition in the land lease market often causes agrarian formations, primarily agroholdings, to raise the rent even to 8-10% of the normative monetary valuation of land and, at the same time, implement social programmes in the village, otherwise the peasants may not extend the term of land lease for the next period. Practice shows that in certain regions this problem is being solved centrally, administratively establishing the standard of payment of a certain amount of funds for social development of the village paid to agricultural enterprises and directing it to the budget of the village council. Therefore, we should agree with Andriichuk opinion on the possibility and expediency of introducing legally established norms of social payments for 1 ha of agricultural land [Andriichuk, 2014]. In this regard, it is proposed to amend the Tax Code of Ukraine by introducing a tax (fee) for the development of rural areas as a local fee, which funds are credited at the local budget and used for their intended purpose for the development of social infrastructure of the settlement. The payers of the tax are owners, land users and tenants of agricultural land, which lead commodity agricultural production and farming at the location of the land. The basis for calculating the tax is the normative monetary valuation of agricultural land, taking into account the coefficient of indexation. We propose to differentiate the collection rates from 0.0% for micro (up to 10 ha) and fractional forms of management (10-100 ha), 0.55% (164 UAH/ha) for small forms of management (100-500 ha), 0.70% (209 UAH/ha) – for medium-sized agricultural enterprises (500-3000 ha) to 0.85% (254 UAH/ha) – for large agricultural enterprises (3000--10 000 ha) and 1.0% (298 UAH/ha) – for agro-industrial companies (agroholdings) (over 10 000 ha). This fee should be considered as an element of transaction costs, which should be included in the cost of products of agrarian enterprises. These rates are tentative and each community can set them in the range from 0% to 1%.

In view of the average normative monetary assessment of 1 ha of agricultural land in Ukraine as of 01.01.2017 at UAH 29 843, the sum of the said tax per one hectare will be from UAH 164 to UAH 298 (Table 6).

Taking into account the actual area of agricultural land of agrarian enterprises (including family farms), which may be the object of taxation, at the level of 19.9 million ha, the volume of revenues from this tax from agrarian enterprises of Ukraine may amount to UAH 4475.8 million. Consequently, the implementation of this proposal will increase the revenue part of local budgets by UAH 4.5 billion, which will be used for development of rural areas.

Table 6. Calculating the amount of potential tax on rural development depending on distribution of agricultural enterprises (including family farms) in Ukraine by agricultural lands size

Indexes	Number of enterprises, 2015		Area of agricultural land, 2015		The size of the tax for the development of rural areas		
	units	% to total enterprises	thousand ha	% to total area of agricultural land	UAH/ ha	UAH million	% to total size of the fee
Enterprises, which had agricultural land	42 052	92.7	19 922.7	100.0	225	4475.8	100.0
including of the following surface, ha							
no more than 5.0	3872	9.2	12.8	0.1	0	0	0
5.1–10.0	3001	7.1	24.2	0.1	0	0	0
10.1–20.0	4129	9.8	64.9	0.3	0	0	0
20.1–50.0	11 911	28.3	453.9	2.3	0	0	0
50.1–100.0	4827	11.5	351.9	1.8	0	0	0
100.1–500.0	6919	16.5	1695.4	8.5	164	278.0	6.2
500.1–1000.0	2467	5.9	1757.9	8.8	209	367.4	8.2
1000.1–2000.0	2446	5.8	3510.3	17.6	209	733.7	16.4
2000.1–3000.0	1099	2.6	2659.1	13.3	209	555.8	12.4
3000.1–4000.0	516	1.2	1785.9	9.0	254	453.6	10.1
4000.1–5000.0	282	0.7	1259.8	6.3	254	320.0	7.2
5000.1–7000.0	281	0.7	1646.4	8.3	254	418.2	9.3
7000.1–10000.0	141	0.3	1172.3	5.9	254	297.8	6.7
more than 10000.0	161	0.4	3527.9	17.7	298	1051.3	23.5
Enterprises, which did not have agricultural land	3327	7,3	x	x	x	x	x

Source: author's calculations and presentation based on the data of the State Statistics Service of Ukraine.

9.5. Conclusions

As a result of research an assessment of the development of rural areas of different regions of Ukraine was made and a role in this process of rational use of agricultural land was determined.

Land degradation, due to irrational land use, hinders development of agricultural sector and rural areas. Expert assessment of economic losses (data as of

2016) on account of spreading soil degradation in Ukraine showed that the total economic loss (loss of income (revenue) from sales) due to harvest shortfall is UAH 33.6 billion, the total amount of lost profits due to shortage of harvest (in actual profitability in 2016) is UAH 6.7 billion. These funds could be directed for the development of rural areas.

The strategy for development of rural areas and adaptation of agriculture of Ukraine to global warming proposes to put a number of strategic measures that would allow to prevent soil degradation processes on the one hand, and on the other – that would contribute to the reduction of greenhouse gas emissions during cultivation and increase carbon sequestration, i.e. the humus in the soil, thus ensuring rational land use.

To solve the problem of increasing the social responsibility of agrarian business, it is expedient to legislatively introduce a tax (fee) for the use of land plots to be used for the development of rural areas, as a percentage of the normative monetary valuation of agricultural lands. The implementation of this proposal will increase the revenue part of local budgets by UAH 4.5 billion and this amount will be used for development of rural areas.

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10. Models and development directions of food supply chains[1]

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Abstract

The aim of the paper was to present the current developments and possible development directions of food supply chains. It was indicated that it is necessary to conduct a research concerning the functioning of the food supply chains. Due to the nature of the food supply chains, especially temporal imbalance of supply and demand, quality requirements and exchange of quality information, an important issue might be an increase in the level of integration within the chains.

It is to be noticed that integration of supply chain is one of the factor for using or limiting the functional weaknesses of the market, which are related to the three sustainability aspects as environmental, social and economic resources, as assumes the concept of sustainability. Main focus of the paper was the environmental aspect of sustainability in food supply chains. As an example of food chain, the meat sector was used.

Keywords: sustainable development, supply chain management, food supply chains, integration, environment

JEL codes: A10, A11, A12

10.1. Introduction

The Institute of Logistics described a supply chain as "a sequence of events intended to satisfy a customer" [Institute…, 1998], giving a view so broad that it could include anything. Other views are more focused, such as H. Peck's description of the "flow of materials, goods and information (including money), that pass within and between organizations, linked by a range tangible and intangible facilitators, including relationships, processes, activities, and integrated information systems" [Peck, 2006]. The inclusion of relationships between different stages is a base for leading an efficient management strategy in the entire chains. The supply chain management is defined by D. Simchi-Levi, P. Kaminsky and E. Simchi-Levi as: "set of approaches utilized to effi-

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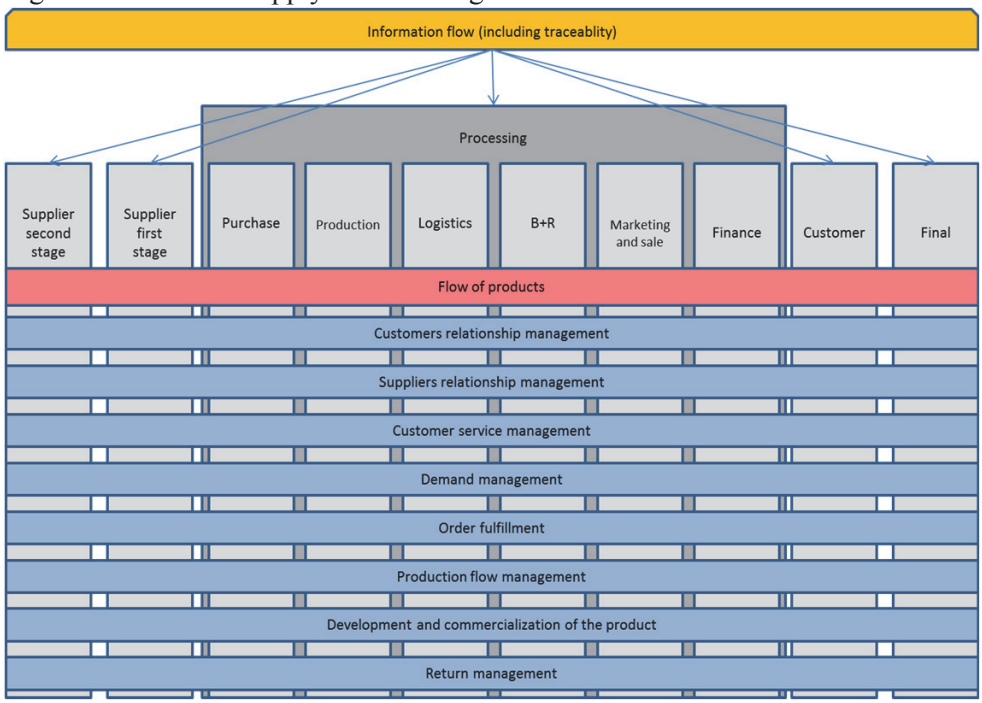
ciently integrate suppliers, manufacturers, warehouses, and stores, so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimize system wide costs while satisfying service level requirements" [Simchi-Levi et al., 2008]. The objective of supply chain management is to increase competitiveness of its all stages. This is necessary because individual organizational units do not correspond individually with the final consumer for the competitiveness of their products and services, but the responsibility lies with the supply chain as a whole. Hence, competitiveness shifts from individual firms towards the whole chain [Jarzębowski, 2012].

Fig. 1. Processes of supply chain management



Source: own work based on: D.M. Lambert, T.L. Pholen [2001, pp. 1-19].

Effective supply chain management requires integration of business processes with key chain participants. The value of standardized business processes is due to the fact that managers from different organizations in the supply chain can use a common language and may associate processes in their companies with other supply chain partners [Jarzebowski, 2012]. The researchers at The Global Supply Chain Forum divided these processes into eight groups, namely [Lambert, Pholen, 2001]: customer relationship management, supplier relationship management, customer service management, demand management, order

processing, production flow management, development and product commercialization, return management (Figure 1).

To sustain long-term growth and profitability in a competitive environment, economic entities must continuously improve their efficiency [Sudit, 1995]. There are several different concepts of efficiency, its measurement and expressions. Within the framework of efficiency, many terms of similar meaning may be applied. However, these concepts are not identical, and the actual concept of efficiency is derived from the structure of the production function, therefore, it is conditioned by changes in the productivity of production factors and their remuneration and refers to the allocation of production factors in the most technically efficient way.

The search for potential improvement of efficiency has also been spurred on by the realization that not only do single enterprises compete against each other but also entire supply chains do so [Christopher, 1992]. Therefore, the supply chain must be viewed as one entity and any measurement system should span the entire supply chain. Taking into account the interactions occurring between the different stages of the supply chain, the effective management strategy of the entire supply chain, and the structure of activities within and between companies is critical for the integration of the entire supply chain. Integration is described both in terms of traditional logistics functions [Gustin et al., 1995] and of removing barriers (or boundaries) between organizations [Naylor et al., 1999]. The need for integration between an enterprise and its environment increases with the degree of intensification of global competition. In this context, the concept of integration, considered as a key factor in achieving better results by an enterprise, is one of the most important topics in the scientific literature. The aspect of the ownership right plays here an important role. According to A.A. Alchian and H. Demsetz, owners of resources increase their productivity – and thus the efficiency of use of the resources – through cooperative specialization, and this leads to an increase in demand for various types of organizations supporting cooperation [Alchian, Demsetz, 1972]. The integration with the environment (external organizations) of the system (company) is also highlighted. Cooperation is here the main element of the organizational integration of a company with the environment [Steffen, Born, 1987, pp. 210]. Integration is described both in terms of traditional logistics functions [Gustin et al., 1995] and of removing barriers (or boundaries) between organizations [Naylor et al., 1999]. The need for integration between an enterprise and its environment increases with the degree of intensification of global competition. In this context, the concept of integration, considered as a key factor in achieving better results by an enterprise, is one of the most important topics in the scientific literature. It is to be noticed that integration of supply chain is one of the

factors for using or limiting the functional weaknesses of the market, which are related to the three sustainability aspects as environmental, social and economic resources, as assumes the concept of sustainability.

For more than a dozen years, an increasingly important area of activity of economic entities is realization of widely understood pro-ecological policy. It is not only about compliance with environmental standards, but also about own--initiative measures, such as: cost savings due to rational management of materials and energy sources, changes in the organization of the company's work and its organizational culture, etc. [Mazur-Wierzbicka, 2007, p. 34]. It keeps the principles of sustainable development. Sustainable development covers a broad spectrum of consumption and waste related topics, i.e.: food and agriculture use and production, natural resource consumption, population growth, quality of life, flora and fauna diversity, waste generation, air, land and water pollution, recycling and reuse, etc. Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs. The concept of sustainability relates to the maintenance and enhancement of environmental, social and economic resources, in order to meet the needs of current and future generations.

In the further part of the paper, the environmental aspects of sustainable development in food supply chain are presented. As an example the meat supply chain was used. It was shown that environmental hot spots occur at different stages of supply chains.

10.2. The environmental hot spot analysis

The sustainable hot spot analysis (SHSA) is based on the work of Bienge et al., [2010]. It is step-by-step qualitative assessment instrument which intends to estimate the resource intensity of a product along its value chain with the objective "[…] to identify key issues of analysed categories, such as resource use, ecological and social challenges along the whole value chain, in a quick, reliable and life-cycle-phase-specific way" [Bienge et al., 2010]. The result, of the so--called "hot spots", can be used to derive improvements within the supply chain. The approach is executed in five steps:

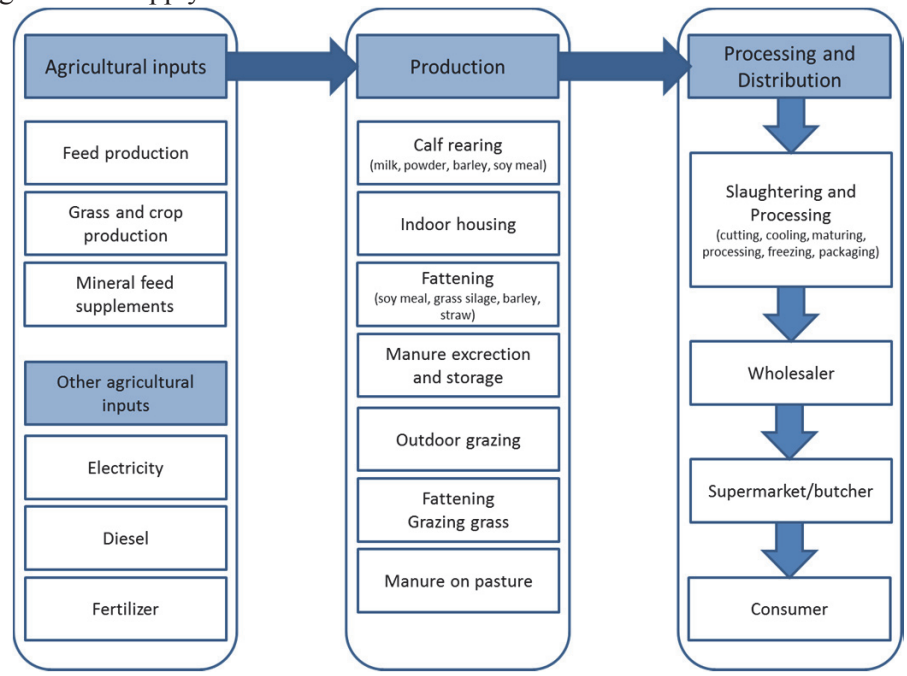
- Defining life cycle stages and categories,
- Aspects significance assessment,
- Life cycle phase significance assessment,
- Identification of Sustainability Hot Spots,
- Stakeholder evaluation and verification.

The results of the environmental hot spot analysis for the beef supply chain outline the primary production, as the largest contributor for environmental damages, which is mainly due to land occupation, feed production, and ma-

nure management. In addition, an essential role is played by the consumer, who significantly influences the use of natural resources and environmental pollution by his consumption patterns (increasing meat consumption, preference of higher processed products).

A generalized representation of the value chain is introduced in Figure 2, which is made through the assumption that soy meal is imported from aboard.

Fig. 2. Beef supply chain



Source: Beauchemin et al. [2010].

For the considered environmental indicators (emissions, energy-, water use, and food waste), it could be shown that their interactions with cattle are complex and depend on different factors, such as production systems, feeding varieties, type of animal housing, manure management, degree of convenience, or origin of agricultural (pre-) products. Furthermore, there is a large variation between the four indicators and their impact categories.

The results of the hot spot analysis for the whole beef meat supply chain are introduced in Table 1.

Table 1. Environmental hot spots in the beef supply chain (the higher number, the higher level of relevance)

Life cycle phase / Categories	Upstream services	Fattening	Slaughtering and processing	Distribution and retail	Consumer
Energy consumption	9	3	6	4	6
GHG emissions	9	9	4	4	4
Water consumption	9	6	4	0	0
Food losses and waste	3	0	2	4	6

Source: Bienge et al. [2010].

Hot spots are found primary in the phase of agricultural upstream services such as feed production and fattening stage. Furthermore, the processing and consumption stage are additional hot spots, according to energy consumption, and consumers are the main contributor due to food wastage.

10.3. Energy consumption

"The 'non-renewable energy' category is an important indicator of the sustainability of food production systems, given that it comes from finite resources which will eventually be exhausted beyond the level that can be economically extracted" [Nguyen et al., 2010]. Energy consumption, along the beef supply chain, is rated very differently in the evaluated studies (for example, the range for processing activities extends over 10-60%).

Table 2. Main causes for energy consumption

Life cycle phase	Main causes for energy consumption
Upstream services	Feed production: • Production of synthetic N and P fertilizer, soil improver • Fuels for roughage, feed, and feed ingredient production • Energy to crop and grass (diesel for agricultural machineries, energy to apply manure to land)
Production	• Manure application (diesel, petroleum) • Electricity (cooling of facilities)
Processing	• Packaging material • Fossil fuels, mainly for heating • Electricity, mainly for freezing and cooling
Distribution	• Transportation (motor drive power) • Refrigeration (temperature controlled transports, cooling counters in supermarkets)
Consumer	• Car driving for shopping • Home preparation

Source: Dammer et al. [2012].

Differences can be explained through variations in the particular production processes (extensive or intensive farming) and they also depend on factors such as transport distance, the degree of processing (fresh or frozen meat, pure meat or conserve), or further input factors, such as energy use for packaging production. Along the beef supply chain, energy intensive processes are those using large amounts of machinery and construction materials [Weidema et al., 2008]. The main factors of energy consumption are listed in Table 2.

10.4. GHG emissions

According to Garnett's [2008] estimation, 19% of total consumption-related emissions are associated with food consumption. Greenhouse gas emissions can arise from all the main steps along the food supply chain and off-farm activities are responsible for approximately a half of GHG emissions. Along the beef supply chain, agriculture is the most important contributor to global GHG emissions. Studies show that agriculture is the reason for about 10-12% of overall global emissions, where livestock is the largest part which covers nearly 80% of this amount [Casey, Holden, 2006; Kristensen et al., 2011]. The major sources and amounts of emissions along the animal food production and consumption are presented in Table 3.

Table 3. Main sources of emissions

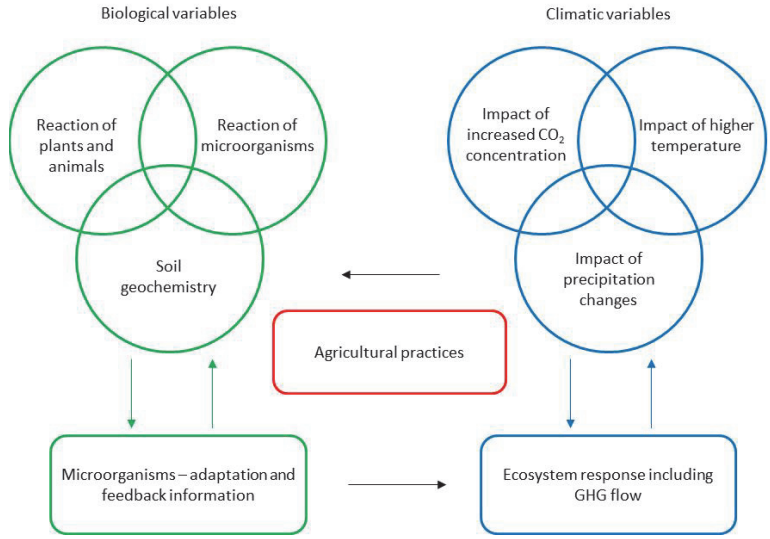
Life cycle phase	Main causes for emissions
Upstream services	• Deforestation due to feed production (CO_2 release from forest and other natural vegetation, CO_2 releases from soils) • Feed production: CO_2 emissions from fossil fuel used in production and application of chemical fertilizers and pesticides (nitrate leaching), N_2O and NH_3 released by chemical fertilizers
Production	• CH_4 mainly from enteric fermentation • Manure management (storage, application, and deposition): NH_3, N_2O, and CH_4 • CO_2 from on-farm use of fossil fuels
Processing	• Refrigerating (CO_2 emissions from fossil fuel use, low impact)
Distribution	• CO_2 from fossil fuel use (low impact)
Consumer	• Transport • Food waste

Source: Dammer et al. [2012].

World and national scientific literature presents numerous opportunities for GHG emissions mitigation in the agricultural sector. However, both the absolute and the relative potential for reduction, and costs or benefits are highly dependent on country-specific biophysical and socio-economic environmental parameters. In the study [Walczak, 2015], it was shown that the effectiveness of

reducing greenhouse gas emissions is due to the presence of appropriate microbial populations.

Fig. 3. Biological and climatic variables



Source: Walczak [2015].

The reduction of greenhouse gas emissions with the participation of soil microflora is carried out indirectly through already existing practices – e.g. changes in use, organic and mineral fertilization, crop residue, reduced crop. Separation of additional, detailed activities that control the amount of GHG emitted and bound by soil microorganisms requires additional research under the Polish conditions.

10.5. Water use

The livestock sector covers about 8% of global water use, because first of all feed must be produced and water is needed for irrigation. In contrast, direct water use for livestock production and processing is less than 1% of the global water use [FAO, 2009]. Differences in water consumption depend, furthermore, on feeding strategy, length of fattening, and feed crop yield [Lundqvist et al., 2008]. Looking at different methods of production, when food is produced either organically or conventionally, consumption of water is not affected [Neunteufel et al., 2010]. FAO stated in the "Livestock in balance report" [2009] that "intensive production has additional service water requirements, generally resulting in much higher overall water consumption than extensive systems."

The main causes for water consumption in the different phases of the life cycle are presented in Table 4.

Table 4. Main causes for water consumption

Life cycle phase	Main causes for water consumption
Upstream services	• Irrigation of feed crops • Water for spreading of pesticides and fertilizer (low relevance)
Production	• Drinking water for animals • Cleaning of facilities
Processing	• Cleaning of facilities

Source: Dammer et al. [2012].

10.6. Food losses

In general, food losses and waste are most severe in the latter part of the meat supply chain in developed countries. Food is thrown away, even if it is still suitable for human consumption. This can be explained by a high per capita meat consumption, which is combined with large waste proportions by retailers and consumers [FAO, 2009]. Consumers contribute to about half of total meat losses and waste, thus this stage of chain has a significant influence on the reduction of losses.

A reduction of losses and wastage has a direct impact on the four analysed environmental factors: less waste means less resource utilization, and thus, less emissions as well as lower consumption of energy and water. Table 5 presents the main sources for food wastage along the beef supply chain.

Table 5. Main sources for food waste and losses

Life cycle phase	Main causes for food waste and losses
Upstream services	• Crop losses during harvest (e.g. due to inefficient technologies) • Plant diseases
Production	• Death of animals
Processing	• Distribution losses and spoilage during storage and processing • Technical deficiencies
Retail	• Spoilage and wastage • Food recalls
Consumer	• Wastage, overeating
Transport (at all stages)	• Interruptions of the cold chain

Source: Dammer et al. [2012].

10.7. Conclusions

The importance of supply chains in agribusiness and their coordination and exchange of information along the chain are particularly important and are gaining in importance. The various forms of cooperation occur within the supply chains and can increase food safety for consumers as well as lead to better performance of chain participants. To sustain long-term growth and profitability in a competitive environment, economic entities must continuously improve their

efficiency. The search for potential improvement of efficiency has also been spurred on by the realization that not only do single enterprises compete against each other, but also entire supply chains do so. Due to the nature of the food supply chains, especially temporal imbalance of supply and demand, quality requirements and exchange of quality information, an important issue might be an increase in the level of integration within the chains.

Nevertheless, the improvement of efficiency and integration in the supply chain cannot be in contradiction with the principles of sustainable development. The concept of sustainability relates to the maintenance and enhancement of environmental, social and economic resources, in order to meet the needs of current and future generations.

The environmental aspects were underlined within the framework of the paper. It was shown that the environmental hot spots occur at different stages of supply chains.

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11. Sustainability performance indicators in dairy farms of Baltic States[1]

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Abstract

Agriculture is a major user of natural resources. Including livestock in the farming system increases the complexity of biological and economic relationships. This study identifies sustainability performance indicators in dairy farms of Baltic States, linking economic, social and environmental variables. Sustainable agriculture integrates three pillars: the economic, environmental and social pillars. As a result of literature review and FADN data analysis, a set of key variables of sustainability in dairy farms of the Baltic States is presented. The study concludes that dairy farms of any Baltic State on average do not perform on remarkably high levels in comparison with other states concerning all three sustainability performance benchmarks.

Keywords: Sustainability performance, Baltic States, agriculture, agri-environmental policy.

JEL code: Q12, Q56

11.1. Introduction

Sustainable agriculture has been defined as an integrated system of plant and animal production that will last over a long time, satisfy human food needs, enhance natural resources, use non-renewable resources efficiently, sustain economic viability of farms and enhance the quality of life for the farmers and society as a whole. The EU vision on sustainable agriculture should increase the productivity without affecting the quality of soil and water, preserve the ecosystems, safeguard animal welfare, generate income for farms and improve quality of life in rural areas, support territorial development and contribute to economy [Sustainable Agriculture, 2012]. In 2016 at a UN Summit, 17 sustainable development goals were adopted to end poverty, fight inequality and gain control over climate changes. The UN expects all the participating countries to set regu-

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lations, to make plans and to take action to tackle the global challenges. [The Sustainable…, 2017]. The scientific debate concerning agricultural sustainability has traditionally been agro-ecologically oriented, nowadays the economic and social aspects of agricultural sustainability have gained increasing attention [Marsden, 2010]. Many authors emphasize that farm performance should be viewed not only on the basis of economic results arguing that the assessment should include non-financial indicators [Ryan et al., 2014, Lebacq et al., 2012]. The awareness of the need to balance the economic growth in the sector with the use of social and environmental resources is growing.

This article aims to provide an analysis on the basis of the sustainability performance of dairy farms in the Baltic States. Dairy farming is one of the main agricultural sectors in the Baltic States. These economically fast-developing countries are sometimes considered agro-environmentally homogenous as well. The average milk production per milking cow in 2005 was 5886 kg in Estonia, 4364 kg in Latvia, and 4312 kg in Lithuania, and it had increased 43%, 35%, and 31% by 2015, respectively. This study examines dairy farms' economic, social and environmental dimensions of sustainability, and compares them between the Baltic States.

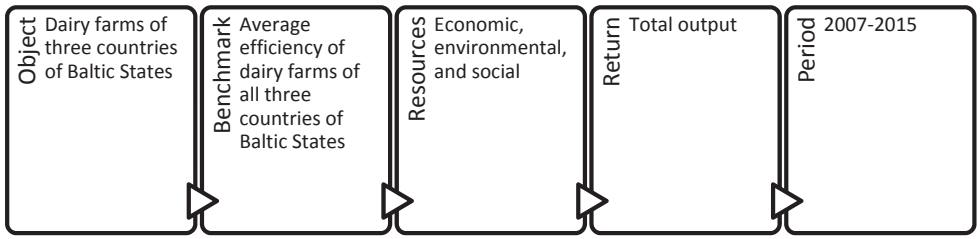
In order to answer this question substantially, this article is structured as follows: the first step introduces a relevant theoretical framework with a primary focus on sustainability performance indicators, and the methodological approach. The analysis follows a triple bottom line logic in assessing and analysing the sustainability performance of dairy farms of the Baltic States. The results of the analysis are discussed and concluded, and followed up with an outline of the need for further research.

11.2. Sustainability Performance in dairy farms: materials and method

The sustainability performance has been measured by literature on business sustainability. Most studies include only a single or a few industries, focusing on a single dimension or aspect of sustainability. Sustainability performance of dairy farms of three countries of Baltic States can be assessed according to economic, social and environmental variables according to Sustainable Value framework (Figure 1). The Sustainable Value approach assumes that a return, such as a profit, is not only created by a single resource, e.g. economic capital, but rather a bundle of resources all of which are scarce [Manzhynsky et al., 2015]. According to this, sustainable value represents the amount of additional total output to land that is created because a dairy sector of the country uses its resources more efficiently than the other countries' dairy sectors under the consideration on average.

The Sustainable Value approach is a value-based assessment approach of sustainable performance [Figge, 2001; Figge and Hahn, 2004]. Sustainable value is calculated in following steps [Liesen et al., 2009]: defining resource efficiencies for objects, determining benchmark resource efficiencies, calculating opportunity costs, determining value contributions, defining sustainable value.

Fig. 1. Sustainability Performance assessment using Sustainable Value approach



Source: authors' compilation using Manzhynsky et al., 2015, O'Donoghue et al., 2016.

The phases of this study were as follows: performance indicators were determined; benchmarks of economic, social, and environmental performance were determined; the performance of the dairy farms of each country to a benchmark was compared. Dairy farms of a country that use their resources more efficiently than the average create sustainable value. The set of economic, social, and environmental indicators of sustainability was created (Table 1). The variables included not only financial performance indicators but also non-financial indicators. They should be universal and reflect the specifics of the dairy farming, and should be easily interpretable, understandable, representative, and capable of illustrating trends over time [Ryan et al., 2014; Doćekalovà et al., 2016].

Dairy farms must be economically viable in the longer term [Ryan et al., 2014]. Sustainable value is created when dairy farms have higher efficiency than the benchmark. The average efficiency of dairy farms of all three countries of Baltic States was used as the benchmark. The resources considered economic, environmental, and social variables. The period includes the years from 2007 to 2015. The source data was obtained from the FADN network and Eurostat databases. The data consists of economic, social, and environmental indicators of Estonian, Latvian, and Lithuanian dairy farms and cattle breeding during the period of 2007-2015. Comparative analysis is used to analyse the data.

Table 1. Economic, social, and environmental indicators of sustainability of dairy farms

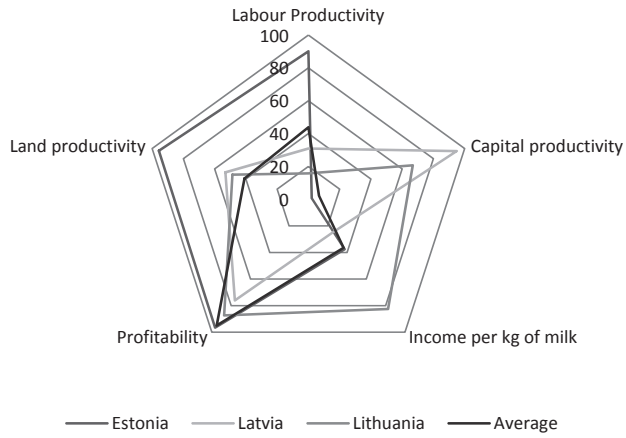
Indicator	Unit	Type of indicator	Benchmark
Labour productivity	€/h	Economic	maximisation
Land productivity	€/ha	Economic	maximisation
Profitability	€/ha	Economic	maximisation
Income per kg of milk	€/kg	Economic	maximisation
Capital productivity	%	Economic	maximisation
Unpaid labour input per week	h/week	Social	minimisation
Average hourly wages	€/hour	Social	maximisation
Paid labour input per week	h/week	Social	maximisation
Income per unpaid labour input	€/kg	Social	minimisation
CH_4 emission from enteric fermentation	t/ha	Environmental	minimization
Nitrogen balance per used agricultural land hectare	kgN/ha	Environmental	minimization
Phosphorus balance per used agricultural land hectare	kgP/ha	Environmental	minimization

Source: authors' elaboration according to Ryan et al., (2014), Lebacq et al., (2012).

11.3. Empirical Results and Discussion

Of economic aspects of sustainability performance, Estonian dairy farms had high labour and land productivity, low capital productivity. Latvian dairy farms were characterized by high capital productivity, and low profitability. Lithuanian dairy farms had low land and labour productivity, but the highest income per kilogram of milk (Figure 2).

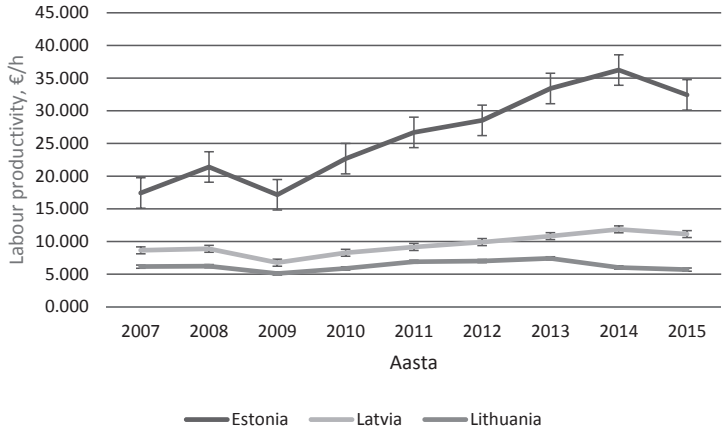
Fig. 2. Estonian, Latvian, and Lithuanian dairy farms' economic sustainability 2015.



Source: authors' calculations based on FADN.

Of these indicators, the labour productivity, which indicates the total farm output to both unpaid labour input and paid labour input grew remarkably in Estonia during the observed period (Figure 3).

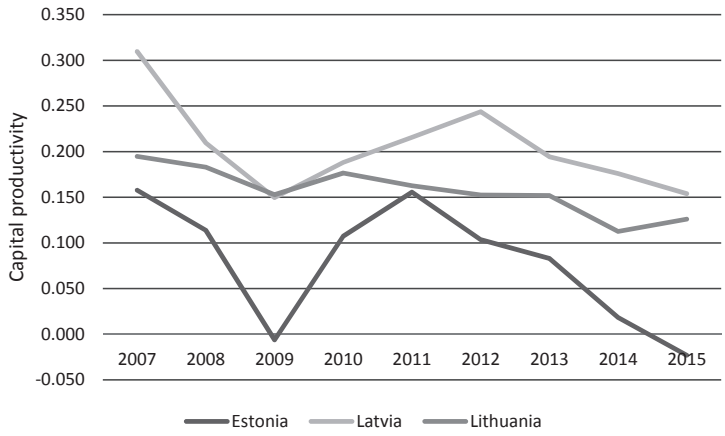
Fig. 3. Estonian, Latvian, and Lithuanian dairy farms' labour productivity 2007-2015



Source: authors' calculations based on FADN.

In spite of growth in labour productivity, the capital productivity gradually diminished during the observable period (Figure 4).

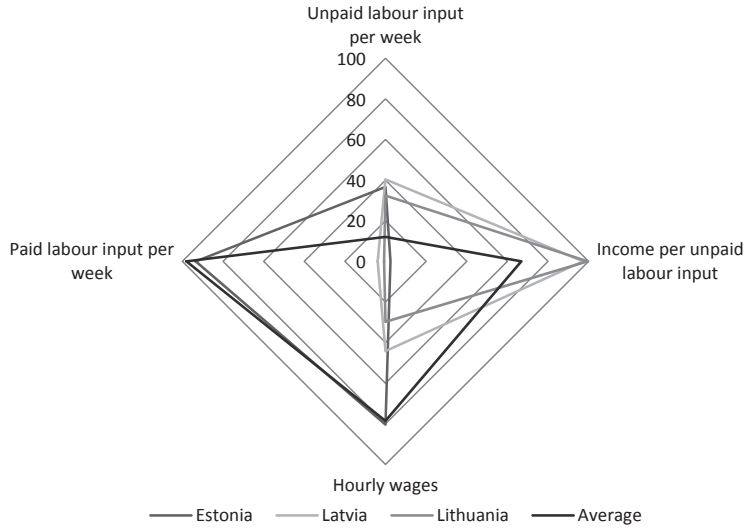
Fig. 4. Estonian, Latvian, and Lithuanian dairy farms' capital productivity 2007-2015



Source: authors' calculations based on FADN.

The social aspects of sustainability were characterized as follows: Estonian dairy farms had high hourly wages and low unpaid labour input per week. Latvian dairy farms had high unpaid labour input per week. Lithuanian dairy farms had low paid labour input per week, and low hourly wages (Figure 5).

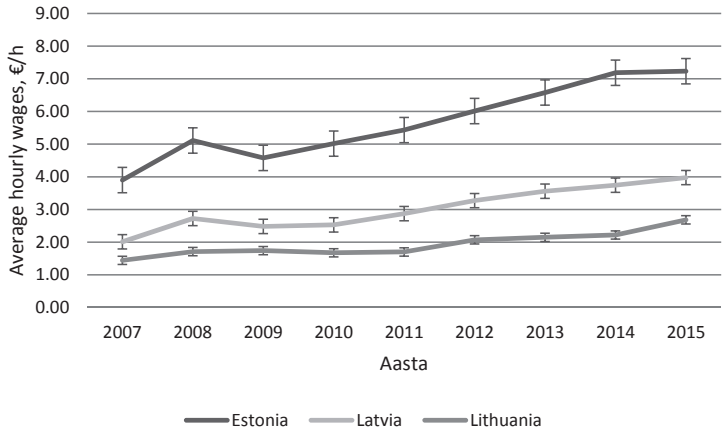
Fig. 5. Estonian, Latvian, and Lithuanian dairy farms' social sustainability 2015



Source: authors' calculations based on FADN.

The indicators selected to assess the social sustainability of dairy farms in the Baltic States offered a possibility to characterize Estonian, Latvian, and Lithuanian dairy farms by high number of working hours by unpaid workforce by paid in a week. The dynamics of hourly wages during 2007-2015 are shown in the figure 6. The hourly wages in all three countries have increased slightly.

Fig. 6. Estonian, Latvian, and Lithuanian dairy farms' hourly wages 2007-2015

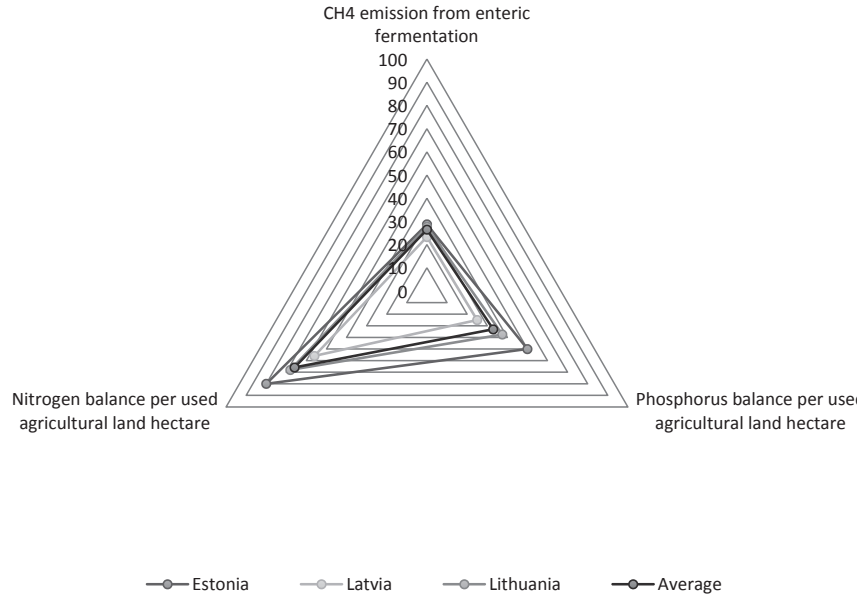


Source: authors' calculations based on FADN.

The three indicators of environmental sustainability showed that CH_4 emission from enteric fermentation per used agricultural land hectare was the highest in Lithuanian and Estonian cattle breeding (Figure 7).

The Estonian cattle breeding sector had high nitrogen and phosphorus balances per used agricultural land hectare. The Latvian cattle breeding sector had low CH_4 emission from enteric fermentation per used agricultural land hectare, and both nitrogen and phosphorus balances per used agricultural land hectare. The Lithuanian cattle breeding sector had high CH_4 emission from enteric fermentation per used agricultural land hectare.

Fig. 7. Estonian, Latvian, and Lithuanian dairy farms' environmental sustainability 2015



Source: authors' calculations based on Eurostat.

11.4. Conclusions

Although the Baltic States are sometimes considered agro-environmentally homogenous, and dairy farming is one of the main agricultural sectors in Estonia, Latvia, and Lithuania, the sustainability performances from the point of view of economic, social and environmental dimensions of sustainability are diverse.

The study concludes that according to the sustainability indicators the dairy farms of Baltic States on average do not perform on higher levels concerning sustainability performance benchmarks. This study does not compare the sustainability performance of Baltic countries with that of other countries, but takes into consideration of broader scope of sustainability performance indicators. This approach limits the depth of the study, but delivers a perspective for further research from the standpoint, in which the use of one-dimensional approaches for measuring and evaluating sustainability performance is limited.

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12. Strategic aspects of the development of the sugar industry in Poland[1]

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Abstract

The sugar market belonged to the most regulated markets in the EU agri-food sector. The basis for its regulation was the administrative limitation of supply, protectionist foreign trade policy as well as minimum buying-in sugar beet price and reference sugar price. The sugar industry in Poland has a long tradition and is of great economic, social and environmental importance as well as an essential part of the food security policy. The sugar industry is a strategic food economy branch as sugar is the main sweetener. The social importance of the sector results from the fact that the sugar beet production is a source of income for growers while the sugar industry and service companies generate national income and jobs. The sugar beet cultivation is a part of sustainable agriculture.

The abolition of production quotas will result in significant changes in the sugar industry. The scenarios for the evolution of the situation in the sugar industry should take into account two basic elements: changes in the EU market following the regulatory reform as well as changes in the economic situation in the global market and foreign trade conditions. The future market policy should contain solutions that will allow to maintain the sugar production at least in the most efficient and competitive regions of the country.

Keywords: sugar beet, sugar, sugar sector, market, market regulations, competition

JEL codes: D40, D20, C10

12.1. Economic and environmental importance of the sugar industry

The sugar industry in Poland has a long tradition and is of considerable economic importance, as it is a strategic section of the agri-food sector. The first sugar factory processing sugar beet in Europe was commissioned in 1801 in Lower Silesia [Łuczak, 1981]. Sugar remains the main sweetener in households

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and in the food industry, despite the growing market of other sweeteners [Szajner, Hryszko, 2017].

The sugar beet production and processing create jobs and play a big role in the regional development. The growers and the sugar industry use the services of service companies. Sugar factories are located in smaller towns, and their activity has a positive impact on the regional development.

The sugar industry produces by-products: molasses, beet pulp, energy and lime, which account for about 10% of the value added [Řezbová, Belová, Škubna, 2013]. Cooperation between the sugar industry and agricultural holdings allows to use these products in a manner beneficial for the economy and the environment [Renouf, Wegener, Nielsen, 2008]. The policy on biofuels in the EU creates new possibilities of growing sugar beet [De Wit, Faaij, 2010; Serra, Zilberman, 2013].

The crop production should be based on crop rotation which will guarantee soil fertility, reduce weeding and the development of pathogens as well as will guarantee good yields. The structure of sowings determines the crop diversity [Uthes, Matzdorf, 2013]. Sugar beet is a part of proper crop rotation and is characterised by the high production of biomass [Ostrowska, Artyszak, 2005]. The structure of sowings in Poland attests to the high possibilities of including a several% share of sugar beet [Wrzaszcz, 2014].

12.2. Changes in the system of market regulations and their impact on the sugar industry

The sugar market regulations in the EU were introduced in 1968, so as to guarantee the self-sufficiency and profitability of the sugar beet cultivation and sugar production. Until 2006, the market regulation was not subject to any serious changes, as the reform by MacSharry [1992] and Agenda 2000 did not introduce any substantial changes[2]. Some changes applied to the foreign market regulations, as they resulted from the liberalisation of global trade in the WTO. The market regulations in the EU were criticised for high prices in the internal market and the low international competitiveness, and did not encourage growers and manufacturers to reduce costs and improve efficiency. The subsidised export increased the supply in the global market, which negatively affected the economic situation of the developing countries. In 2005, the WTO challenged the EU export subsidies[3]. The European Commission, taking account of a need to

[2] Council Regulation No 1009/67/EEC of 18 December 1967 on the common organization of the market in sugar. Council Regulation (EC) No 1260/2001 of 19 June 2001 on the common organisation of the markets in the sugar sector (L 187/1 30.06.2001).
[3] European Communities – Export Subsidies On Sugar, AB-2005-2, WTO, 28 April 2005.

improve the competitiveness, the WTO's position and the interests of market participants introduced a reform in the years 2006-2010[4] [Agrosynergies, 2011].

In 2017, the EU introduces another regulatory reform whose major elements will be the abolition of production quotas and the minimum sugar beet buying-in price as well as the production charge[5]. The foreign trade regulation instruments will be slightly modified. The market will be protected by high customs duties, but there will be preferential import quotas.

Table 1. Selected elements of the sugar market regulation

Market regulations	Current	Proposed
Production quotas	YES	NO
Management of non-quota sugar	YES	NO
Reference sugar price	EUR 404.4/tonne	NO
Minimum sugar beet buying-in price	EUR 26.29/tonne	NO
Production charge	EUR 12.00/tonne	NO
Monitoring of sugar prices	YES	YES
Import	Preferential quotas	Preferential quotas
Export	YES	YES
Import and export licences for sugar	YES	NO/ YES (for import as part of quotas)
Private storage aid	YES	YES
Coupled aid for sugar beet cultivation	YES	YES

Source: own study based on the European Commission data.

12.3. Impact of regulations on the sugar industry

Market competition is a resultant of the impact of five forces which in the sugar sector may be specified as follows: competition among sugar producers, bargaining power of suppliers (growers), bargaining power of consumers, threat on the part of sweetener substitutes and the threat of the entry of new producers to the market [Porter, 2008]. Market regulations limited the impact of the com-

[4] Council Regulation (EC) No 318/2006 of 20 February 2006 on the common organisation of the markets in the sugar sector. Council Regulation (EC) No 319/2006 of 20 February 2006 amending Regulation (EC) No 1782/2003 establishing common rules for direct support schemes under the common agricultural policy and establishing certain support schemes for farmers. Council Regulation (EC) No 320/2006 of 20 February 2006 establishing a temporary scheme for the restructuring of the sugar industry in the Community and amending Regulation (EC) No 1290/2005 on the financing of the common agricultural policy (L 58/1 28.02.2006).

[5] Regulation (EU) No 1308/2013 of the European Parliament and of the Council of 17 December 2013 establishing a common organisation of the markets in agricultural products and repealing Council Regulations (EEC) No 922/72, (EEC) No 234/79, (EC) No 1037/2001 and (EC) No 1234/2007 (L 347/672 20.12.2013).

petition forces. Production quotas decreased the competition among companies and excluded the entry of new companies to the market. The threat on the part of the import was effectively restricted by the trade policy. The sugar market in Poland is a classic oligopoly, as four producers manufacture a homogeneous product. Owing to the production quotas, the producers could compete among each other with the production volume to a small extent (Steckelberg and Cournot models). The competition strategy was built on the cost reduction and concentration on the group of customers. The position of the sugar oligopoly was strong in relations with the growers, despite concluding contracting agreements and the minimum sugar beet buying-in price. The demand for sugar is inflexible which is beneficial for the producers. Other sweeteners have a low market share, and the production of isoglucose was restricted by the production quota [Dillen, Dries, Tollens, 2006].

The liquidation of the production quotas changes the conditions of competition in the national sugar industry. The producers to the greater extent will be able to compete among each other with the production volume. In Poland, there are four producers, of which the market share of 60% is held by three German concerns. The liquidation of the production quotas and a possible decline in the production profitability may result in the production concentration in the efficient and competitive EU-15 regions, at the expense of the EU-13 regions. The production concentration can be useful in the context of efficiency, but also poses a risk of an increase in monopolistic practices. The liquidation of production in certain regions will have adverse economic, social and environmental effects.

The reform of the market regulations will have a great impact on the functioning of the market in the context of the balance sheet. In Poland, the production quota was 1,405.6 thousand tonnes and was lower than the demand and production potential of the sector. So far, the market demand has been covered by the domestic production only in part, as non-quota sugar was either exported or included into the quota production amount in the next season. An important role in supplying the market was played by the import. The liquidation of the quotas will make the production cover the internal demand. The market situation will be complicated by the preferential import. Some plants will be involved in refining raw sugar, so as to use resources more effectively. This situation will result in the supply surplus. In conditions of low prices in the global market, the export will bring financial losses to producers and it will be necessary to reduce the production.

The changes in the market regulations also provide for the liquidation of the production quotas of isoglucose, which is currently the main sugar substitute [Zimmer, 2013]. This is a significant change in the context of the competition in

the market of sweeteners. The isoglucose production quota in Poland is 42 thousand tonnes of dry matter and is lower than the demand. The liquidation of the production quotas will result in the increased production, as the producers have a great potential. The barrier to the increase in the production may be the demand, as isoglucose may be applied in certain sectors of the food industry only [Gocht et al., 2012].

In addition to the liquidation of production quotas, an important change in the regulations will be the liquidation of the minimum sugar beet buying-in price. In the Member States applying the SPS direct payment system, „sugar payments" have been included into farm payments, which made it difficult to assess their impact on the production profitability. In the SAPS system, „sugar payments" have been identified as separate support and it was possible to assess their impact on the cultivation profitability.

12.4. Polish sugar industry after the accession to the EU

In Poland, the sugar industry has been subject to the in-depth restructuring and modernisation. An important role has been played by global investments of sugar concerns and the accession to the EU, which coincided with the regulatory reform. The restructuring resulted in the reduced number of sugar factories and the exclusion of many plantation regions from the production. In the years 2006--2015, the sugar beet cultivation area decreased to about 40%. In 2016, the cultivation area increased to 206 thousand ha as a result of the small production volume in the 2015/2016 season. Sugar concerns are preparing for changing the market regulation in 2017 and contracted a lot of raw material, so that after abolishing the production quota non-quota sugar could be sold in the EU market. Structural changes are reflected by a large decline in the number of growers and increased cultivation concentration. The number of growers decreased by 56%, but the average size of a plantation doubled. The production concentration on good soils and on large farms had a beneficial impact on the efficiency. The technological sugar yield increased to 10 tonnes/ha.

The number of sugar factories decreased to 18, and the production per sugar factories tripled, to about 120 thousand tonnes. The production potential of the sugar industry is about 2.3 million tonnes. Modernisation of the plants improved the capital and labour productivity and management efficiency. Restructuring processes made the sugar industry become one of the most effective branches of the domestic food sector. In the conditions of high prices, the sugar industry gained very large profits and demonstrated the high profitability (about 20% of net income) [Szajner, Hryszko, 2017].

The sugar consumption shows an upward trend and significant structural changes. The consumption in the food industry and in other sections of the economy is growing systematically while in households it is decreasing. At the same time, the consumption and export of sweetened products are growing. The sugar consumption is 40-44 kg per capita and the growth possibilities are small. It is possible to increase the consumption in the food industry, which increases the export.

Table 2. Polish sugar industry in the years 2004-2016

Specification	2016	2004=100%	Average annual growth rate [%]
Sugar beet cultivation area [thousand ha]	206	69.4	-3.0
Number of growers [thousand]	34	43.6	-6.7
Average plantation area [ha]	6.1	158.9	3.9
Root yield [tonne/ha]	65.5	153.0	3.6
Technological sugar yield [tonne/ha]	10.1	216.3	6.6
Sugar beet harvest [million tonnes]	13.5	106.0	0.5
Number of sugar factories	18.0	41.9	-7.0
Sugar production [thousand tonnes]	2,084	104.0	0.3
Production per sugar factories [thousand tonnes]	120	600.0	16.1
Technical labour productivity[tonne/employee]	632	359.6	11.3
Duration of the campaign [days]	112	140.0	2.8
Sugar consumption [thousand tonnes]	1,700	105.3	0.4
food industry	1,075	129.5	2.2
households	545	73.6	-2.5

Source: IAFE-NRI study, CSO data, KZPBC.

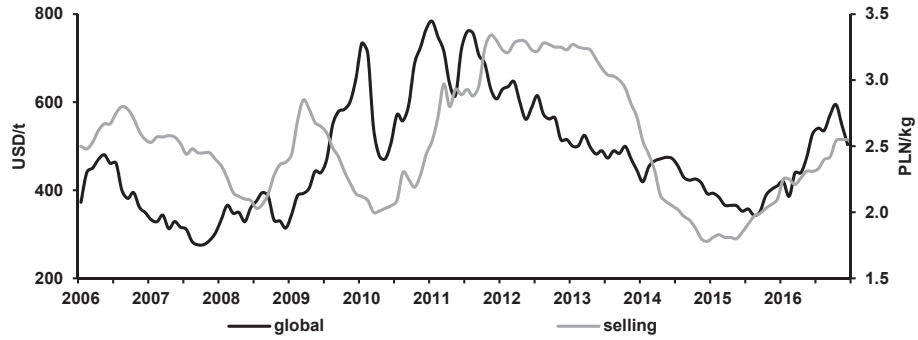
The Polish sugar sector is a net exporter. Foreign trade is characterised by high volatility due to the production fluctuations. The production volume was lower than the production and consumption. As a result, 400-500 thousand tonnes of sugar were exported annually, while 200-250 thousand tonnes were imported. As a result of the reform, in the years 2006-2010 the share of import in the market supply increased to about 15%. The share of export in the production was variable

(12-40%). A new phenomenon is the import of sugar for refining, which is about 130 thousand tonnes annually. The major trading partners in the export are the EU countries, including Germany. The important outlet markets are Russia, Kazakhstan, Israel and Syria. The import is dominated by sugar for refining from the ACP/LDC countries (e.g. Mauritius, Zimbabwe, Swaziland, Sudan).

The sugar beet buying-in prices were determined by: minimum buying-in price, quality of raw material, trade agreements, EUR exchange rate, as well as economic situation [Szajner, Hamulczuk, 2015]. The integration with the EU resulted in a high rise in the buying-in prices in the 2004/2005 season to PLN 187/tonne. As a result of the 2006-2010 reform, the minimum buying-in price was lowered and the prices fell to about PLN 115/tonne. Trade agreements and the recovery made the buying-in prices rise to PLN 145/tonne in the years 2011--2013. In the 2014-2015, due to the economic slump the buying-in prices fell to about PLN 120/tonne. The decrease in the prices and income of the growers was compensated for by decoupled „sugar payments" (about PLN 54/tonne). The year 2015 saw a change in support for income of the growers as coupled payments for sugar beet were introduced. In the years 2015-2020, Poland can allocate for this purpose about EUR 80 million a year. In 2015, support amounted to PLN 2,138.26/ha, i.e. about PLN 41/tonne.

The prices in the sugar market were characterised by high volatility with relatively small changes in the inflation rate. Annual fluctuations in the buying-in and selling prices were ± 20-40%, and the rates of those prices were characterised by similar directions of change. An exceptional situation occurred in 2006, when a deep decline in the buying-in prices (by 27%) was accompanied by the stabilisation of the selling prices. The price volatility is illustrated by the cumulative price indices. In the years 2005-2016, the cumulative index of the sugar beet buying-in prices amounted to 64.4%, while that of the prices increased by sugar payment – to 87%. In the same period, the inflation rate amounted to 123.1% and food price ratio was 130.7%. The cumulative indices of the sugar selling and retail prices were, respectively, 98.8% and 126.4%. The real rise in the sugar prices in relation to the sugar beet prices and the positive effects of restructuring of the plants have contributed to an increase in the profitability of the sugar industry. The sugar prices in the country are dependent on the prices in the global market [Areté, 2012].

Fig. 1 Polish and global sugar prices



Source: IAFE-NRI study, unpublished ERS, USDA data.

12.5. Scenarios for the development of the sugar industry

The projections made by the European Commission and the OCED-FAO assume that the global and EU sugar market in a long term will be characterised by the evolutionary development [European Commission, 2015; OECD-FAO, 2016]. The experience of recent years suggests that the business cycle in the global sugar industry lasted 5 years [Isermeyer, Kleinhanβ, 2005], and in recent years it has been shortened to 2 years [Szajner, Hamulczuk, 2015]. The economic changes in the global and EU market as well as the market regulation proposal formed a basis for the scenarios of the Polish sugar industry. The abolition of the production quotas and the minimum buying-in price as well as the maintenance of the regulations in foreign trade will make the domestic market be under greater influence of the economic situation in the global market [Chen, Saghaian, 2015]. It has been assumed that the WTO Doha negotiations will not be completed [Smit, Helming, 2012]. The following three scenarios for the market development have been adopted:

- scenario I: global white sugar prices at the level of about EUR 350/tonne and low prices of energy resources,
- scenario II assumes a large supply of sugar in the global market and low prices of energy resources, as a result, the global white sugar prices will fall to about 250 EUR/tonne,
- scenario III: assumes rise in the global white sugar prices to EUR 500 EUR/tonne and high prices of energy resources.

The first scenario assumes that the global prices will remain at the level from the years 2014-2015. In such conditions, the EU sugar prices will oscillate around the reference price (about EUR 400/tonne). The sugar production in Po-

land will be possible in efficient sugar factories only. It is expected that some concerns will exclude 3-6 inefficient sugar factories from production. The plantation areas of these plants will be partially taken over by the remaining sugar factories. It is foreseen that the sugar beet cultivation area will be about 190 thousand ha, and the sugar production about 1,800 thousand tonnes. In the context of the market balance, this is the status quo scenario. The export will amount to 300-400 thousand tonnes, and the import will remain at the level of about 250 thousand tonnes. Owing to the relatively low prices, both in the sugar industry and in agricultural holdings restructuring transformation will be required, with the aim of cost reduction.

In the scenario of the poor economic situation and low global prices, the EU sugar prices will decrease to about EUR 340/tonne. Consequently, the prices in the country will also decrease and the sugar industry will pay low prices for raw materials. In these conditions, the profitability of the sugar industry will significantly deteriorate and sugar concerns will exclude 6-8 plants from production. The decline in the cultivation profitability will make the growers seek more profitable types of production. This is a very disadvantageous scenario for the sugar industry and the entire food sector. The persistent economic slump will result in the deep restructuring changes. The sugar beet cultivation area will fall to 140 thousand ha, and the sugar production to 1,350 thousand tonnes. In the conditions of the domestic demand of about 1,750 thousand tonnes, there will be adverse changes in the market balance. The export will decrease to about 100 thousand tonnes and the large import (about 500,000 tonne) will be required. The reduced sugar beet cultivation area and exclusion of some plants from production will have adverse social and environmental effects.

The third scenario is an optimistic variant of the market development. The sugar beet cultivation area may go up to 220 thousand ha. Poland will be a large exporter of sugar (about 500,000 tonnes annually). At the same time, the import will remain at the level of about 200 thousand tonnes as a result of bilateral trade agreements and growing refining. In these market conditions, the sugar sector entities should continue the modernisation processes and diversify the economic activity (e.g. secondary sugar processing, biogas, biofuels). Strengthening and improving the competitive position of the industry is only possible through the improved efficiency.

Table 3. Forecast of the situation in the Polish sugar market in 2025

Specification	2016	Scenario I		Scenario II		Scenario III	
			2016=100		2016=100		2016=100
Global white sugar price [EUR/tonne]	400	350		250		500	
Cultivation area [thousand ha]	200	190	95.0	140	200	190	95.0
Yields [tonne/ha]	61	63	103.3	63	61	63	103.3
Harvest [thousand tonnes]	12,300	12,000	97.6	8,850	12,300	12,000	97.6
Sugar production [thousand tonnes]	1900	1800	94.7	1350	1900	1800	94.7
Sugar consumption [thousand tonnes]	1,710	1,750	102.3	1,750	1,710	1,750	102.3
Export	400	300	75.0	100	400	300	75.0
Import	200	250	125.0	500	200	250	125.0
Self-sufficiency [%]	111.1	102.9	-	77.1	111.1	102.9	-
Share of import in supply [%]	11.8	14.3	-	28.6	11.8	14.3	-
Share of export in production [%]	21.1	16.7	-	7.4	21.1	16.7	-

Source: IAFE-NRI study.

12.6. Summary

The sugar industry in Poland is a strategic branch of the food sector. Sugar is a basic sweetener, and maintaining the production is an essential part of food security. The sugar industry is of great economic, environmental and social importance.

The sugar market is one of the most regulated food markets, and the market regulations strongly interfere with the market rights. The basis of the system were the production quotas, official prices and foreign trade regulations. The abolition of the sugar and isoglucose production quotas and of the minimum sugar beet buying-in price will change the market conditions. This applies to the sugar production and distribution and will have a significant impact on the market balance. Limitation of the supply determined the impact of the competition forces and its liquidation will substantially change the competition conditions. The abolition of the production quotas will aggravate the competition among

sugar producers, the threat on the part of substitute products will increase, the market entry possibilities for new entities will improve and the bargaining power of the growers will be reduced, mainly as a result of liquidating the minimum buying-in price. The foreign trade regulations will remain unchanged. As a result of trade agreements, the developing countries will import sugar to the EU on preferential conditions. Foreign trade will play a greater role in the market balance. In addition, the liberalisation of production will result in a stronger link between the Polish market and the global market. The impact of the global economic situation on the domestic prices will be stronger.

The global sugar prices are characterised by high volatility, and the business cycle has been shortened to about 2 years. The prices are determined by the supply-demand situation and are correlated with the energy prices. Such trends will persist also in the future, and therefore, the projections on the development of the situation in the global market and in Poland should take into account the cyclical fluctuations of the economic situation. Monitoring of these trends, interpretation and use of such information should be an important element of the market regulations.

Three scenarios of the supply-demand situation in Poland, depending on the economic situation and the level of the prices in the global market sugar, have been presented.

- The first scenario assumes that the global white sugar prices will remain at the level of EUR 350/tonne. In these conditions, restructuring transformation will be required and the production will be possible only in efficient plants. No significant changes will take place in foreign trade.
- The second scenario assumes a decline in the global prices to EUR 250/tonne, which will put pressure on the prices in Poland. In these conditions, the industry will be deeply restructured. Many sugar factories and plantation regions will be excluded from production, and the sector will become a net importer.
- The third scenario foresees that the global prices will rise to EUR 500/tonne and be higher than the EU reference price. It is expected that the production in Poland could increase to about 2 million tonnes of sugar and will exceed the demand. The import will be reduced to duty-free quotas be reduced and supply surpluses will be intended for export.

The liberalisation of the sugar market will result in the stronger integration with the global market, and this may result in the variability of conditions and the increase risk of business activity. Therefore, the market policy should cover a broad set of instruments and regulations (the so-called safety net):

- risk management system with regard to the sugar production and farm income, which allows administration to respond to changes in the market situation;
- maintenance of private storage aid and active trade and promotion policy. The market should be protected by customs duties and non-tariff instruments. Sugar should be included into the group of sensitive products. Promotional measures should include the diversification of outlet market;
- farm income stabilising instruments, for example, direct payments closely linked with the sugar beet cultivation area and linking the sugar beet cultivation with environmental objectives. The industry policy should take into account support for the growers in a form of environmental payments;
- support for investment in agricultural holdings and linking them with activities focused on the multifunctional and sustainable rural development;
- empowering the farmers in the marketing chain. A key role is played by contracting agreements, support for the creation of industry organisations and producer groups, and activities aimed at the (capital) integration of the growers with the sugar industry;
- prerequisite for the effective market policy is access to information and possibility of predicting changes to be able to take action on time. What is necessary is a modern and effective market monitoring system, which will provide companies and administration with access to market information.

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13. The possibility to reach meat self-sufficiency in Romania in the long term[1]

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Abstract

Meat production is crucial for reaching the self-sufficiency targets for the important agricultural products from the perspective of Romania's food security, as defined by a recent national strategy. Taking into consideration the difficult situation of the European pork market in 2015 and 2016, which has aggravated the old problems of the pig farming sector in Romania, it is expected that the investment support measures and instruments will not be effective in the short term. The poultry farming sector is the main vector to reach self-sufficiency in meat by the year 2035, having technical performances comparable to those of the most efficient producers in the EU, yet slightly disadvantaged by the weaknesses of the domestic poultry market, i.e. consumers' preferences for cheap, low quality products. With a smaller share in total meat consumption nationwide, beef can contribute to reaching the self-sufficiency target in the future, both through production increase and through production quality improvement, which will also put into value the export potential of this product.

Keywords: self-sufficiency, meat production, meat consumption, Romania

JEL codes: Q11, Q18

13.1. Introduction

Within the Food Security and Safety Project, the issue of the evolution of the economic and social sectors involved in ensuring food security in Romania was addressed. This prospective approach is part of the wider framework of Romania's Development Strategy for the Next 20 Years, 2018-2038 [Vlad, 2017], coordinated by the Romanian Academy[2].

[1] Article prepared for International Scientific Conference "Strategies for the agri-food sector and rural areas – dilemmas of development"organised by IAFE-NRI, 19-21 June 2017, Stary Licheń, Poland.

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In this context, a first objective of this project was to evaluate the situation of the food and nutrition security of Romania's population and to identify its main determinants and vulnerabilities. By outlining certain plausible hypotheses concerning the convergence of the main economic indicators towards the European average level, mainly with regard to purchasing power, as well as highlighting certain priorities in the agri-food sector development, the necessary milestones have been defined on the basis of which the vision on food security and safety was developed towards the horizon of 2038.

It was considered that agriculture plays a crucial role in ensuring food security, as the domestic agricultural production represents the most direct form to ensure the necessary food for a country's population. In the situation when self-sufficiency has not been reached, the countries can import foodstuffs, but the massive food imports represent vulnerability for any country, mainly in the present context of high volatility of agricultural world prices.

At the same time, it was considered that food security is only partially conditioned by the existence of a sufficient agricultural supply. Most often the problems and vulnerabilities appear at micro-economic level, where the access to food is limited by the low purchasing power, by the lack of incomes, by poverty in general. That is why an essential determinant of a country's food security is the country's general development level, on which the agriculture development and productivity as well as the household incomes, population's welfare and the physical and economic access to food ultimately depend.

Thus, in approaching the issue of developing a vision on food and nutrition security towards 2038, the need for the general socio-economic development of the country was considered, on one hand, and the need to develop the agri-food sector and the rural area, on the other hand.

The formulation and substantiation of the development targets for the Romanian agri-food sector in short, medium and long term, so that this sector can become a supplier of food security at national and European level, with performance comparable to that of the developed countries of the European Union, represented the next stage in the prospective approach. In this context, due to the long term envisaged, i.e. a period of more than 20 years, the need emerged to have some benchmarks on the possible or likely evolutions of the economy and society globally, as reflected by the representative studies conducted so far [Conforti, 2011].

On this line, the establishment of necessary human and financial resources for reaching the proposed food security targets starts from the priorities set for getting Romania's development and productivity level closer to the European average level, namely:

- increasing the Romanian agriculture role as food security supplier, by increasing the coverage of food consumption needs from domestic agricultural production, by the stabilization of domestic agricultural supply (mainly through measures meant to support the irrigation infrastructure as well as through other measures to fight against the climate change effects) and by increasing the agricultural exports and acquiring the food security supplier status at regional and European level;
- improving the population's access to food and the nutrition quality, by increasing the population's purchasing power, by narrowing the gaps in relation to the economic access to food of different population categories as well as the improvement of diet quality by increasing the animal protein intake and food diversity;
- rural development and increasing the educational level of the population working in agriculture, premises for the improvement of food and nutrition safety, by solving up the problem of technical municipal infrastructure in the rural communities by the year 2038 and by raising the young farmers' educational and vocational training level.

13.2. Methodology elements

The research work on the theme of food security and safety was developed in the period April 2015 – December 2016; in this period consultations with the experts in agriculture, agricultural research, consultancy, financial bodies, and from other related domains took place.

The methods used by the team of researchers were of qualitative type (literature review, SWOT analysis, defining the scenarios and vision), quantitative (extrapolation of trends) and semi-quantitative (Delphi technique).

The elaboration of the report also included the detailed study of the most recent prospective and strategic approaches at general and sectoral level [OECD/FAO, 2016], as well as the yearly forecast of the European Commission [EC, 2016].

A mix of indicators was used for the SWOT analysis, including those utilized by the national and international organizations for the evaluation of the population's food and nutrition security from different regions of the world. The data sources refer to indicators and studies developed by FAO (Food and Agriculture Organization of the United Nations), OECD (Organization for Economic Co-operation and Development), IFPRI (International Food Policy Research Institute), EUROSTAT (the statistical office of the European Union), EIU (Economist Intelligence Unit, which publishes the Global Food Security Index), NIS

(National Institute of Statistics from Romania) and MARD (Ministry of Agriculture and Rural Development of Romania).

The short, medium and long term targets for the agricultural productions with deficit, mainly in meat, vegetables and fruit, were established on the basis of the analysis model of food balance sheets, used by the National Institute of Statistics, in conformity with FAO and EUROSTAT methodologies. The main indicator, for which the levels corresponding to the three time horizons were proposed, is the utilizable production, from which we obtain (by adding the imports and deducting the exports) the supply availability. The ratio of utilizable production to supply availability, expressed in percentage terms, represents the self-supply level (indicator expressing the self-sufficiency rate for the respective product). The main component of the supply availability is represented by the availability for human consumption, indicator whose evolution is in direct relation with the evolution of the population at national level. The levels of Romania's population for which the targets were proposed in the short, medium and long term, were taken over from the main scenario of population projections (EUROPOP2013) developed by Eurostat.

The hypotheses taken into consideration for defining the foreign trade targets were based on the statistical indicators for the period 2007-2014 (annual average growth rate and annual fixed and chain base indices). These were correlated with the trends provided by the information from the balance sheets, as well as the trends estimated by the team members who studied the most important agricultural products. We had in view maintaining the well-established export markets and expanding on the Asian markets for certain products with potential (dairy products, wines).

For the calculation of food consumption we used information from FAOSTAT food balance sheets, which provide information on food availabilities per capita for the main food products in different countries, equations being estimated for the quantities of consumed products in relation to the Gross Domestic Product per capita, by using different functional forms of Engel curves.

The assessment of necessary finance for areas considered as priorities for food security and safety was made through the analysis of achievements and problems arising from the implementation of NRDP 2007-2013 measures, the evaluation of the possible impact of the NRDP 2014-2020 measures on the agri-food chains and rural areas, the investigation and evaluation of the impact of measures funded from MARD budget, completed by the discussions with experts involved in various projects, mainly in the projects of irrigation system rehabilitation and agricultural research reform.

13.3. SWOT analysis

The SWOT analysis focused on issues concerning the agricultural sector contribution to ensuring food security for the population, as well as on aspects in relation to the access to food, to the food demand determinants and to certain issues regarding the population's nutritional status. The main elements related to meat production and consumption in Romania are presented in Figure 1.

Fig. 1. Elements referring to meat in the SWOT analysis of food security

STRENGTHS	WEAKNESSES
-significant agricultural resources for animal production (fodder crops, pastures, hayfields) -progress in meeting the consumption needs from domestic production (poultry meat, sheep and goat meat) -important investments in food industry after accession -food consumption increased in nutritionally superior products (meat, fruit, fish) -implementation of zoo-veterinary norms according to European legislation	-the domestic agricultural production cannot cover the consumption needs in certain important groups of products (meat, milk, fruit, vegetables and fish) -human consumption dependence on imports is high in certain products (soybean, sugar, meat, fish, fruit) -the daily availability of animal protein (gr/capita/day) is lower in Romania compared to other EU member states -the share of consumption expenditures of poor population (first decile) exceeds 65% of total consumption expenditures
OPPORTUNITIES	THREATS
-incomes increase and poverty alleviation – increasing domestic demand for nutritionally superior products (fruit, meat) -increasing external demand for food (for meat in the Near East and Asia-Pacific areas)	-uncertainties regarding the future evolution of the Common Agricultural Policy by the year 2038, including those concerning agriculture funding from EU sources -evolution of climate factors -occurrence of certain animal diseases

Source: own elaboration.

13.4. Meat self-sufficiency in Romania

The agricultural production self-sufficiency, defined as share of domestic consumption covered by the domestic production is considered the main food security guarantor of a country by the traditional approaches. In Romania's case, the coverage of food consumption needs from domestic production is a priority objective for meat, as a result of the alarming low self-sufficiency rate in pork (79% in 2015). Self-sufficiency in poultry meat and beef was neither reached in the year 2015. That is why the vision proposed under the project has in view reaching a 100% self-sufficiency rate in meat (per total) by the year 2038. This potential target is also added to the improvement of self-sufficiency in vegetables and fruit, considered important products from the perspective of the food

consumption pattern evolution in Romania, in the sense of increasing the share of fruit and vegetables in the population's diet.

From food security perspective, in Romania, pork and poultry meat production is essential. As for beef and sheep and goat meat production, this is important for dietary diversification, while having a complex contribution to putting into value the country's agricultural resources, by the export of live animals and meat products inclusively.

The proposed targets for meat production, by each animal species, took into consideration the national evolutions up to the present moment, as well as the European and world forecasts for the period 2016-2026.

In this global and European context, taking into account the domestic needs and possibilities, Romania can propose to maintain its self-sufficiency in sheep meat and to reach self-sufficiency in poultry meat by the year 2028, and to reach self-sufficiency in beef and pork by the year 2038.

The consumption needs for fresh pigmeat meat, for which prices are higher, are mainly covered from the domestic pork production, in which self-sufficiency was low, in the year 2015, while the meat necessary for the sausage and cold meat industry is mainly ensured from imports (Table 1). On the short term (2020) no major changes are expected as regards the self-sufficiency level, as the pigmeat sector will be still under restructuring and adaptation to the new animal health and welfare standards. For the 2028 horizon, the self-sufficiency is expected to increase to 90%, due to the domestic production growth, with quality carcasses and competitive prices, while imports will slightly decrease. On long term (horizon 2038) the industrial pigmeat sector will get consolidated, while the self-sufficiency level is likely to get closer to 100%.

Table 1. Targets for pigmeat (fresh meat equivalent)

	u.m.	*Baseline situation (2015)*	*Short term (2020)*	*Medium term (2028)*	*Long term (2038)*
Utilizable production	thou.tons	434	486	608	668
Import	thou.tons	238	202	125	100
Export	thou.tons	33	40	55	80
Supply availability	thou.tons	620	648	678	688
Self-supply level	percents	70%	75%	90%	97%

Source: own calculations.

The relatively high self-sufficiency level in poultry meat, in the year 2015, will further increase in short and medium term, due to production growth in Romania above the average growth level in EU (Table 2). Maintaining high rates after 2028 as well presupposes an increase of exports in long term, while self-sufficiency will exceed 100% in 2038. The (industrial) poultry meat production growth repre-

sents one of the modalities to capitalize on grain production; however, the large poultry farms will have to ensure part of their feed on direct basis, by taking over farmland areas into their operation, which will ensure the feed price stability.

Table 2. Targets for poultry meat (fresh meat equivalent)

	u.m.	*Baseline situation (2015)*	*Short term (2020)*	*Medium term (2028)*	*Long term (2038)*
Utilizable production	thou.tons	406	455	496	570
Import	thou.tons	137	132	121	115
Export	thou.tons	88	90	95	130
Supply availability	thou.tons	455	496	522	555
Self-supply level	percents	89%	92%	95%	103%

Source: own calculations.

Considering the desideratum to reach self-sufficiency in beef by the year 2038, Table 3 presents the targets in short, medium and long term, possible to reach due to the support provided to the cattle raising sector under MARD programs, to which the support under the NRDP 2014-2020 measures is added. Reaching the proposed targets for beef production is quite an ambitious objective, which could be facilitated by the initiation of a national program for the specialization in beef production of small farms that raise cattle.

Table 3. Targets for beef (fresh meat equivalent)

	u.m.	*Baseline situation (2015)*	*Short term (2020)*	*Medium term (2028)*	*Long term (2038)*
Utilizable production	thou.tons	99	101	111	122
Import	thou.tons	34	32	29	27
Export	thou.tons	8	7	9	12
Supply availability	thou.tons	125	126	132	137
Self-supply level	percents	79%	80%	84%	89%

Source: own calculations.

With support by measures similar to those from the bovine sector, the proposed sheep and goat meat production targets in short, medium and long term (Table 4) envisage maintaining a self-sufficiency level of over 100% and export growth.

Table 4. Targets for sheep and goat meat (fresh meat equivalent)

	u.m.	*Baseline situation (2015)*	*Short term (2020)*	*Medium term (2028)*	*Long term (2038)*
Utilizable production	thou.tons	49	53	58	65
Import	thou.tons	1.1	1.2	1.2	1.4
Export	thou.tons	7	8	10	13
Supply availability	thou.tons	44	46	50	53
Self-supply level	percents	111%	114%	117%	122%

Source: own calculations.

To sum up, the proposed targets for total meat production can ensure self--sufficiency in meat and meat products by the year 2038, mainly on the basis of the sustained growth of poultry meat production and of relaunching the pigmeat production. By the contribution of these two sectors, the growth of total meat production (Table 5) is expected to be 29% in medium term and 44% on long term.

Table 5. Targets for total meat production (fresh meat equivalent)

	u.m.	*Baseline situation (2015)*	*Short term (2020)*	*Medium term (2028)*	*Long term (2038)*
Utilizable production	thou.tons	1040	1155	1333	1485
Self-supply level	percents	79%	83%	92%	99%

Source: own calculations.

As Romania is one of the European countries with medium to low incomes per capita, it is confronted with certain vulnerabilities in relation to the food security of certain population categories, under the background of poverty and social exclusion. The indicator that most synthetically reflects this situation is represented by the share of food consumption expenditures (foodstuffs and beverages) in total consumption expenditures, which reached 38.2% in the year 2015, this being one of the highest levels in the EU-28 member states. However, the share of food consumption expenditures decreased from 52.2% in 2001, hence by about 14% in 15 years.

The target indicators for the next 20 years were established starting from the economic theory concerning food consumption evolution in relation to incomes (Engel curves). According to this approach, food demand is growing sharply (elastic demand) when household incomes are at low levels and begin to follow an increasing trend. This situation was associated to the short term, as the food expenditure elasticity estimates, for the year 2011, indicate values greater than one or close to one for most groups of food products [Alexandri et al., 2016].

On medium term, with the constant growth of incomes, food demand becomes inelastic, in the sense that it continues to grow, yet the growth rate slows

down; in long term, the saturation of demand growth is reached for most products, with the demand even decreasing in certain products, under the background of diet modification and increasing concerns for a healthy diet. These evolutions, i.e. the saturation of demand and even the decrease of consumption in certain products (meat, for instance) take place at present in certain developed European countries, due to the concerns for a healthy diet, change of demographic structures by the increasing share of elderly population, lifestyle changes, which presuppose a less intense physical activity. In France, for instance, food consumption expenditures decreased from 20% in the year 1960 to 14% in 2001, practically by 6% in 40 years. In the same period, the population's food behaviour changed, due to the increasing health concerns. The consumption of traditional products rich in sugar and fat has been gradually abandoned, and the consumption of red meat has decreased since 1980. The consumption of poultry meat and of ready-to-eat food increased instead.

It is expected that similar evolutions of food consumption will also take place in Romania, with the increase of population's incomes and purchasing power. Having in view the economic growth forecasts in Romania in long term, we presuppose that the consumption expenditures will also increase at the same time. In this sense, we presuppose that the consumption expenditures of households will increase three times by the year 2028 and six times by 2038, compared to those in the year 2015.

Starting from these assumptions and using certain regression equations that were based on Engel curves, we estimated an increase of the consumption of meat and other products of animal origin, due to the unsaturated demand for a large part of the population from Romania (Table 6).

Table 6. Targets for the annual meat consumption level (fresh meat equivalent)

	u.m.	*Baseline situation (2015)*	*Short term (2020)*	*Medium term (2028)*	*Long term (2038)*
Meat consumption, out of which:	kg/capita	63.4	66.9	72.1	77.2
-pigmeat	kg/capita	31.3	32.9	35.4	37.1
-poultry meat	kg/capita	23.0	25.2	27.2	29.9
-beef	kg/capita	6.3	6.4	6.9	7.4
-sheep and goat meat	kg/capita	2.2	2.4	2.6	2.9

Source: own calculations.

13.5. Support to investments in the meat subsector

In order to reach the self-supply targets for the important agricultural products from the perspective of Romania's food security, we estimated the nec-

essary public funds for supporting investments in the respective agricultural production sectors (for meat, Table 7).

Pigmeat

Taking into consideration the difficult European pork market situation in the years 2015 and 2016, which has aggravated the older problems of the pig raising sector in Romania, it is expected that the investment support measures and instruments will not be effective in short term. In order to overcome the current problems in the pig raising sector, beyond the rigorous management of the swine fever risk, investments are necessary on the reproduction farms specialized in producing piglets with high performance genetics as well as in modern pig raising technologies. Thus, a similar support to that in the period 2007-2014 is estimated at about 150 million euro from public funds (mainly European funds) for the period 2016-2020, to be continued at the same level in the next years (150 million euro for 2021-2027, and 300 million euro for 2028-2038).

Poultry meat

The poultry raising sector represents the main vector for reaching self--sufficiency in meat by the year 2038, with technical performance comparable to that of the top performers in the EU, yet slightly disadvantaged by the domestic poultry market weaknesses, by consumers' preference for cheap, low quality products respectively. These add to a series of other problems, namely: feed price volatility, difficult access of small farmers to high-quality breeding material, weak integration of small farms into the national and European markets, the need for consolidating the poultry meat exports to the EU and outside EU. For the period 2016-2020, an absorption of about 100 million euro is estimated from the public funds under NRDP 2014-2020, for supporting investments on holdings, about 50 million euro for poultry meat processing, taking into consideration production integration into large poultry complexes, as well as about 20 million euro for setting up young farmers, in the situation when these will be included into certain forms of associations with larger units that can provide them with genetic material of high quality (1 million euro might come for the support provided under the cooperation sub-measure). The amounts of public support (from European and national funds) for the periods after 2020 should be similar, i.e. 172 million euro for the period 2021-2027 and 345 million euro respectively for the period 2028-2038.

Beef

With a low share in total meat consumption at national level, beef can contribute to reaching the self-sufficiency target in the future, both by production increase and by production quality increase, which will put into value the export potential of this product. The investments in efficient technological systems for beef cattle raising (for feeding and maintenance) can receive support

under NRDP 2014-2020, 85 million euro from public funds for investments being estimated for the period 2016-2020; the amount should be increased in the period 2021-2027 (130 million euro) and in 2028-2038 (235 million euro). Part of this amount could be also covered by the payments to farmers from the areas with natural constraints, mainly to cattle raisers from the mountainous area.

Table 7. Estimating the support from public funds necessary for financing investments in meat production (million euro)

	Necessary 2016-2020	*Necessary 2021-2027*	*Necessary 2028-2038*
Pigmeat	150	150	300
Poultry meat	171	172	345
Beef	85	130	235

Source: own calculations.

The comparison between the available resources and the necessary resources for the period 2016-2020 reveals that from food security perspective the main problem is not represented by the financial resources (in fact not all the available funds from NRDP 2007-2013 have been spent); the main problem is represented by the set of measures to stimulate investments (production implicitly) in the priority sectors for food security, i.e. the livestock sector and the fruit and vegetable sector implicitly. The credit guarantee funds have had and will continue to have an important contribution to the implementation of private investment support measures, as it was proved by the activity of Rural Credit Guarantee Fund.

As regards funding, the specificity of the food security and safety theme is given by the importance of European funding, both for the support to investments (by the seven-year rural development programs) and the support to current farmers' incomes (through direct payments). In this respect, the optimistic and even the realistic scenario, described in this report, started from the assumption of the continuation of the generous European funding received by the farming sector and rural area from Romania. It must be mentioned that the funding started even from the pre-accession period, through the program SAPARD and continued with the financial allocations received under the two CAP pillars, from the EAGF and EAFRD funds, during the financial programming 2007-2013 and 2014-2020. Thus, the agricultural sector was one of the main beneficiaries of Romania's accession to the European Union, with the European funds ensuring the stability and predictability of farmers' incomes.

13.6. Scenarios concerning meat consumption

The scenarios developed in this study started from certain hypotheses [European Parliament 2016], mainly concerning the modality to cover the funding needs.

The realistic scenario had in view CAP operation along the current directions in the next 20 years, with total financial allocations at EU level slightly diminishing. An increasing convergence between Romania and the Old Member States was expected.

The pessimistic scenario assumed that the European Union would continue to function for the next 20 years, but had in view CAP funding diminution through the reallocation of money to other destinations. In this situation, the estimated amounts for reaching the targets from this strategy should largely come from the national budget, which might lead to non-reaching certain objectives.

The optimistic scenario presupposed that the importance of agriculture would be recognized at European level, which would make the future CAP be funded in accordance with the ambitious objectives assumed. In this case, Romania could be an important beneficiary of CAP funds.

The indicator estimated for the three time horizons (2020-2028-2038) refers to the total meat consumption per capita, as a staple product in the Romanian consumers' diet (Table 8). The selection of this indicator was determined by considerations linked to the importance of animal protein in diet; in this respect, food consumption in Romania is deficient, mainly in certain vulnerable categories of the population, such as children from poor families. The construction of scenarios underpinning the proposed targets was based on certain criteria and hypotheses concerning the evolution of population's incomes, the future of the Common Agricultural Policy and the evolution of domestic meat production.

Table 8. Scenarios for the evolution of total meat consumption (kg/capita/year)

Scenarios	*Horizon 2020*	*Horizon 2028*	*Horizon 2038*
Optimistic	70	80	85
Realistic	67	72	77
Pessimistic	65	67	70

Source: own calculations.

The meat consumption per capita from Romania was also analysed on comparative basis with that of France [Monceau et al., 2002], in the period 1961-2011, in order to highlight the gap existing between the two countries as well as to understand the long-term evolutions, in the context in which Romania could set oneself, under the optimistic scenario, to reach the current meat consumption of France by the year 2038.

13.7. Conclusions

The estimations presented in this paper started from the assumption of continuing the generous European funding received by the agricultural sector and rural area in Romania.

The proposed meat production targets by each animal species took into account the national development up to the present moment and the European and world forecasts for the period 2017-2026.

Considering the assumed hypotheses and the proposed targets, it is possible to reach self-sufficiency in meat by the year 2038 under the realistic scenario, on the basis of sustained growth of poultry meat production and of relaunching pigmeat production.

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14. Wine industry as a source of rural growth and development[1, 2]

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Abstract

Wine industry is one of the industries that has grown and developed the most in the past century. From one modest part of agricultural production, what it was in 19th century, it grew into a key driver of those economies who either have a long tradition and significant heritage, such as France, Italy and Spain, or have invested and promoted heavily their wine regions, such as USA, Argentina or South Africa. Wineries are usually situated in rural areas and their development and earnings that they generate affect directly and immediately their rural environment. They do not contribute only in terms of financial benefits, but also in a number of other social, demographic and environmental aspects. In this paper we analyse all the effects that wine industry has on its environment and economy of wine regions.

Keywords: wine industry, vineyard, wine tourism, rural development

JEL codes: R11, Q29, Z32

14.1. Introduction

Wine is a product that has undetachably been connected with mankind civilization achievements. Not only does that process of production of wine require a set of skills and equipment, but also it is always connected to the artistic and scientific achievements of certain society. For example, one of the most famous Iranian poets, Omar Khayyam, has wrote the most beautiful and acknowledged poems on wine.

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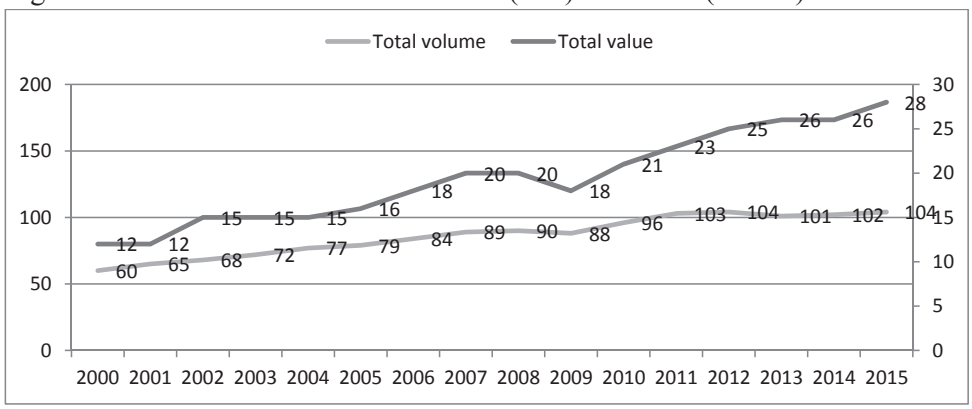
The world's most eminent civilizations had wine as a part of everyday life, rituals or just nourishment – the Romans, the Greeks, the Carthaginians, the Egyptians are among them.

With the decline of Roman Empire and coming of medieval dark era, dominated by religious fanaticism, the wine is practically disappeared from everyday life and homes of regular people. It is thanks to monasteries and monks that knowledge of wine making and vine caring has been preserved. With the era of big discoveries and loosen discipline in terms of religious life in Europe, wine is coming back as a product for consumption and pleasure, hence as an element of agricultural and economic sector.

Today (as of 2015), total wine market amounts to EUR 28.3 billion (accounted as total exports of wine) [OIV[3], State of the vitiviniculture world market, 2016], as represented in Figure 1.

Fig. 1. Evolution of wine trade in volume (mhl) and value (bn Eur)



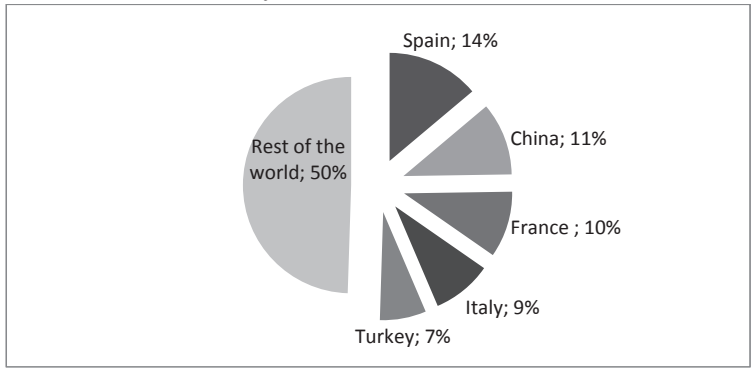
Source: OIV, State of the vitiviniculture world market, 2016.

Wine trade in 2014 has been dominated by Spain, Italy and France, which together represented more than half of the exports in terms of value.

There are total 7,534 thousand hectares of vineyards in the world. Total grape production is 75.7 million of tons, out of which less than 50% relates to wine varieties (for example in France, Argentina and other important wine producers, major part of grape production refers to wine grapes, whereas in China, India, Iran or Turkey this share is much less). As represented in figure 2, top 5 producers account for half of the world's vineyards: Spain, China, France, Italy and Turkey.

[3] OIV is International Organisation of Vine and Wine, intergovernmental organisation related to wine, vine and other products and beverages based on grape or wine

Fig. 2. Share of area of vineyards in the world in 2015



Source: OIV, State of the vitiviniculture world market, 2016.

Total world wine production is 259 million hectolitres in 2016. Main producers are European countries, namely Italy, France and Spain which account for 53% of worldwide wine production. World wine consumption in 2015 is estimated at 240 million of hectolitres.

There are over 10,000 grape varieties. If we take into account that different varieties can be blended in order to obtain a certain wine, and that the same variety can result in a series of different wines depending on the region and on technology, we come up to extremely high number of wines made in the whole world.

Wine itself and viticulture and wine industry form various important aspects of a national economy:

- From the demand side:
  - Answer to the needs of contemporary lifestyle
  - Answer to new needs and motives of tourists
  - Organic product.
- From the supply side:
  - Agricultural product
  - Export product
  - Destination brand ambassador.

The countries that can benefit from viticulture and wine industry must meet appropriate natural and climate requirements, such as:

- Type of climate;
- Sum of sunshine hours, highest and lowest temperatures;
- Rainfalls – quantity, frequency, timing;
- Altitude and a slope of terrain;
- Ventilation;
- Composition of soil [Korać et al., 2016].

Although due to global warming we witness also countries such as United Kingdom or Japan becoming able to successfully plant vineyards and successfully produce their own wine.

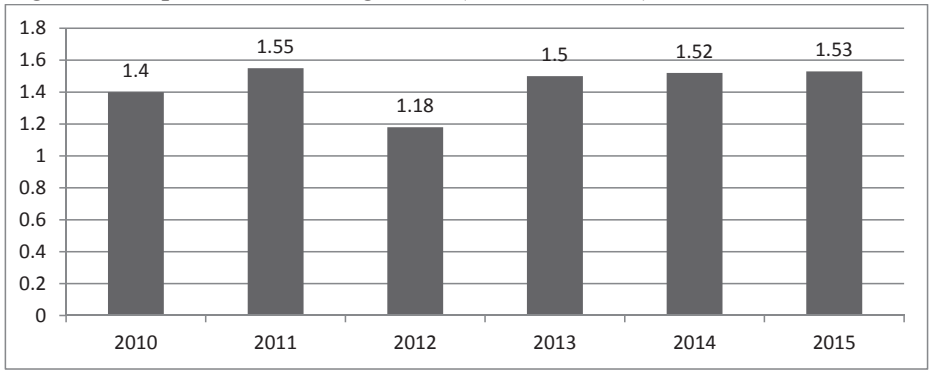
The goal of this paper is to identify whether viticulture and wine industry have any influence on rural areas and whether they can generate their growth, and if so, what are the factors that can be affected by viticulture and wine industry, directly or indirectly, and what are the factors that cannot be influenced by viticulture and wine industry.

14.2. Wine production in selected countries

Some countries that used to be typically rural or have got significant share of rural areas, have managed to achieve impressive economic growth by becoming important participants of worldwide wine industry; just to name the few: Argentina, China, South Africa, Romania. Here below we will present basic information on their wine production, and we will also represent information on Serbia.

Argentina – first vines were brought to South America by missionary priests, while the region was still Spanish colony, and first wine was made for communion purposes. It is in late 19th century that European immigrants, mostly French and Italian, have introduced widespread wine production. Today (as of 2015) total production of grapes in Argentina amounts to 2.7 thousand of metric tons and total production of wine to 1.6 billion litres (Figure 3).

Fig. 3. Wine production in Argentina (in billion litres)

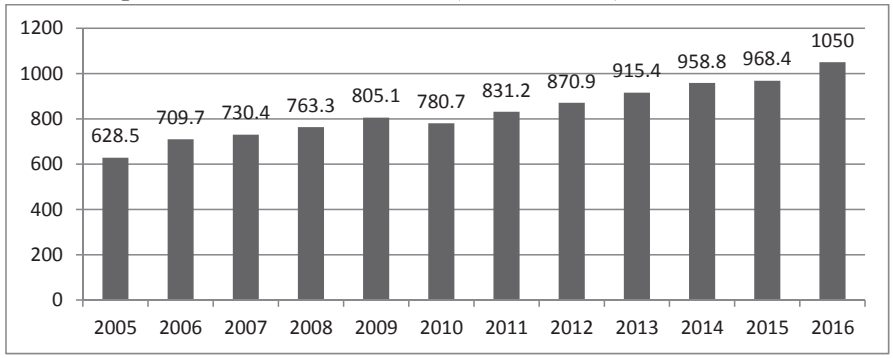


Source: USDA Foreign Agricultural Services, Argentina Wine Annual Report, 2015.

South Africa – similarly to Argentina, development of wine industry in South Africa is also connected to the period of colonisation. First vine was planted in 17th century and today South Africa is one of the world leaders in wine pro-

duction with over 1 billion of produced wine in 2016 [WOSA[4], South Africa Wine Industry Statistics, 2016], as represented in Figure 4.

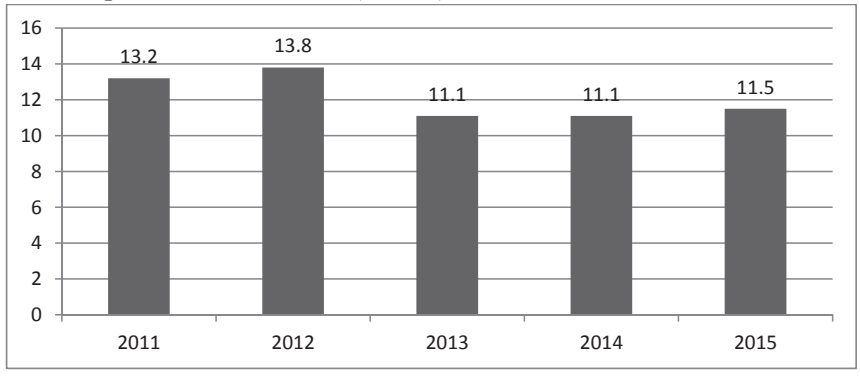
Fig. 4. Wine production in South Africa (million litres)



Source: WOSA, South Africa Wine Industry Statistics, 2016.

China – in the period 2000-2015 share of Chinese vineyards in total world's surface of vineyards has almost tripled (from 4% in 2000 it grew to 11% in 2015) [OIV, World Vitiviniculture situation, 2016], consequently grape production has grown, too. In terms of wine production, in 2016 China has been 6th producer in the world with 11.5 mhl of wine produced (Figure 5). As China is also one of the world's largest importers, it is one of the world's largest consumers of wine. However, this market is becoming saturated and it is yet to see how the Chinese wine industry will develop.

Fig. 5. Wine production in China (in mhl)

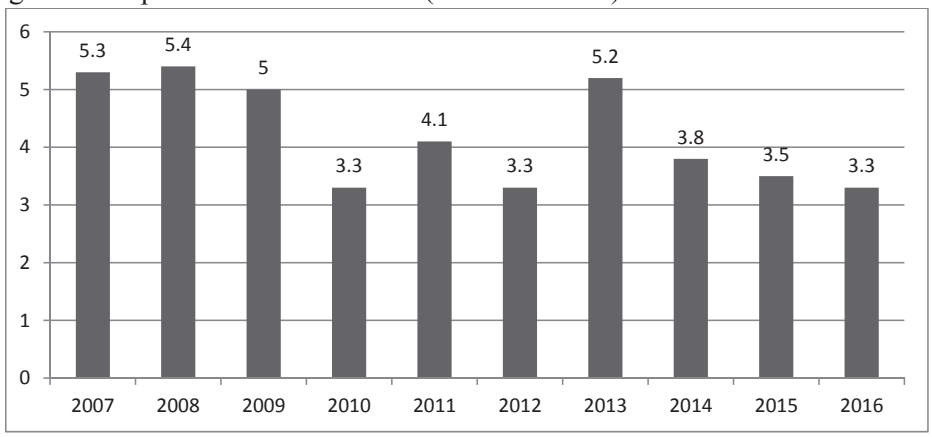


Source: OIV, World Vitiviniculture situation, 2016.

[4] WOSA is the organisation named Wines Of South Africa which gathers all South African wine producers who export their wine.

Romania – in terms of surface of vineyards, Romania has the largest surface in Europe, after Italy, France and Spain [APEV[5], Romanian Wine Industry, 2015]. It is also one of the largest wine producers in Europe (Figure 6), however its production is mostly related to cheaper bulk wines aimed to be exported.

Fig. 6. Wine production in Romania (000 hectolitres)

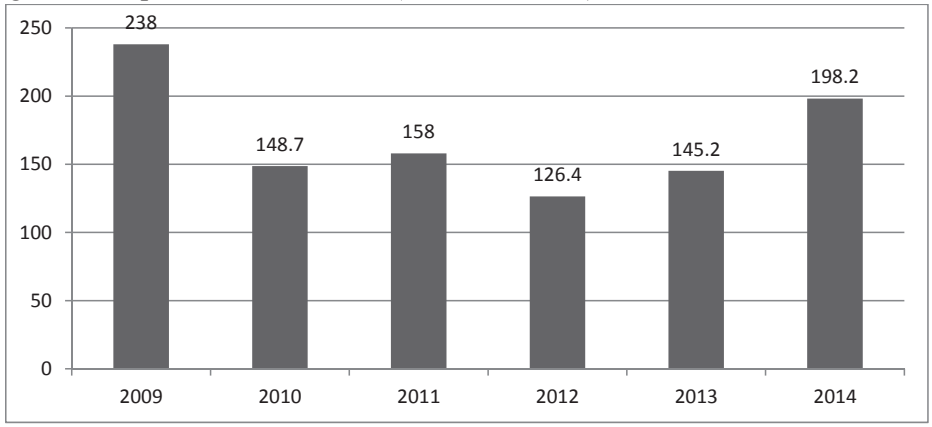


Source: APEV, Romanian Wine Industry, 2015.

Serbia – history of wine production in Serbia is quite similar to the one in the rest of Europe. For example in XIV century, Serbian king Dušan the Mighty, Emperor of the Serbs and Greeks, has built a wine pipeline 25 km long, that was transferring wine directly from his vineyards in Velika Hoča, to his castle in Prizren, both situated in Kosovo and Metohija; an enormous architecture achievement even by today's criteria. After the World War II, in a communist regime, Yugoslavia has been established as one of the world's top wine producers, although this was mainly cheap low-quality bulk wine. After the ex-Yu crisis, war and sanctions, amount of vineyards as well as wine production have decreased dramatically. As of 2013, total surface of vineyards in Serbia amounts to 22 thousands of hectares [Jakšić et al, Wine Atlas, 2015]. Government of the Republic of Serbia has succeeded with its measures of stimulating of planting new vineyards to stop the decreasing trend and turn it into a positive one. This generated increase in wine production, as well (Figure 7).

[5] APEV is Romanian Wine Exporters and Producers Association

Fig. 7. Wine production in Serbia (in million litres)



Source: Jakšić et al. [2015].

Main raw material for production of wine is grape. Vineyards are situated in rural areas therefore wine industry is naturally and integrally related to rural areas.

14.3. Rural development indicators background

There are not only different classifications of rural development indicators, but even different definitions of what "rural" actually means. Some of the leading international organisations have developed their own definitions, which all have common parts but also have differences. Most acknowledged are classifications of Organisation for Economic Co-operation and Development (OECD), European Union (EU), the World Bank and Food and Agriculture Organisation of the United Nations (FAO). According to OECD, rural area is a local community with a population density below 150 habitants / km^2 (500 in the case of Japan) [OECD, 1994]. However, as basic territorial units in OECD member countries vary in size and in number of inhabitants, therefore they use a range of criteria to define rural:

- Size of population
- Population density
- Commuting intensity
- Share of agriculture [UN, 2007].

Indicators are statistical variables that help to transform data into relevant information. Indicators of rural development need to be based on:

- Published statistics
- Consistently collected data
- Comparable areas
- The same unit of measurement
- Based on a clear definition [UN, 2007].

According to OECD, basic rural development indicators should address four basic themes that tackle rural development:

- Population and migration
- Economic structure and performance
- Social well-being and equity
- Environment and sustainability.

As far as EU is concerned, Proposal on Agri-Environmental Indicators is the document that sets the frame for rural development indicators, and they should be covering the following main topics:

- Population and migration
- Economic structure and performance
- Social well-being.

The World Bank has identified a number of key factors, which enhance rural well-being, and grouped them into the following categories:

- Basic socio-economic data;
- Enabling environment for rural development;
- Broad based economic growth for rural poverty reduction;
- Natural resource management and biodiversity;
- Social well-being (education and health)

The FAO produced Guidelines on Socio-Economic Indicators for Monitoring and Evaluating Agrarian Reform and Rural Development in 1988. The guidelines were the result of extensive collaborative work by UN agencies and countries. Some of the main indicators covering the areas of concern are:

- Poverty alleviation with equity
- Access to land, water and other natural resources
- Access to inputs, markets and services
- Development of non-farm rural activities
- Education, training and extension
- Growth.

14.4. Methodology

In the following part of this paper we will analyse indicators of rural development. We used OECD classification of indicators [OECD 2016, Regional Well-Being: A user's guide], which are grouped into 4 main areas of influence: economy, demography, social well-being and environment.

- ECONOMIC INDICATORS

Productivity: GDP per capita, working age population, labour force, part time employment

These indicators are definitely directly affected by wine industry in sense that wineries hire people both full time (for regular activities) and part time (for seasonal activities), hence they increase labour force and employment. Also, their products and their sales account for GDP or GVA in their respective areas, therefore they also increase GDP in total and GDP per capita.

As far as working age population is concerned, wine producers do not have specific preferences for either young or elder workers so we cannot conclude that there is any influence on this particular indicator.

Growth

Wineries do contribute to the growth of their respective regions in sense that if their business is developing and growing, the same goes for the region's economy, and vice versa, if their business is shrinking, it affects negatively the region's economy.

Investment

Viticulture and wine production are industries which require significant investment in order to set a base for production and in order to build production facilities: purchase of land for vineyards, planting vineyards, building and equipment of the winery and also investment in additional facilities, should winery decide to do so. Therefore, we can conclude that wine industry has got a positive impact on investment.

Innovation

Student enrolment by level of education, educational attainment of labour force, R&D personnel by sector (business, government, higher education, private and non-profit sector), R&D expenditure, patent applications, share of employment in hi-tech manufacturing and knowledge-intensive services.

Wine industry does not have direct impact on this indicator. However, it can have indirect impact by creating environment that attracts local students to increase level of education in order to be eligible to work in wine industry. Also, critical mass of wineries can attract higher education institutions to channel their R&D personnel to work on projects and researches related to the needs of wine industry businesses.

- DEMOGRAPHIC INDICATORS

Population (age structure), density, dependency ration, sex ratio, child-to-woman ratio, growth/sinking ratio of the total population, mortality and life expectancy, working age population group, deaths, deaths by age.

Wine industry cannot affect these indicators.

Natural balance

Wine industry cannot affect these indicators.

Youth and Ageing: youth population group, share of elderly population.

Wine industry cannot affect these indicators.

Migration: new residents in the region, persons who left the region.

Wine industry can affect these indicators by creating new jobs and attracting people to come to the region.

Households: number of households, number of persons living in a household.

Wine industry cannot directly affect these indicators. However by creating jobs and providing salaries for employees, it can in indirect way positively affect this indicator.

- SOCIAL WELL-BEING INDICATORS

Material conditions: Income (household disposable income PC), Jobs (employment and unemployment rate), Housing (number of rooms per person, share of housing cost).

These indicators overlap in certain extent with some of the economic indicators; as we stated above, wine industry directly and positively affects these indicators.

Quality of life: health (life expectancy at birth, mortality rate, number of active physicians, number of hospital beds), education (share of labour force with at least secondary school), environment (exposure to air pollution), safety (homicide rate, motor vehicle theft rate), civic engagement (voter turnout), accessibility of services (share of household with broadband access).

To most of stated indicators wine industry does not have influence (homicide rate or voter turnout). Indirectly it can affect education and accessibility of services.

Subjective well-being: Community: percentage of people who have friends or relatives to rely on in case of need; Life satisfaction: average self-evaluation of life satisfaction.

This group of indicators also isn't directly affected by wine industry.

- ENVIRONMENTAL INDICATORS

Topography and climate

Wine industry does not affect these indicators.

Soils, water, species: municipal waste, air pollution, CO_2 emissions, vegetation coverage share, number of private vehicles.

Wine industry has a positive impact by preserving agricultural land.

Habitats and landscapes

As any other farming activity, vine growing plays an important role in maintaining differentiation of species diversity.

Cultural heritage

Wine industry has got a positive impact on this indicator as the wine is not just a regular agricultural product or just a beverage, it is representing destination it comes from and carries its reputation. In this sense, wineries can have a big influence in preserving the local values and heritage by interpreting them through their wines.

According to Charters et al, 1999, wine is unusual, as a farm product, because it is consumed from a package (bottle) which usually is visible while its contents are consumed – unlike cheese, for example. Therefore communication with consumers through bottle labelling is particularly important as a means of creating awareness of wine characteristics and, especially, its geographical identity. A basic wine bottle label identifies the name of the winemaker / grape grower, the property on which it was produced, the geographical location etc. The labels are an important means of communication, whatever their limitations.

14.5. Results and conclusions

Issue of rural areas and how to address challenges they face has been dealt with both by scientific groups and governments, with lots of effort put in finding the sources of growth of these areas, balancing it, and providing optimal results for all stakeholders.

Table 1. Summarised influence of wine industry on rural development

Area of rural development	Indicator	Influence: No / Yes – direct / Yes – indirect
A. Economy	Productivity	Yes – direct
	Growth	Yes – direct
	Investment	Yes – direct
	Innovation	Yes – indirect
B. Demography	Population	No
	Natural balance	No
	Youth and Ageing	No
	Migration	Yes – indirect
	Households	Yes – indirect
C. Social well-being	Material conditions	Yes – direct
	Quality of life	No Yes – indirect
	Subjective well-being	Yes – indirect
D. Environment	Topography and climate	No
	Soils, water, species	Yes – direct
	Habitats and landscapes	Yes
	Cultural heritage	Yes – direct

Source: authors' analysis.

With this analysis we aimed at pointing out that wine industry can be great source of rural growth that may be obvious for traditional wine regions, such as France, Italy or Spain but also for those countries which have not been traditionally seen as wine destinations (Argentina, South Africa, China etc.). In order to present impact of wine industry, we analysed indicators of rural development and discussed influence that wine industry may or may not have on each of them. In the Table 1 we summarised indicators and notation whether wine industry has or has not got influence on them.

The future of the wine industry and trends of development definitely can shape perspectives for growth of rural areas as well, so it is worth mentioning the main ones:

- Organic and biodynamic farming as well as broadly similar practices known generically in France as "agriculture raisonnée", i.e. introducing green economy, seeking economic opportunities from socially and environmentally sustainable practices and vice versa [European Network For Rural Development]. The sustainable economic growth can and must be an engine of ecological progress [Mihailović, Cvijanović, 2013].
- Shortening supply chain [Ploeg et al., 2000]: shifting from the anonymous producer-consumer relations, eliminating (unnecessary) intermediaries, producers tend to directly market their products. This also means exploring new distribution channels, and in this process wine tourism turned out to be very efficient.
- Formation of professional networks [Brown, Butler, 1995] in order to capture jointly some of the strategic advantages of their larger, more established competitors.
- Much public and private attention has been directed to tourism's economic potential, according to Hall et al, 2003. In the current global environment the relationship between gastronomy and tourism therefore represents a significant opportunity product development as well as a means to rural diversification. Specialised products offer the opportunity for the development of visitor product through rural tours, direct purchasing from a farm, specialised restaurant menus with an emphasis on local food, and home stays on such properties.
- Referring to the second point of this paragraph, newly established channel of wine sales, namely wine tourism, has gained lots of importance in modern wine industry. Wine tourism can successfully merge goals and interests of wine industry and sustainable and rural development goals. According to Resonance Consultancy in their Resonance Report (2013), US Travel Association estimated in 2007 that 17%, or 27.3 million travellers,

have engaged in "culinary or wine-related activities while traveling". Whereas infamous wine regions are concerned, i.e. new wine producers and destinations, they should aim at offering additional value for tourists, such as enriched and diversified offer, standardisation of the offer [Jojić Novaković, Cvijanović, 2017].

This research is significant mainly for policy makers in order to perceive wine industry and how it can generate positive influence on rural development.

Limitations of this paper are related to the absence of analysis of specific region and its wine industry, therefore direction for future analysis may be more detailed analysis of influence of wine industry onto specific region.

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15. Why large farms dominate and rural areas struggle in Slovakia?[1]

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Abstract[2]

After 1989, Slovak agricultural sector was transformed from centrally planned economy to the market economy. Before 1989 farms in Slovakia were large co-operatives and state farms with large acreage, without existence of private companies. Agriculture in Slovakia has also currently different structure compared to agriculture in old EU member states. The majority of UAA (75%) is cultivated by large farms – agricultural holdings – with 1200 ha per farm on average. Therefore, although subsidies in form of direct payments per hectare are lower than in old EU member states, the payment per farm is one of the biggest in EU. In the paper, we analyse the effect of large farms on rural employment, wages, agricultural production and profitability of large farms. The analysis is based on individual farm data in the period 1994 to 2014 in Slovakia. The results show from that steep decrease in employment, low wages and low level of agricultural production of large farms is one of the reasons for disparities in development of rural areas and urban areas in Slovakia.

Keywords: Slovak Agriculture, Profitability, Production, Employment, CAP

JEL codes: Q13, Q14, Q18, R19

15.1. Introduction

Slovak agriculture is currently typical for decrease in economic importance on total GDP, decrease in agricultural production, negative balance of trade in agricultural products, less employment in primary production and food processing as well as negative effects on rural areas [Tóth, 2014].

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Although there have been changes due to privatization after 1989 and EU accession in 2004, still large farms dominate. Based on farm census in 2010 there have been 26 463 farms in Slovakia, but 75% of UAA was cultivated by less than 10% of farms with legal status of a cooperative, joint stock company or limited liability company.

Serenčéš et al., analysed by ratio analysis situation and development of agricultural production in Slovakia [Serenčéš et al., 2016]. In the observed period 2009-2013 using FADN data they focused on farm net income and farm area. In comparison to other EU countries the average farm size was significantly higher. In 2013 the average area of land per farm in the Czech Republic was 232.93 ha, in Germany 86.63 ha, in France 85.87 ha, in Hungary 45.02 ha, in Netherlands 34.61 ha, in Austria 32.39 ha, in Poland 19.11 ha and in Slovak Republic 594.82 ha.

There has always been significant political tradition towards small farm protection and support in Europe [Mayfield, 1996]. Many arguments have been used to support this attitude covering aspects like social importance and environmental benefits. His study concludes, that small farms seems to be more connected to local rural economy than large farms, and therefore small farms do more support rural areas mainly in indirect employment. Therefore, small farms deserve more attention and support focused on rural development.

The role of agriculture in economic development and rural policy support for small farmers in comparison with large agriculture is in centre of long and controversial discussion. Small agriculture has similar potential to stimulate agricultural production growth than large farming. Short supply chains cover mainly informal sectors and generate more jobs than holding agriculture. Focus of agricultural and land policy on small food producers and a complex integrated rural development policy is, therefore, needed not only due to social equality, but also due to economic development support [Mellor et al., 2017].

A study [Keijiro, Yanyan, 2016] analyses farms in Asia, which are dominantly small. Obviously small farms use labour intensive production methods. Therefore, the question arises whether they can survive the pressure in form of steep salary increase in majority of Asia countries. Results also show that the productivity of small farms did go down while the productivity of large farm did grow which is a disadvantage of small farms. Study concludes that if no policy action will be taken, Asia will lose comparative advantage in agriculture and in the future, will turn into net cereals importer.

Alexandri, et al., studied the role of small farm in economy of rural area and farmers households [Alexandri et al., 2015]. Romania is a country with the highest number of farms in the role of family subsistence in the EU. Out of 3.7 million of farms in Romania 3.3 million are low income farms due to extremely

low production. Although these small farms play a minor role on the market, they are important for the rural areas, because they produce food and generate social security for households and contribute to environment in form of using traditional production methods. Key findings are strong diversification of production of small farms in comparison to large farms, which are much more specialised. Analysis of food consumption behaviour shows high proportion of self--sufficiency in majority of food products, lower food diversity in comparison with urban areas and lower price of calories of rural households.

Technical efficiency in agriculture is [Bojnec et al., 2014] significantly linked to subsidies, average UAA of the farm specialisation in agriculture. Foreign direct investments have no significant effect. Reforms and institutional development, vide privatization and price liberalisation and income gap between urban and rural areas positively correlate with technical efficiency in agriculture. Increase in technical efficiency in agriculture and rural economy development is considered for a strategy to increase standard of living in agriculture and rural areas.

Technical efficiency analysis was studied on a sample of farms in Wisconsin [Chavas, Aliber, 1993]. Results show the existence of significant economy of scale on very small farms and some major economy loses on large agricultural holdings. The study also concludes, that majority of farms benefit in form of economy of scale but these benefits have the tendency to disappear with the increase in the size of the farm. Empirical evidence shows significant link between financial structure and performance and technical efficiency.

Possibilities to decrease labour input by technology were tested on large farms in less favoured areas [Stolbova, Micova, 2012]. Large farms in Czech Republic were more effective than small. So was the diversification towards non-agricultural activities on large farms. Focus and effects of policy measures related to LFA was analysed on small and large farms. The study also evaluates the economic results of small and large farms. Results show, that subsidies in LFA should be linked to the farm area and should go down per hectare in large farms. Authors conclude that such a regulation would have no negative effect on the net value added per 1 annual working unit.

Wang et al., analyse main factors, which did lead to the replacement of labour by technology in rural China in 1984 to 2012 using panel data on province level [Wang et al., 2012]. Analysis shows a tremendous increase in real wages in agriculture mainly after 2003 in comparison with relatively stable real price of farm technology equipment. Relative price of technology to agricultural labour did lead to sharp improvement in farm technology. Substitution elasticity between labour and equipment was high in case of some agricultural products, which did lead to replacement of labour by technology.

Key reason for low efficiency of Slovak agriculture is low value added which is compensated by public funds in form of subsidies. Subsidies in Slovak agriculture are mainly linked to UAA of the farm. According to [Serenčéš, Tóth, 2012] up to 90% of net value added is used to cover the labour cost. The question is whether this is due to high labour cost or generally low value added in Slovak agriculture.

Comparison of Slovak agriculture with other EU countries in 2013 [Serenčéš et al., 2016] shows, that Slovak agriculture has low level of total agricultural production per hectare (1024.98 EUR), low net value added per hectare (296.02 EUR) and as the only country out of EU 28 Slovakia records negative farm net income.

15.2. Methodology

The data used for the analysis are from the database of Ministry of Agriculture and Rural Development of the Slovak Republic and cover the period 1994-2014. We use individual farm data for all legal entities (except small family farms). From the dataset the following farms were excluded: farms with negative equity (liabilities exceeding total assets) over the observed period and farms with missing data. On average 1300 farms per each year were analysed covering more than 60% of UAA in Slovakia. Due to the observed period and significant changes in the structure of farms we did not analyse panel data.

Before 1989 only cooperatives and state-owned companies existed in Slovak agriculture. During the transformation and privatization process of the national economy, the former legal structure of agricultural sector has been gradually changed. Private companies (Ltd., JSC.) started to exist and the number of independent farmers in the primary sector increased rapidly in the first years of transition. Structural changes have led to a decrease of the share of cooperatives, and to an increase in the number of private companies.

Table 1. Farms structure in the analysis (private companies and cooperatives) in period 1994-2014

Indicator/Years	**1994**	**1998**	**2002**	**2006**	**2010**	**2014**	**Average**
Total farms	1098	1227	1201	1352	1281	1457	1281.9
Private companies (PC)	70	415	561	787	777	970	616.6
Cooperatives	1028	812	640	565	504	487	665.3
PC in%	6.4%	33.8%	46.7%	58.2%	60.7%	66.6%	46.8%
Cooperatives in%	93.6%	66.2%	53.3%	41.8%	39.3%	33.4%	53.2%

Source: own calculation based data of Ministry of Agriculture and Rural Development of the Slovak Republic.

We analysed following ratios to compare the performance and effect of large farms on Slovak rural areas:

- Profitability in EUR/ha = Earnings Before Taxes/UAA[3],
- Production in EUR/ha = Total Revenue/UAA,
- Subsidies in EUR/ha = Total Receive Subsidies/UAA in EUR/ha,
- Employees per 100 ha = AWU[3] * 100/UAA,
- Salary in EUR = Annual Gross Wage /AWU,
- Productivity in EUR/ha = Total Revenue/AWU.

15.3. Employment in Agriculture

Currently in all EU member states (except for Ireland and Malta) the employment in agriculture is decreasing. Compared with the base year 2005 on average for all member states the labour force input is on the level of 73.50% of 2005 level. In Eurozone countries, the level is 81.92%. Out of V4 countries is the decrease in employment the highest in Slovakia (47.57% of 2005 level), followed by Czech Republic, Poland and the smallest decrease in employment was recorded in Hungary.

Labour input is one of the three main production factors followed by Land and Capital. And decrease in labour force input by the same level of production results in higher productivity. But if we link together (Figure 1) AWU per 100 ha and Standard Output/ha in EUR (crop or livestock) Slovakia has as of 2014 employment (AWU per 100 ha) comparable with the countries like France, Luxembourg, Germany but the Standard output on the level of less developed countries (Romania and Bulgaria). The standard output/ha in EUR in Slovakia is one of the lowest out of EU countries. The decrease in employment in Slovakia was not followed by increase in productivity. Slovakia is behind old member states in value of production per hectare and also all V4 countries have higher standard output per hectare.

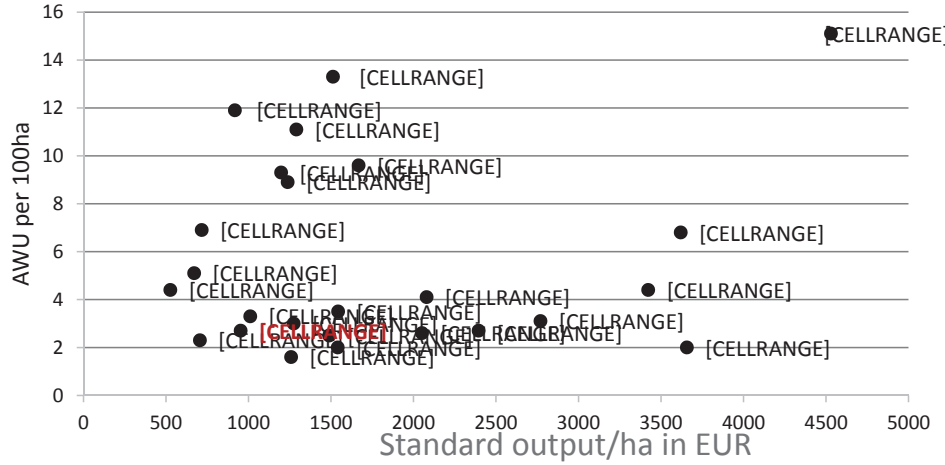
[3] UAA – Utilised Agricultural Area.
[4] AWU – Annual Work Unit - corresponds to the work performed by one person on a full--time basis.

Table 2. Total labour force input 2005=100%

GEO/TIME	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
European Union (28 countries)	92.96	90.72	87.84	80.97	78.84	78.48	77.63	76.23	74.61	73.50
Euro area (19 countries)	95.53	92.84	88.63	88.00	85.92	84.97	83.33	82.71	82.23	81.92
Belgium	94.29	92.71	90.00	88.43	82.30	83.03	82.71	81.84	81.10	82.13
Bulgaria	78.93	74.25	69.57	64.89	59.99	55.46	51.28	47.49	44.13	41.00
Czech Republic	91.24	86.71	82.33	78.16	76.29	76.01	75.50	75.36	75.29	75.29
Denmark	93.48	92.37	87.60	86.17	82.77	83.40	83.80	85.99	87.53	88.41
Germany (until 1990 former territory of the FRG)	95.13	93.22	91.35	89.60	88.83	88.16	86.34	86.51	85.14	84.71
Estonia	87.02	82.51	77.39	67.05	64.42	61.20	58.87	58.08	53.62	52.61
Ireland	101.08	99.53	98.59	111.44	111.44	111.35	110.12	110.12	110.12	110.12
Greece	94.76	82.34	71.54	72.77	74.09	75.50	76.99	74.93	72.93	71.01
Spain	98.13	99.53	90.64	94.74	88.80	87.46	82.74	81.03	80.49	81.80
France	95.52	93.38	91.17	89.13	88.07	86.83	86.03	85.32	84.61	83.93
Italy	97.19	94.95	92.54	93.34	90.03	87.71	86.41	87.80	89.80	91.63
Cyprus	90.24	90.35	87.87	88.50	88.50	88.15	89.20	87.21	82.58	82.58
Latvia	77.69	71.74	67.22	62.14	63.89	61.13	59.96	55.87	55.43	53.55
Lithuania	91.01	86.92	84.74	82.60	82.26	83.76	83.41	86.35	86.87	84.85
Luxembourg	94.88	92.77	90.64	93.48	92.00	94.91	89.19	88.64	88.66	86.60
Hungary	87.94	82.36	84.69	85.05	83.67	82.96	85.10	88.64	84.62	84.23
Malta	103.45	103.45	103.45	120.69	120.69	120.69	123.15	123.15	124.24	124.24
Netherlands	96.98	94.71	94.09	92.55	91.75	90.15	91.20	89.66	89.77	87.29
Austria	92.72	90.50	89.58	87.20	86.04	85.69	84.82	83.15	82.07	80.95
Poland	100.32	100.32	96.59	83.55	83.55	83.55	84.52	84.52	84.52	84.52
Portugal	94.78	92.62	91.16	83.48	80.68	79.90	75.91	71.54	69.02	64.57
Romania	84.94	82.90	82.90	63.14	59.01	60.59	60.25	55.20	49.81	45.96
Slovenia	93.24	92.38	89.06	85.53	86.61	89.73	91.90	90.85	90.37	88.96
Slovakia	92.41	91.40	87.04	56.78	58.10	57.79	54.86	54.55	49.49	47.57
Finland	94.49	92.20	90.33	85.34	84.41	82.64	78.90	84.41	82.54	79.31
Sweden	90.74	89.21	87.79	86.38	84.95	83.51	82.12	80.74	79.39	78.06
United Kingdom	95.62	94.61	93.28	95.83	97.48	97.56	96.61	96.69	97.28	97.12

Source: own calculation based data of EUROSTAT.

Fig. 1. Employment vs. production in year 2014



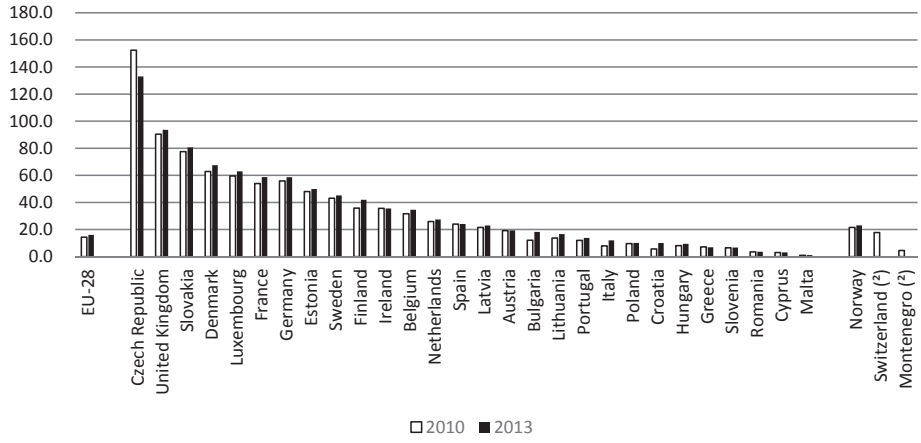
Source: own calculation based EUROSTAT.

From this we did formulate two research questions:

- Why such a low production per ha?
- Why such a sharp decrease in employment?

To answer both research questions we have to focus on the structure of farms in Slovakia first. According to Eurostat, the Slovak Republic is in third place (behind Czech Republic and United Kingdom) in regard to average utilised agricultural area per holding (Figure 2). Compared to EU-28 in Slovakia average UAA per farm is five times higher.

Fig. 2. Average utilised agricultural area per holding, 2010 and 2013 in hectares



Source: EUROSTAT (online data code: ef_kvaareg).

15.4. Structure of Slovak agriculture

Agricultural primary sector in the Slovakia represents a wide range of different farms. The number of farms, their use of utilized agricultural area (UAA) and production has been changing in the recent years. In total in Slovakia there were 17 708 farms registered for subsidies in 2014. These farms cultivate and produce agricultural production on 1 883 220 ha of UAA. There were 2 653 private companies (consisting of 1 968 limited liability companies and 119 joint-stock companies) and 566 cooperatives recorded in the year 2014. As mentioned before the farms in Slovakia operate on very large areas. It led to the unusual situation when minority of farms (2 653 = 14.98%) cultivated the majority of UAA (1.5 million hectares = 80.23%) in 2014.

Table 3. Size structure of Slovak farms in 2014

Legal form	Number of farms	Land (ha)	Land per farm	Share on all farms (%)	Share on total lands (%)
Joint stock company	119	132472.01	1 113.21	0.67%	7.03%
Cooperative	566	691 054.33	1 220.94	3.20%	36.70%
Small – family farm	9 785	53 291.14	5.45	55.26%	2.83%
Ltd.	1 968	687 429.45	349.30	11.11%	36.50%
Farmers	5 046	303 866.73	60.22	28.50%	16.14%
Other	160	12 383	n.a.	0.90%	0.66%
Farms in total,	17 708	1 883 220.05	n.a.	100.00%	100.00%

Source: own calculation based data of the Agricultural Paying Agency of Slovakia [2015].

While the structure of farms in Slovakia differs from the EU-28, also the measures implemented through CAP are different in Slovakia. Farmers are not motivated to produce while the intensity of support is increasing. Subsidies per hectare in median values increased about 260% in comparison to years 1994 and 2014, but total revenues only about 80% (see in table 4). Based on accounting standards in Slovakia subsidies are a part of company revenues so the 80% increase in revenues was by a part due to increase in subsidies. Excluding the subsidies from company revenues the difference in subsidies growth and revenues growth would be even higher.

Table 4. Subsidies, Total Revenue and EBT in EUR/ha of Slovak farms in period 1994-2014

Year	Count	Subsidies/ha			Total Revenue/ha			Earnings Before Taxes/ha		
		LQ*	Median	UQ**	LQ	Median	UQ	LQ	Median	UQ
1994	1077	34.5	77.8	107.7	441.6	681.0	966.4	-93.7	-23.5	9.9
1995	1108	50.6	89.9	119.8	455.4	711.5	1048.5	-72.1	-7.8	15.9
1996	1150	50.3	88.0	120.2	453.4	756.0	1148.4	-61.8	1.1	23.4
1997	1206	69.4	101.7	127.4	506.1	816.2	1244.7	-47.6	4.2	41.4
1998	1215	68.3	100.4	123.7	460.2	771.0	1217.0	-63.7	1.8	27.9
1999	1175	76.2	109.2	136.3	419.4	734.4	1146.3	-66.1	1.2	28.1
2000	1175	107.4	138.6	169.4	465.8	779.3	1213.2	-54.2	0.7	15.6
2001	1190	78.0	115.5	148.3	490.7	854.9	1382.2	-7.5	7.7	37.1
2002	1196	66.9	107.2	139.1	507.6	854.9	1413.7	-3.7	7.3	30.7
2003	1280	76.2	108.2	137.0	264.5	553.2	984.9	-90.5	0.5	16.4
2004	1238	158.8	186.3	214.0	331.0	629.7	1048.9	3.6	24.5	74.3
2005	1367	149.9	183.8	227.3	284.1	606.5	1139.5	0.0	13.7	57.0
2006	1350	165.6	210.4	291.4	293.6	642.6	1161.1	2.1	18.3	63.3
2007	1333	174.6	234.9	327.6	710.9	1136.0	1726.2	5.3	30.1	98.7
2008	1286	193.4	264.8	357.2	758.3	1221.1	1923.5	0.8	20.6	80.9
2009	1341	205.6	291.2	392.0	624.2	936.2	1513.3	-145.8	2.1	33.8
2010	1277	207.7	291.2	386.7	655.7	1015.3	1596.9	-49.1	7.7	53.4
2011	1381	193.9	266.5	342.7	702.4	1179.9	1925.6	-5.9	20.7	101.3
2012	1448	201.8	256.9	327.1	691.4	1176.1	1840.8	-34.3	13.5	84.0
2013	1444	205.2	257.1	322.8	688.1	1124.1	1832.5	-69.8	4.3	44.2
2014	1449	223.5	282.8	343.8	716.4	1235.7	1962.3	-15.1	19.4	90.3

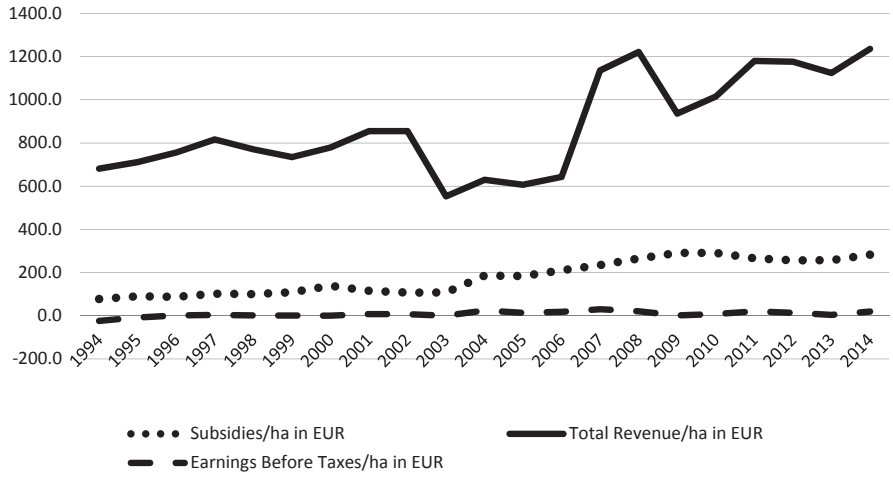
* lower quartile, percentile 25

** upper quartile, percentile 75

Source: own calculation based data of Ministry of Agriculture and Rural Development of the Slovak Republic.

Profitability measured by Earnings before Taxes/UAA* in EUR per ha was very low in the observed period. After 2004 when Slovakia did join European union we recorded a significant improvement in profitability (80% of farms are profitable in 2004-2008). The development and changes in profitability, subsidies per ha and revenues per ha are presented in Figure 3.

Fig. 3. Production, Subsidies and Profit per ha in EUR



Source: own calculation based on data of Ministry of Agriculture and Rural Development of the Slovak Republic.

15.5. Employment in Slovak Agriculture

Large farms in combination with improved technology result to a decrease of employment in Slovakia. In employment hired workforce dominates and hired workers receive salary. In table 5 we compare AWU per 100 ha, Gross salary per year and AWU and farm total revenues per AWU in EUR. Over the observed period 1994-2014 gross salaries increased by 300% while revenues per AWU by 546% (comparing with median values). Gross salary in agriculture remains low compared to General average salary in Slovakia (80% in 2014).

Table 5. Employees, Salary and Productivity of Slovak farms in period 1994-2014

Year	Count	AWU per 100 ha			Salary/AWU in EUR			Total Revenue/AWU in EUR		
		LQ*	Median	UQ**	LQ	Median	UQ	LQ	Median	UQ
1994	1077	5.4	7.0	9.1	1789.2	2014.0	2286.8	7523.8	9467.3	12590.3
1995	1108	4.9	6.7	8.6	1956.2	2247.5	2587.3	8287.5	10674.0	14011.2
1996	1150	4.3	6.1	8.0	2227.8	2556.2	2966.3	9412.4	12595.7	16633.8
1997	1206	3.9	5.7	7.8	2496.8	2863.0	3318.1	10993.5	14703.9	20031.9
1998	1215	3.3	5.0	7.1	2731.9	3123.7	3610.3	11646.2	15442.8	21016.6
1999	1175	2.7	4.4	6.3	2910.3	3357.9	3838.6	12600.4	16964.9	23257.9
2000	1175	2.5	4.0	5.8	3065.8	3546.1	4115.5	14488.8	19595.6	28151.2
2001	1190	2.2	3.7	5.4	3317.4	3872.5	4532.8	16815.4	22724.3	32418.5
2002	1196	2.1	3.6	5.3	3496.7	4072.2	4775.4	17367.1	24012.7	34848.3
2003	1280	1.7	3.2	5.0	3525.2	4229.6	4979.1	18116.3	25920.9	37990.4
2004	1238	1.8	3.1	5.0	3711.4	4599.1	5456.6	22650.5	31298.2	46427.2
2005	1367	1.6	3.0	4.9	3900.3	4922.2	5887.1	23979.0	33517.2	50270.7
2006	1350	1.6	2.8	4.6	4159.2	5288.4	6329.6	26840.6	36620.6	54869.6
2007	1333	1.6	2.7	4.3	4717.2	5982.1	7072.6	28710.3	40691.7	60458.3
2008	1286	1.5	2.6	4.1	5125.9	6581.9	7893.0	32762.4	47285.4	70510.5
2009	1341	1.3	2.3	3.7	5070.9	6515.8	7948.5	28426.7	41172.7	64910.5
2010	1277	1.2	2.2	3.5	5349.6	6817.4	8319.2	31824.4	46348.7	73614.8
2011	1381	1.1	2.0	3.3	5435.0	7280.9	9020.8	35629.5	56511.7	87183.4
2012	1448	1.0	1.9	3.1	5366.8	7486.9	9266.0	36793.8	58613.8	95940.4
2013	1444	1.0	2.0	3.1	5326.9	7673.1	9535.3	36246.1	57135.7	89272.7
2014	1449	1.1	2.0	3.1	5440.0	8017.5	9945.8	37954.6	61173.3	98005.6

* lower quartile, percentile 25

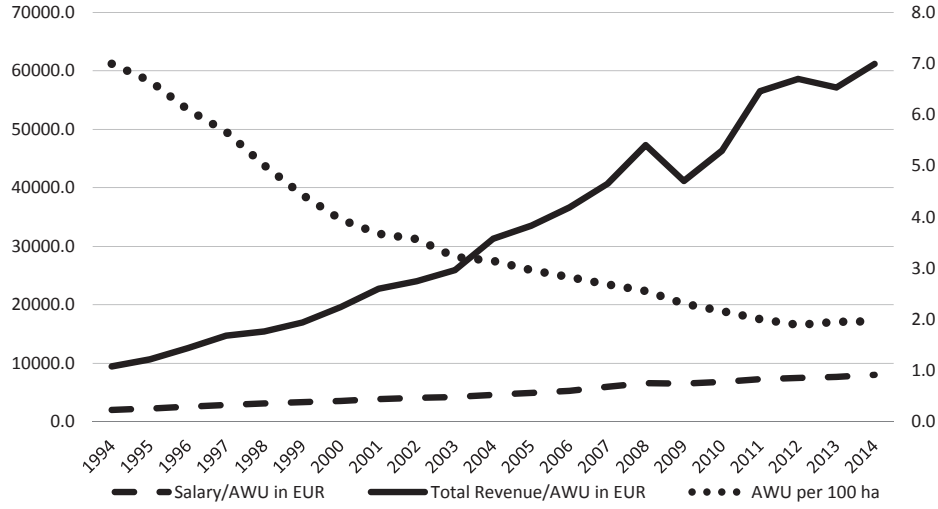
** upper quartile, percentile 75

Source: own calculation based on data of Ministry of Agriculture and Rural Development of the Slovak Republic.

Comparing decrease in employment and increase in revenues per AWU we conclude, that the increase in productivity was only due to decrease in number of employment in Slovak agriculture and not due to increase in animal or crop production generally.

In Slovakia, there are 53 thousand employees currently employed comparing with 203 thousand in 1994. This represents and decrease by 5 employees (AWU) per 100 ha over the observed period.

Fig. 4. Employees, Salary, Productivity



Source: own calculation based on data of Ministry of Agriculture and Rural Development of the Slovak Republic.

15.6. Conclusions

Slovakia has the third highest UAA per farm in EU and agriculture is dominated by large farms with 75% share on total land (UAA). Large farm use hired labour. Since 2005 in Slovak agriculture employment did decrease the most out of all EU countries. One of the main reason for this is the farm size in combination with EU Common Agricultural Policy. Farms receive subsidies which are mainly linked to UAA of the farm. Higher UAA means higher subsidies in total. There is no motivation to increase the production because of decoupling applied in CAP. Large farms in Slovakia tend to decrease the cost by decreasing labour input. In comparison to countries with small farms the decrease in employment is much higher in Slovakia. Small farms cannot rely on subsidies only but they need also real agricultural production. Large farm on other hand (1 200 hectares is the average size of large farms in Slovakia) receive only in form of subsidies a significant amount of money (in Slovakia 282€/ha on average) and tend to replace labour by technology much more than small farms.

In countries with small farms there are much more CAP beneficiaries mostly in rural areas than in countries with large farms. Rural development and rural economy suffers more in Slovakia than in countries with small farms.

Current labour input per 100 ha in Slovakia is comparable to Germany, France, Luxembourg, Denmark, but Standard Output is the lowest even compared to V4 countries. This is mainly due to the size of the farm measured by UAA and ownership structure, which is based on private companies with a limited number of owners.

Large farms in Slovakia behave rationally and try to benefit from the current CAP. In the production, they focus more on crop than on animal production which is much more labour intensive. In crop production, the large farms focus on products with low value added and crops, where intensive large farm technology can be used. Therefore, Slovakia crop production is focused on basic commodities and products with low value added. Large farms benefit from economy of scale. Standard Output per ha (excluding direct payments) in Slovakia is comparable with Romania, Bulgaria, Ireland and is lower than in the case of the other V4 countries. We conclude that support for young farmers and small farms would result into higher employment and increase in value added of agricultural production in Slovakia. Rural economy would benefit in form of higher or constant employment, local food consumption and development of other sectors in rural areas.

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16. The role of agriculture for income and employment in the Bulgarian rural areas[1]

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Abstract

The role of agriculture for increasing the well-being of the rural communities has been a major issue in the economic literature and agricultural policy development. It is highly accepted that the agricultural industry plays a major role for providing jobs, business opportunities, incomes and safety net for both professional farmers and rural population. Although in the recent 2 decades EU dedicated a lot of efforts to diversify the rural economy and to provide other alternatives for employment and incomes, and to improve the territorial balance at the urban-rural axis, the agriculture is still the staple industry for rural areas. Meanwhile, the rural areas are characterized with higher unemployment rate compared to the national averages whereas the agriculture very often faces problems hiring not just qualified working force but also non-professional seasonal labour, which is denoted as "unemployment paradox". The main goal of this research is to analyse how the changes in production structure of Bulgarian agriculture weigh on the employment development and income growth in the rural areas and why relatively high unemployment in rural areas co-exists with demand of labour in the agriculture – "unemployment paradox". The analysis also aims to determine the current and prospective contribution of agriculture to the income development and employment opportunities in the Bulgarian rural areas. It also analyses the importance of the higher incomes in the rural areas for the labour intensive sectors – such as vegetable production and dairy farming. The main results confirm the interconnection between agriculture and income in the rural areas. Although the unemployment rates are not directly correlated to the shift in the Bulgarian production structure, it is still one of the main factors that is strongly correlated with labour productivity and demand of labour in the rural areas.

Key words: agriculture, income, employment, Bulgaria, rural development

JEL codes: Q10, Q18, R11

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16.1. Introduction

The word "rural" according to the Merriam–Webster[2] dictionary means "of or relating to the country, country people or life, or agriculture". It is used to characterize the countryside as a counterpoint to the cities. Traditionally it regards the life in the countryside as a strongly connected to the agriculture. Rural territories, on agricultural policy perspective, have been regarded also as areas where employment had to be created in order to stem the migratory flows to cities [OECD, 1988]. Since the 1960s the governments in the developed countries place the special focus on the development of rural areas and tried to adopt and implement policy specifically designed to their needs.

Different countries and international organizations have different criteria for definition of rural areas. The definition affects the design of the policies aimed to foster the economic and social development in these regions. Usually the definitions are based on the number of inhabitants of the territorial unit (expl. per square km), or number of inhabitants in the biggest town within the set territorial unit.

The definition of rural area in Bulgaria was a problem with high importance during the pre-accession period, when Bulgaria was setting up its major political objectives. After the EU accession the problem had even more practical dimension, because of the planning, adoption and implementation of the Rural Development Programme, begin a part of the CAP.

There are two criteria for the definition of the municipalities that are considered rural areas in Bulgaria (LAU 2 territorial level) – the population density and the population in the town serving as a municipal centre. According to Regulation 14/2003 of the Ministry of Agriculture and Forestry and the Ministry of Regional Development a rural area in Bulgaria is a municipality with population density lower than 150 people per km^2 and without cities or towns with more than 30 000 inhabitants. Based on these classification 231 municipalities, out of 264 are defined as rural. They cover 81.4% of the national territory and 42% of the Bulgarian population resides in these areas.

Since its introductions there has been a number of recommendations aiming to improve the classification including some socio-economic characteristics [Anastasova-Chopeva, 2006; Popov et al., 2008], however the classification is applied in the policy-making process even today.

The EU urban-rural classification is applied on NUTS 3 level, which in Bulgaria covers 28 regions with brother administrative function than the municipalities. This classification is developed for statistical use and it allows compar-

[2] https://www.merriam-webster.com/dictionary/rural

ison between the EU countries. According to it there are three types of regions – predominantly rural, intermediate and predominantly urban regions. The definition of each region follows three steps: firstly, to identify populations in rural area (all areas outside urban clusters[3]); the second step is to define each NUTS 3 region based on the share of population living in rural areas; and the third step is to consider the size of the urban centre within the region. Following these procedure the criteria for setting up a region are as follows:

- "Predominantly rural" – if the share of the population living in rural areas is higher than 50 and there is not any urban centre with population more than 200 000 people (that concerns at least 25% of the regional population);
- "Intermediate" – if the share of the population living in rural areas is between 20 and 50 there is not any urban centre with population more than 500 000 people (that concerns at least 25% of the regional population);
- "Predominantly urban" – if the share of the population living in rural areas is below 20 and there is an urban centre with more than 500 000 inhabitants, that concerns more than 25% of the regions' population.

Following this classification the 28 NUTS 3 level regions in Bulgaria are to be considered as follows: 7 predominantly rural regions (RR); 20 intermediate regions (IR) and 1 urban region (UR) – Sofia grad.

Even though both classifications are based on international nomenclature there are some differences. For the purposes of the policy-making in Bulgaria the national definition is used, but for collection on statistical data and comparison on EU level the Eurostat classification is applied. The national statistical instate collects some information for the cities and villages, but does not publish specific information based on any of the two classifications.

Agriculture is a major issue in the economic and rural development literature. It is considered the backbone of rural economy and to have a unique role for sustainable development [OECD, 2006; World Bank, 2008]. The higher share of employed in agriculture (7%) and its decreasing role for Bulgaria's GDP (4%) mean that it still serves as a social net and buffer for the rural population.

It is impossible to discuss any rural development policy without including policy aimed at agriculture development. However, there are several persistent problems that affect the rural economy worldwide and in Bulgaria [OECD, 1988; Boyukliev, 2009]:

- Production-structures – agriculture and non-agriculture, are ill-adapted to global market demand;

[3] According to the EUROSTAT methodology "Urban clusters" are clusters of contiguous grid cells of 1 km² with a density of at least 300 inhabitants per km² and a minimum population of 5000 (http://ec.europa.eu/eurostat/web/rural-development/methodology).

- Slow rural jobs growth and higher unemployment. There is a constant decline in the employed in agriculture, but also in the rural employment as a whole;
- Reduced rural population growth and sometimes decline;
- Lags in human resource development (lower education and qualification);
- Inadequate social and economic infrastructure and fewer social services.

The agriculture has direct and indirect effects of the rural employment. On one hand it is still the one of the major economic sectors, but it is also strongly connected with its supporting industries – providing inputs and services for the agriculture and processing the produce. The structural development of the Bulgarian agriculture – its dual structure (many small farmers and a few big ones) that is persistent even though there is a decline in the total number of farms led to changes in the rural areas. The shift of the production structure towards scale-enlargement, intensification, industrialization in some cases led to decline in the number of employed and migration to the cities or abroad of the active workforce.

The main aim of the report is to analyse how the changes in production structure of Bulgarian agriculture weigh on the employment development and income growth in the rural areas; to explore the coexistence of relatively high unemployment in rural areas with demand of labour in the agriculture; to determine the current and prospective contribution of agriculture to the income development and employment opportunities in the Bulgarian rural areas. The main hypothesis of the research is that unemployment in the rural areas and income and remuneration of labour from agriculture are related to the structural changes in the Bulgarian agriculture.

16.2. Methods and data

This analysis is predominantly concerned with rural regions in Bulgaria based on the European definition. The effect of agriculture development on income and employment in rural areas is a universally accepted concept, however, it is not always straightforward and its importance could not be measured directly. Therefore, based on theoretical and literature review, several factors have been identified that influence the employment and income in the rural areas and are also highly connected to the agriculture development. The effects of these factors were analysed by developing two models and applying correlation and factor analysis. The data covers the period 2000-2015. The main sources are Eurostat and National Statistical Institute of Bulgaria.

Two models have been developed for examining the role of agriculture on the income and employment in rural areas.

The first model examines the correlation between the unemployment rate and number of factors.

$$Ur = f(P, Ed, Sr, \overline{Re}, \overline{Ra}, Y) \quad (1)$$

Where *Ur* is the unemployment rate (15+ years,%) in predominantly rural, *P* is the population in the predominantly rural areas, *Ed* is the% of the population aged 25-64 with primary or lower education; *Sr* is proxy for the structural changes in the agriculture, calculated as a ratio of the share of extensive to intensive sectors; $\overline{Re}$ is the average salary in the economy as a whole; $\overline{Ra}$ is the average remuneration in the agriculture; and *Y* is the GDP growth.

The second model analyses the correlation between the remuneration of labour in agriculture at a national level and set of factors that influence it.

$$Ra = f(GVA/Em, Ed, Sr, P, FI, Nf, Nem) \quad (2)$$

Where *Ra* is the remuneration of labour in the agriculture (EUR lion); GVA/Em is the gross value added per employed in the predominantly rural areas, *Ed* is the% of the population aged 25-64 with primary or lower education; *Sr* is proxy for the structural changes in the agriculture, calculated as a ratio of the share of extensive to intensive sectors; *P* is the population in the predominantly rural areas; *FI* is the factor income in agriculture (EUR million); *Nf* stands for the number of farms in Bulgaria; *Nem* is the number of employees in agriculture (thousand AWU).

After the calculation of the correlation coefficient the weight of each factor has been calculated, using the individual significance of each factor and its correlation within the multifactor model based on factor analysis. The weight of each factor shows its role for the dependent variable.

The study is complemented by factor analysis of the impact of the prior--mentioned factors on the unemployment in RR and the remuneration of labour in Bulgarian agriculture. The factor analysis (FA) is done through estimation of the importance of the impact of each independent variable on the dependent variable, where the sum of factors' weights rate is maximum 1. The significance of the factors is different from the statistical significance, which is understood as probability of the study rejecting the null hypothesis, given that it was true. In the case of applied FA, the significance is assumed as the importance of the driving factors on the independent variables. The implementation of the FA is done through several steps, described as:

$$DEVA_{k=1}^{N=F} = \frac{\mathrm{VAEN}_{k=1}^{N=F} - \mathrm{VAAV}_{k=n}^{N=F}}{\mathrm{VAAV}_{k=n}^{N=F}} \quad (3)$$

The first stage is designated to estimate the deviation of the dependent and independent variable ($DEVA_{k=1}^{N=F}$), which represents a proportion between the individual entry of the variable ($\mathrm{VAEN}_{k=1}^{F}$) and the group variable average ($VAAV_{k=n}^{N=F}$). The deviation of dependent and independent variables is done separately, as the goal is to estimate in each instance in the data series how and to what extent react both variables. The second stage is to calculate the factor deviation in each instance ($DEFA_{k=1}^{N=2F}$), which measures the subtraction between the individual entry of independent ($DEVA_{k=1}^{N=INVA}$) and dependent variables divided into their sum. The goal is to see and calculate the movement of independent variable in each instance at the same time of dependent variable change.

$$DEFA_{k=1}^{N=2F} = \frac{DEVA_{k=1}^{N=INVA} - DEVA_{k=1}^{N=DPVA}}{DEVA_{k=1}^{N=INVA} + DEVA_{k=1}^{N=DPVA}} \quad (4)$$

The factor significance comprises the impact of 2 studied factors (dependent and independent ($FASI_{k=n}^{N=2F}$) and is the difference between 1 and the sum of individual factor deviations ($DEFA_{k=1}^{N=2F}$), where the $DEFA_{k=1}^{N=2F}$ is limited in the range from 0 to 1. If the individual factor deviation is received initially over 1, it is set to 1.

$$FASI_{k=n}^{N=2F} = 1 - \frac{\sum DEFA_{k=1}^{N=2F}}{NU_{k=n}^{N=F}} \quad (5)$$

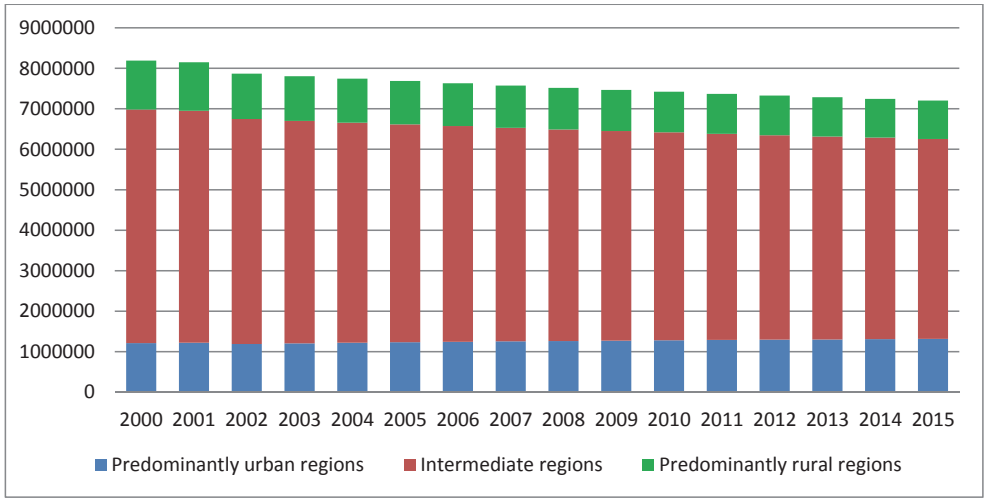
The weight of each factor shows its role for the dependent variable as the sum of coefficients of factor significance of all factors participated in the FA is limited to 1. Whenever, the sum of the factors significance is less than 1, it is considered that there are other not integrated factors that impact the changes in the independent variable and those factor significance is determined as a remaining value between 1 and the sum of factor's weight coefficients. Prior to complete the FA, the coefficients of factor's significance are adjusted by correcting them with the multi-correlated coefficients anticipating that all those independent factors are in some relationship between them, which must be taken into account.

16.3. Main results

Predominantly rural and intermediate regions, according to the EU definition, cover 99% of the Bulgarian territory (in 2015). Seven of the main Bulgarian administrative regions (NUTS 3 level) have been classified as predominantly rural. They cover 22% of the Bulgarian territory and 14% of the Bulgarian population lives there. The rural population shows a downward trend in the period 2000-2015 due mainly to migration and higher death rates (due mainly to the age structure). The% of people in intermediate regions is also declining. Urban

regions, although in Bulgaria only the capital fulfils the requirements for such qualification on NUTS 3 level, are the only ones having increase in population, both in nominal and relative terms (Fig. 1).

Fig. 1. Population in the rural, intermediate and urban regions in Bulgaria, 2000-2015

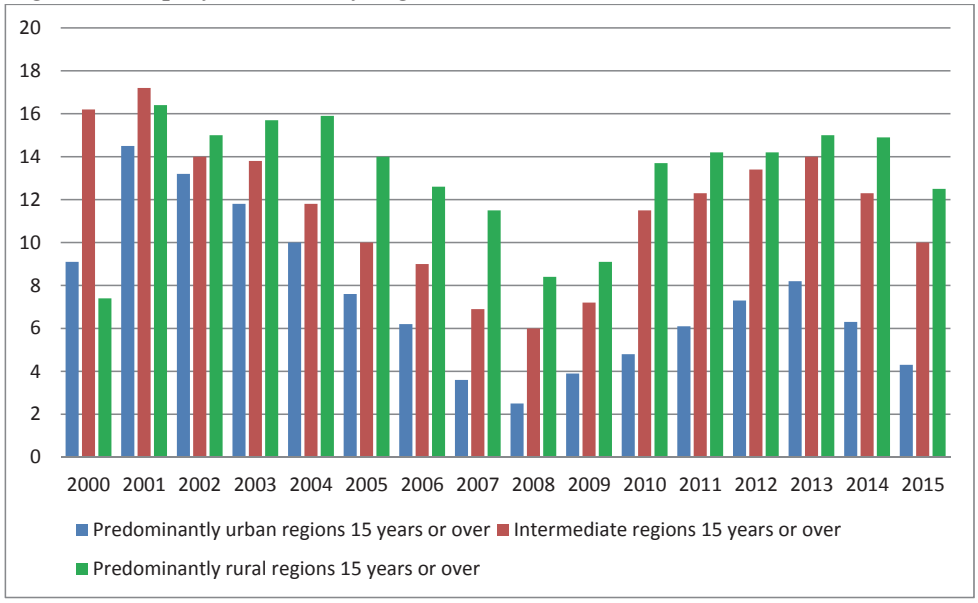


Source: Eurostat.

The unemployment is one of the major problems that influence the migration of population from the rural areas. After 2002 the unemployment rate in the rural regions has been higher than the unemployment rates both in the intermediate and urban regions (Fig. 2) and in 2015 it is over 12%.

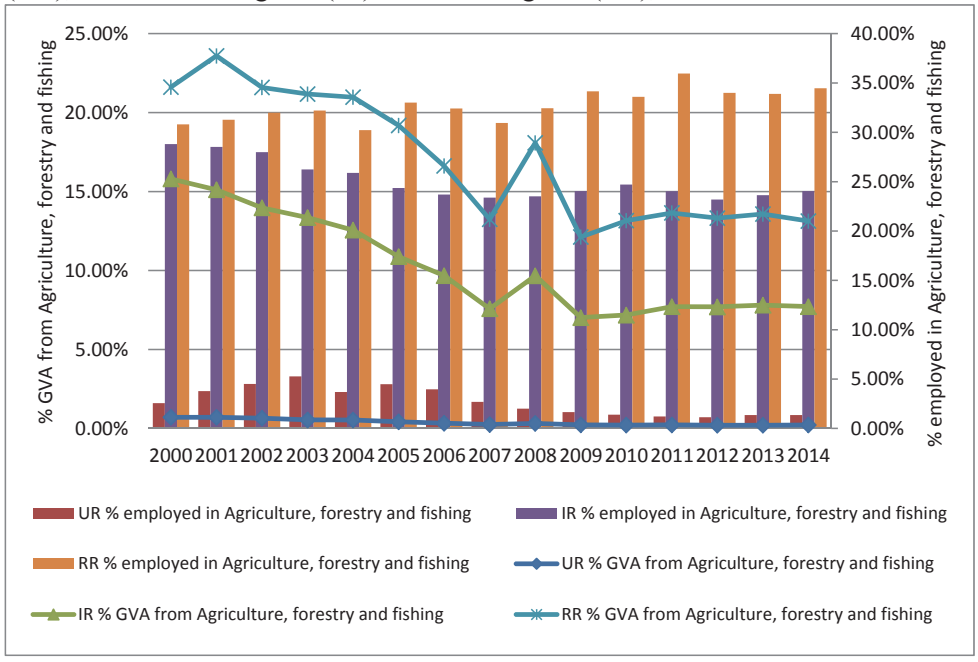
At the beginning of the new millennium the agriculture is the biggest sector in the rural regions. The GVA produced in it is higher than the GVA produced in any other sector and it is 21.6% of the total GVA produced in the region, followed by the Industry (except construction). For the next 15 years the importance of Agriculture in the GVA of all regions decreases (GVA from agriculture is about 4% since 2007 on national level). This situation is related to more rapid development in the other sectors of the economy than to a decline in GVA, produced in the agriculture. In 2014 15% of the GVA in the rural regions is from Agriculture, but 34.47% of the employed people are still working in the agriculture sector. In the intermediate regions 7.7% of the GVA and 34% of the employees are from Agriculture. In the urban region, less than 1% of the GVA and less than 2% of the employed is from agriculture. This data show that agriculture still has a major role for the development of the rural regions. Having in mind that agriculture could also employ less-skilled and non-qualified labour force, and that most of the employed are non--payed family labour the importance of the agriculture is even higher.

Fig. 2. Unemployment rate by region, 2000-2015



Source: Eurostat.

Fig. 3. GVA and employment in Agriculture, forestry and fishing in Urban regions (UR), Intermediate regions (IR) and Rural regions (RR), 2000-2014



Source: Eurostat.

Agricultural production in Bulgaria is concentrated in several major sectors, of which cereal production in 2015 accounts for about 30% of the GVA, and field crops (cereals, oil and fodder) make up to 58% of the GVA. Gross value added generated by horticulture and fruit production is less than 9%, while livestock farming accounts for the remaining 27%. Thus the intensive sectors that require less land, more capital and labour input are losing their share, and potentially have high effect on the employment in rural areas and thus on the unemployment rates and remuneration of the employed.

The results of the applied correlation analysis for the first model are presented in table 1. This model investigates the strength of the correlation between the unemployment rates in the rural areas and number of factors. These factors include the total number of the population, the educational level, the ratio between extensive and intensive sectors (serves as a proxy for the structural change in the Bulgarian agriculture), the average remuneration in the economy and in the agriculture and the GDP growth that represents the total income growth in the economy. The main interest is which of the analysed factors, if any, has a strong correlation with the unemployment rate in the rural areas and what is the importance of these factors for the development of the variable in the 15-year period.

Table 1. Results of the correlation analysis of Model 1

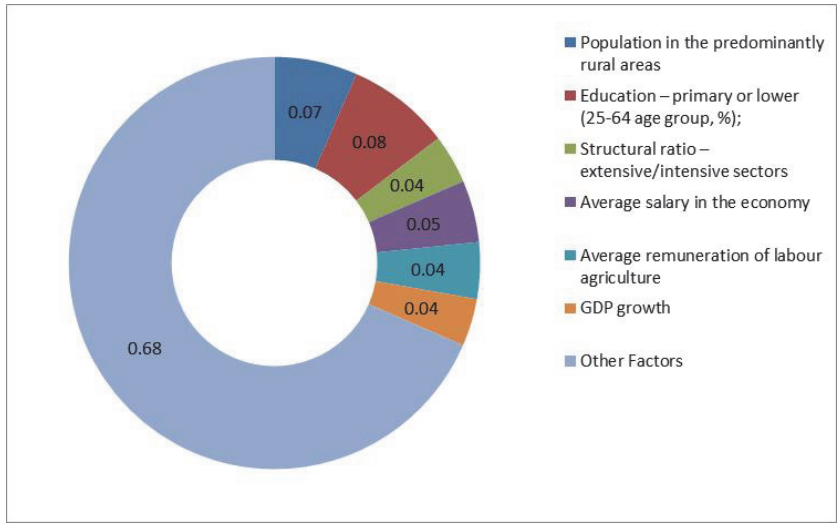
	Population in the predominantly rural areas	***Education – primary or lower (25-64 age group,%);***	***Structural ratio – extensive/intensive sectors***	***Average salary in the economy***	***Average remuneration of labour agriculture***	***GDP growth***
% Unemployment rate (Age 15+)	-0.062	-0.044	0.155	-0.014	0.031	-0.014

Source: own calculations based on Eurostat and NSI data, 2000-2015.

The correlation analysis showed that none of the analysed factors has any significant correlation with the unemployment rate in the rural regions. The change of the production structure of the Bulgarian agriculture – the increasing importance of the extensive sectors – has a minimal impact on the unemployment rate. However, its sign indicates that the increasing of the crop production that requires more capital and less labour has a negative effect on the employment in the rural areas.

On the next step of the methodology we calculated the factors' weights (Fig. 4.). 68% of the unemployment rate throughout the analysed period is due to other factors that we did not cover in this analysis.

Fig. 4. Importance of the analysed factors for the unemployment rate in the rural regions



Source: own calculations based on Eurostat and NSI data, 2000-2015.

This result confirms the thesis that the unemployment, especially in the rural areas, where the population has low education and qualification and worse age structure, does not necessarily depend on the economic development of the agriculture and the offered remuneration in the agriculture. Focusing on more capital intensive production, even if they are able to pay more for the labour, the producers will need less but more qualified employees.

The second model analyses the correlation between the remuneration of labour in agriculture and number of factors that impact both the quantity and the quality of the available labour force and demand for labour input in the agriculture. The results are presented in Table 2. For all the analysed factors, except the number of employees in the agriculture, there is a strong correlation with the remuneration of labour. For some of them the correlation is positive, for others – negative.

The correlation between the remuneration and the labour productivity, expressed as GVA/employed is strong, which confirms one of the main economic principles. Also positive is the relationship with the factor income produced in the agriculture. The higher the income from agriculture – the more the producers will be able to pay for more productive labour force. Other important factor in that regard is the change in the production structure of our agriculture. The Bulgarian agriculture is focusing in highly labour and capital intensive sectors – such as field crops, that also have strong positive correlation with the remuneration of the employed.

Table 2. Results of the correlation analysis of Model 2

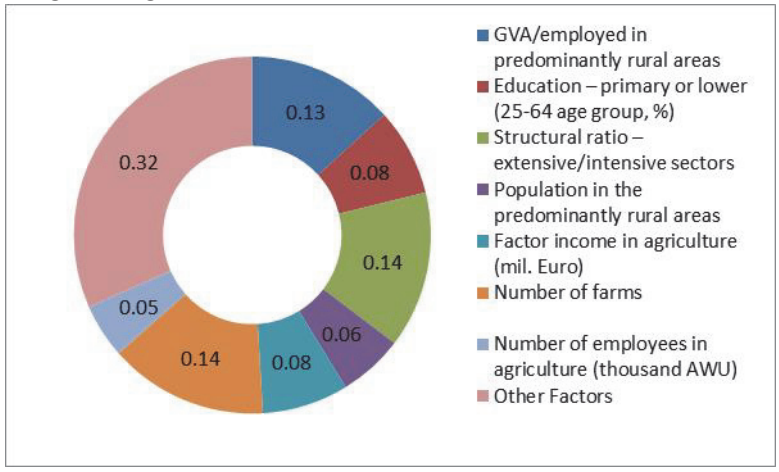
	GVA/ employed in predominantly rural areas	*Education – primary or lower (25-64 age group,%)*	*Structural ratio – extensive/ intensive sectors*	*Population in the predominantly rural areas*	*Factor income in agriculture (EUR million)*	*Number of farms*	*Number of employees in agriculture (thousand AWU)*
Remuneration of labour in the agriculture (EUR million)	0.903	-0.956	0.938	-0.829	0.704	-0.942	-0.276

Source: own calculations based on Eurostat and NSI data, 2000-2015.

Negative relationship between the remuneration of labour and the percent of people with primary and lower education in the rural areas, the number of employees and farms confirms the hypothesis that the increasing of labour productivity results in increasing of the money payed for labour.

The importance of each factor is presented on Fig. 5. The analysed factors account for 68% of the change in remuneration in the analysed period. Highest importance has the production structure of our agriculture and the number of farms, followed by the labour productivity. Education and factor income have equal shares and the number of employees and the total population in the rural areas have the lowest importance.

Fig. 5. Importance of the analysed factors for the remuneration of the labour in Bulgarian agriculture



Source: own calculations based on Eurostat and NSI data, 2000-2015.

16.4. Conclusions

Socio-economic situation in the rural regions of Bulgaria is worse that the situation in the intermediate and urban regions, although balanced rural development is one of the main goals of the agricultural policy implemented in the country. Agriculture has been recognized as one of the most important sectors that could bring about economic development in less developed regions, characterizes with slow economic growth and high unemployment. Agriculture still has an important role for the employment and GVA in rural regions; however its growth is slower than the other sectors. The higher unemployment rate in the rural regions is not specifically related to the restructuring of the Bulgarian agriculture. Having in mind the political efforts put into the development in less-developed rural areas there is an "unemployment paradox" – the economic activities suffer from lack of labour and at the same time there is surplus of people actively seeking work, as evident from the high unemployment rates. This paradox has serious socio-economic effects and it should be further researched and addressed in the future CAP.

The structure of Bulgarian agriculture and the growing share of extensive crop production are strongly correlated to the higher labour productivity and higher remuneration. The structural change has an impact on the number of farms as the smaller farmers exit the agricultural production and bigger field crop producing farms increase the land they use. The remuneration of employed in agriculture is strongly correlated with the labour productivity (GVA/ employed) in rural areas. It is not expected that there will be rural development without development of more intensive agriculture.

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17. Product restructuring of Bulgarian agriculture – dilemmas and strategic directions[1]

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Abstract

The aim of the paper is to assess the dynamics and the results of the changes in the produced products and their impact on the development of agriculture in the period of our country's membership in the European Union. What dilemmas does product restructuring cause and what national strategic priorities and solutions should be developed? In the paper are revealed the trends in the development of crop and livestock production for the period 2003-2016.

The main tasks for reaching the aim are disclosed in the form of questions:

- How is restructured the production of grain, technical crops, vegetables and fruits?
- Changes and trends in the main livestock production. How is cattle, sheep, and pig and poultry production changing?
- How does Bulgarian agricultural production develop?
- Does this development correspond with the competitive advantages of Bulgarian agriculture, traditions and development potential?

Keywords: structural changes, production restructuring, agricultural output, livestock, crop production

JEL codes: Q10, Q15, Q18

17.1. Introduction

The processes of restructuring of the agricultural sector are very important for development of the countries, according to where they take place. The literature connected with these processes divide the main reasons as:

- Land consolidation

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Land consolidation has been an important instrument of rural development for over a century throughout Europe. The efforts aimed at making agriculture and forestry more competitive through a comprehensive reallocation process, landscaping, environmental management, conservation projects, and other functions may be implemented in land consolidation, which reflects in restructuring of the agricultural sector on horizontal base [Lisec et al., 2014; Hualou, 2014].

The land consolidation have to improve spatial and economic conditions for farming by decreasing the number of separate plots that belong to a given farm, as well as adjusting the shape of plots to enable mechanized cultivation of soil, and decreasing the distance between dwellings and cultivated plots [Kupidura et al., 2014]. Moreover, the land transition driven by policy led to big changes in crop and livestock breading.

- Product restructuring driven by policy and requirements of the agriculture sector

The idea of product restructuring is to view the change as a multifactionality of the agricultural holding, increasing competitiveness of inner agricultural sector, using relative and absolute advantages of subsectors and cross-country trade [Lagakos, Waugh, 2013]. Production structures engaged in agricultural activity and producing agricultural products are the result of a long evolutionary process, depending on the specific conditions existing in each country and it has different limits in time aspect [Boehlje, 1984].

In the last decade, agri-economic research in our country has gradually shifted from the relatively narrower issue of the expected consequences from the implementation of the Common Agricultural Policy and the competitiveness of Bulgarian agricultural products, the difficulties of accession, the organizational restructuring of the sector and the revealing of the comparative advantages of the main economic actors in the integrated and sustainable development of agriculture and rural areas, towards employment and income in them and others. In these reports, classical economic approaches for research are increasingly combined with methodological approaches and tools from sociological, psychological and other scientific areas. As a result, a number of international and national studies were devoted to the diversification of the rural economy, the opportunities for alternative employment in rural areas, the income of rural households [Mishev et al., 2006, Kanchev et al., 2006, 2008; Hadzhieva et al., 2004; Popov, 2007].

The restructuring of agricultural sector is strongly influenced by the policy of the country. There are evidences of few subsectors in Bulgaria, which were traditional, but being not prioritized for subsidy they lost their relative and absolute advantages (clearly evident from the serious decrease of sugar beet in sown areas, which in 2004 was 1,000 ha, and according to data from the Ministry of

Agriculture and Food in 2015 is only 2.1 ha in Bulgaria). As well as some of the policies forced the agricultural producers to become monoproducers, which reflected negatively of the biodiversity of the countries [Pe'er et al., 2014].

CAP subsidies are disbursed in the form of decoupled direct payments, the so-called Single Payment Scheme (SPS). Under the SPS, farms receive annual payments that do not depend on the current or future quantities of agricultural production, but are linked to farmland. In Bulgaria SPS increase the gap between the subsectors in plant production and there is a transition in agriculture from labour intensively production to low labour intensively. This fact can be backed by the increasing number of eligible farmers for land payment in grain sector in Bulgaria till 2015 [Harizanova, 2015].

The new programming period brought some restriction of eligibility of land per farm, but the obtained results still do not reflect on product structure. Farmers who are eligible to receive payment under the basic payment or single area payment scheme are required to comply with such agricultural practices that are favourable for the climate and the environment (green requirements). Green requirements are: crop diversification, maintenance of permanent grassland and availability of environmentally focused areas [Ministry of Agriculture and Foods, 2015].

17.2. Structural changes in Bulgarian agriculture

- Agricultural changes – ratios and compartments

Over the past few years, the gap between animal and plant production has been increasing. Before the implementation of the CAP and especially SAPS, the differences between animal and plant outcome were negligible in favour of crop outcome. After 2007 the process is intensive and the gap is around 3 time smaller outcome of bread livestock compared to crop production outcome (Fig. 1).

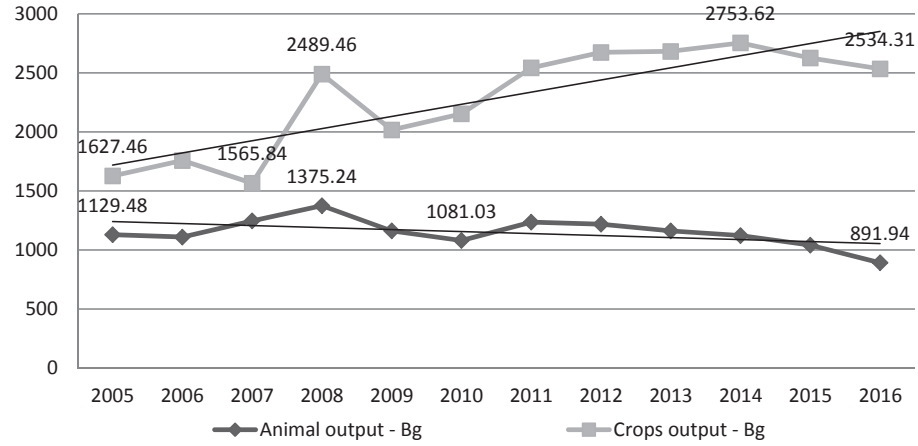
The depicted development of the sectors means a radical or significant change in the way natural resources are used in different territories and the realized income from a unit natural resource used for their production. A question arises whether the new production structure is making better or worse use of unique natural resources and creates opportunities to develop the productive potential of the rural area and ultimately of our country.

The structure of agricultural output also results in low gross output. In 2014, gross agricultural output in Bulgaria is estimated at around 830 euros per hectare while the EU-27 average is above 2,200 EUR/ha.

Comparing the results between the outcomes of crops and livestock production in Bulgaria and in Poland, it can be concluded that there are observed significant differences. The trend of Poland is almost even and during the studied period

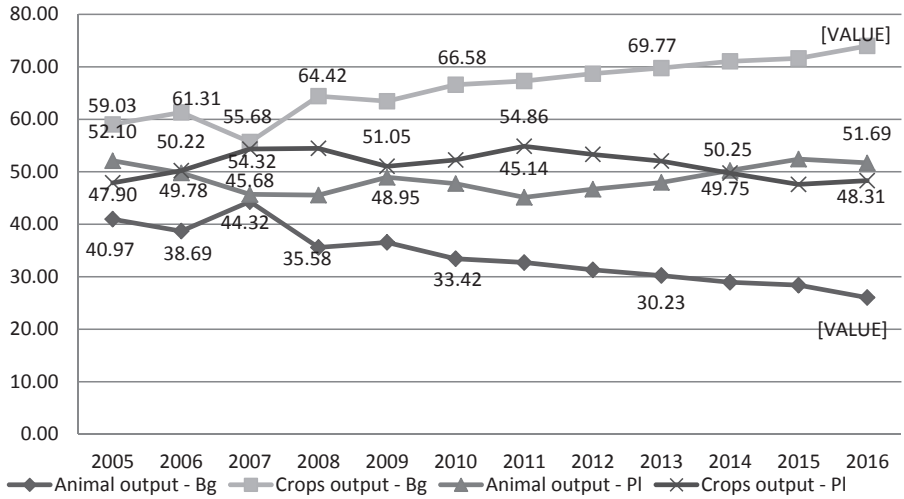
the ratio between crop and livestock production is almost equal with difference of 2-3% (Fig. 2). The same trend is observed in data for EU level.

Fig. 1. Ratio between livestock and crop outcome in Bulgaria



Source: Eurostat, Agricultural output 2017.

Fig. 2. Ratio between the production of plant and livestock products in Bulgaria and Poland (%)



Source: Eurostat, Agricultural output, 2017.

- Structural changes: Land

In the current years the agricultural area is 5 202 752 ha (2015), which represents about 47% of the country's territory. The relative share of cultivated land in terms of the utilized agricultural area of the country remains constant compared to the previous years and is around 70%.

The agriculture structure in Bulgaria is a result of the transformation period over 20 years ago, when were liquidated the collective's farms from the socialist period, was restored land ownership to the former owners and all consequences followed from this. The number of agricultural holdings decreased for the observed period by approximately 60%.

The result is a dualistic agriculture and all the statistical data since 1992 confirm this conclusion. The tendency is observed mainly in the case of farms cultivating land between 30 and 50 ha, where the increase is 187% compared to 2003, followed by farms with size of 20-30 ha (154%).

The negative trend is observed since 2005 in all farms up to 5 ha, but the highest share is between 0-2 ha, where the decrease for the period 2003-2013 is 69% (own calculation by official statistic data of MAF 2003-2013) [Ministry of agriculture and foods, 2008, 2012, 2014].

Structural changes between the groups according to agricultural area size classes (table 1) confirmed the dualistic distribution of Bulgarian agriculture, where in 2013 2,23% of agricultural holdings were cultivating approximately 80% the UAA [Giagnocavo et al., 2015]. The number of farms between 0 and 2 ha decreased from 89% to 72% during ten years (as share).

Table 1. Distribution between UAA and holdings by types

Agricultural area size classes – ha	**2003**		**2007**		**2010**		**2013**	
	% of holdings	% of UAA	% of holdings	% of UAA	% of holdings	% of UAA	% of holdings	% of UAA
0	1.61	0.00	2.27	0.00	3.55	0.00	3.76	0.00
>0 & < 2	88.91	10.77	84.64%	6.26	79.67	3.99	72.26	2.66
>=2 & < 5	6.29	4.19	7.96%	3.78	8.21	2.50	10.94	2.19
>=5 & < 10	1.46	2.21	2.04%	2.18	2.90	2.01	4.28	1.93
>=10 & < 20	0.60	1.82	1.11%	2.39	1.84	2.56	2.67	2.45
>=20 & <30	0.19	1.03	0.39%	1.49	0.80	1.94	1.26	2.00
>=30& < 50	0.18	1.53	0.33%	2.01	0.83	3.21	1.34	3.44
>=50 & < 100	0.18	2.86	0.40%	4.57	0.79	5.57	1.16	5.36
>=100	0.58	75.60	0.86	77.30	1.41	78.23	2.32	79.97

Source: Ministry of Agriculture and Foods 2014, own calculation.

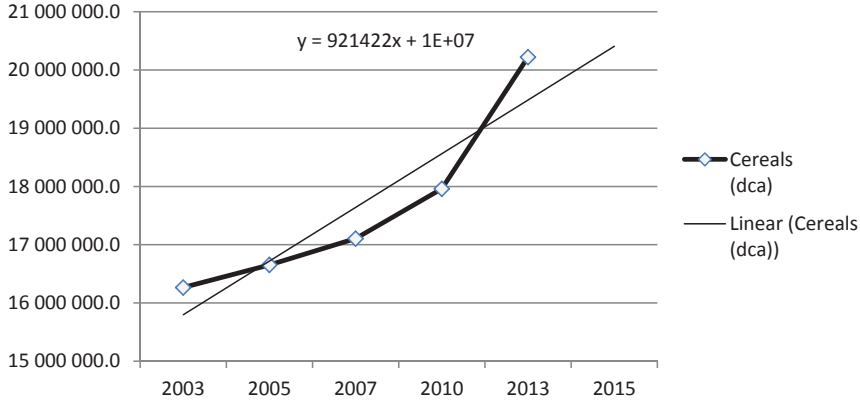
The structure thus altered has led to the following results:

- The added value created to 1 employed in agriculture increases from 2.6 thousand to 3.3 thousand euros. But this indicator is 2.5 times lower than the EU-27 average.
- The number of employees converted to AWU in the sector is continuously decreasing and in 2016 it is 50% less than in 2007. In the same period, the nominal number of people employed decreased by only 8%. This means, according to the researchers [Ivanov et al., 2017], that agriculture continues to perform not just an economic role in the country's economy. Households also has a social and cultural impact. The majority of these are engaged in unpaid, family work, are engaged seasonally in family farms and their number, although decreasing, as employment does not change cardinally.
- Since 2007 labour productivity and productivity have increased significantly due to subsidies in agriculture. Bulgaria's labour productivity indicator lags behind more than 2.5 times the EU average.
- Land use utilization is also low, as Bulgaria has less than 4% of EU resources but produces only less than 1% of GVA.
- GVA per unit of agricultural land in Bulgaria is 300 EUR/ha with an average of 880 EUR/ha.
- The economic potential of the agricultural holdings in Bulgaria is low – 4.4 economic size with an average economic size of 15.2 for the EU.

The product changes in Bulgarian agricultural sector cause scientific interest despite the land transformation between the farms.

- Structural changes: crop production
  - Cereals. Cereals are with permanent trend of increasing the cultivated area (figure 3), but as a share the structure is constant around 40% of arable land (2013/2003). In the structural level is observed a general trend of consolidation of the holdings. The cereals producers represented by large scale farms cultivate 90% of the land the sector.
  - Potatoes. Potatoes are with decreasing trend for the period 2003-2015. Total deduction decreased with 60% for the period 2015/2003. The negative structural changes are represented in the group cultivating from 0 up to 10 ha (66 cum.%). The number of holdings cultivating over 100 ha increased 40%, from 30-50 ha –87%.

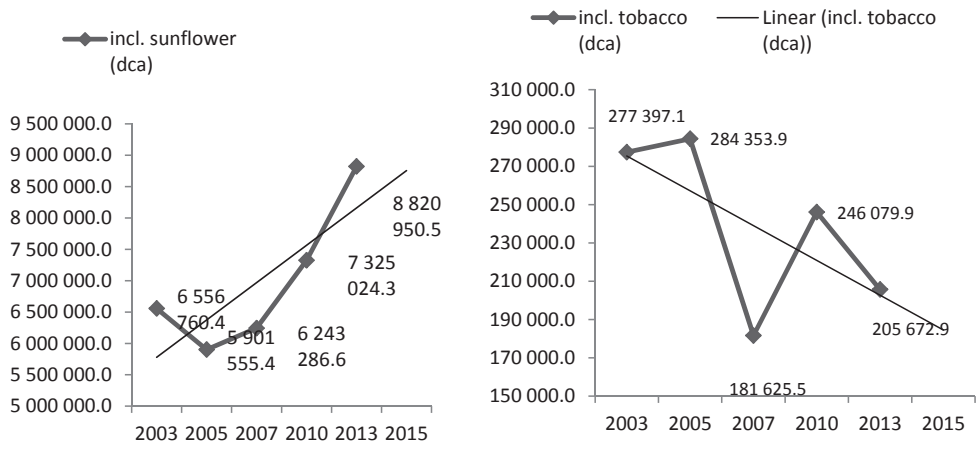
Fig. 3. Structural change cereals 2003-2015



Source: Ministry of Agriculture and Foods 2016, own calculation.

– Industrial crops. In the group there are two main cultures – sunflower and tobacco. Both crops represent more than 80% of the crops in the group. Despite the total positive trend of development of the industrial crop, the product structure during the years has significantly changed (Fig. 4). Until the sunflower is rapidly increasing the tobacco is cutting down the cultivated area.

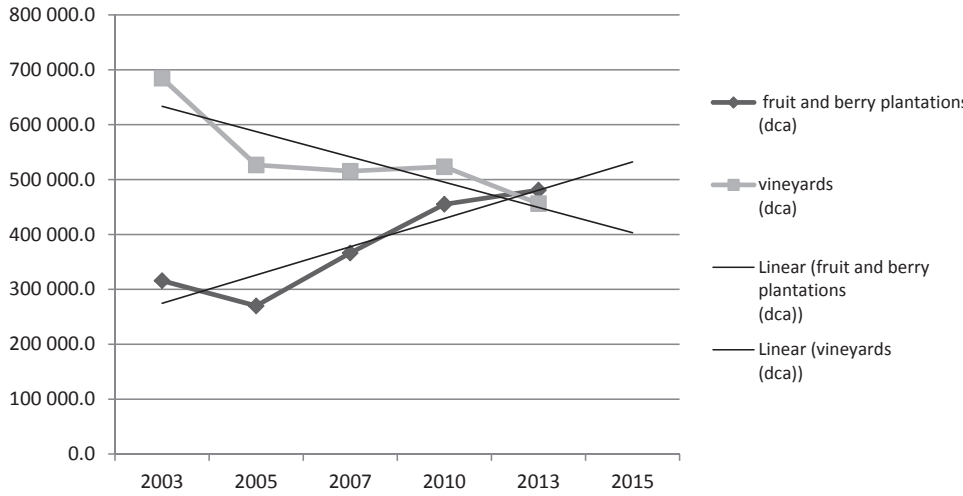
Fig. 4. Structural change – industrial crops 2003-2015



Source: Ministry of Agriculture and Foods 2016, own calculation.

– Permanent crops. The main crops included in this structure are vineyards, fruits and berries plantations. In summary the development of the cumulative group is stable, but within the group major changes are observed (Fig 5).

Fig. 5. Structural change –permanent crops 2003-2015



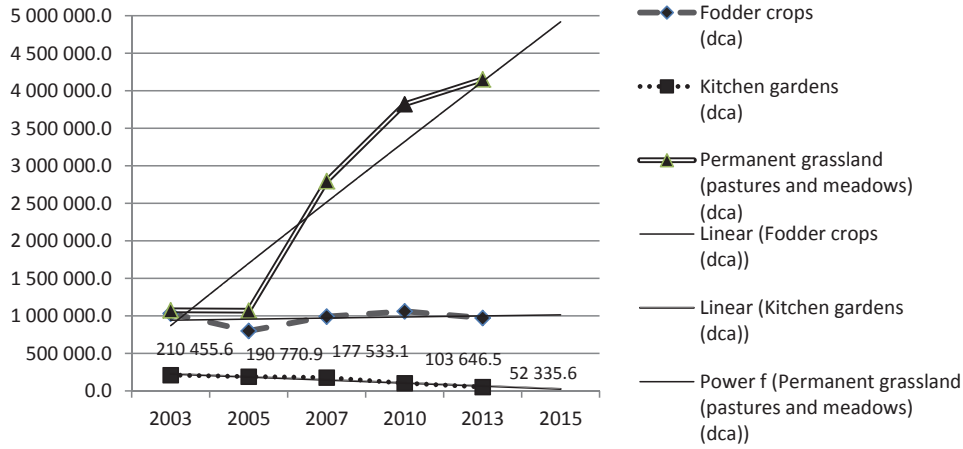
Source: Ministry of Agriculture and Foods 2016, own calculation.

Figure 5 shows the increasing trend of fruit and berry sector in Bulgaria, and the trend is observed over the last 10 years. The opposite statement is connected with vineyards in the country. The country is having a tradition in wine industry but the cultivated land is having a long trend of reduction.

- Fresh vegetables, melons, strawberries. During the observed period the group is cultivated on less land area compared to 2003. The reduction of vegetables, melon and strawberries totals 23% (outdoor 25% and open field with 37%).
- Kitchen gardens, fodder crops, permanent grassland (Fig. 6). Kitchen gardens are traditional for Bulgarian agriculture, but in the observed period they decrease from 210 455 dca to 52 335 dca. This can be explained by natural demographic processes and migration, where the owner of the farm is no longer in the sector, but no one is inheriting the activities to continue the farm.

  Fodder crops are a transitional raw material connected to livestock and is following the main trend of slow reduction of the cultivated area. The pastures and meadows are rapidly increasing in the period, which can be explained with the nature of cultivation of that land (minimum investment) and possibility to receive agricultural support through the specific measurement.

Fig. 6. Structural change of kitchen gardens, fodder crops, permanent grassland 2003-2015

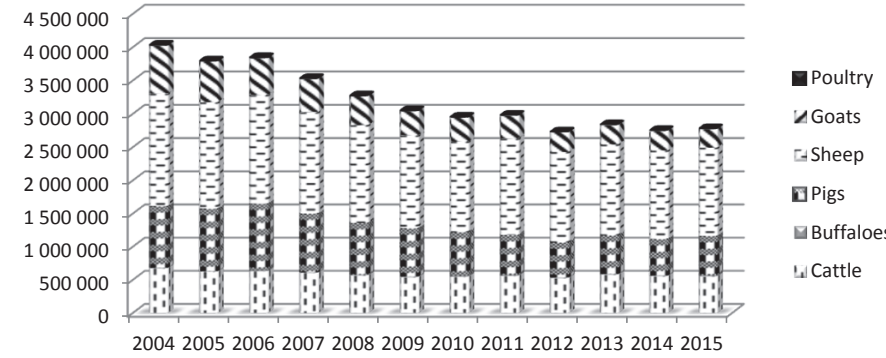


Source: Ministry of Agriculture and Foods 2016, own calculation.

- Structural changes: livestock breading

Structural changes of the livestock breading in Bulgaria are having a general trend of reduction of number of animals (Fig. 7). Livestock breading is dominated in Bulgarian agriculture by sheep, cattle, pigs and goats. Since 2007 the structure inside did not change significantly, which can be confirmed by official statistic data.

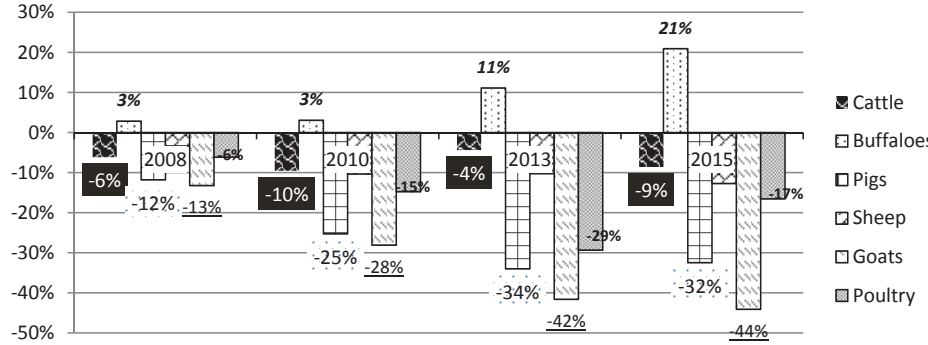
Fig. 7. General development of livestock breading



Source: Ministry of Agriculture and Foods 2016, own calculation.

The biggest reduction is observed in the number of goats, where the reduction compared to 2007 is 44%, and for pigs (32%). Despite the negative statistic there is an increase in the numbers of buffaloes – 21% since the country entered the EU (Fig. 8).

Fig. 8. Structural changes: livestock breading after EU accession

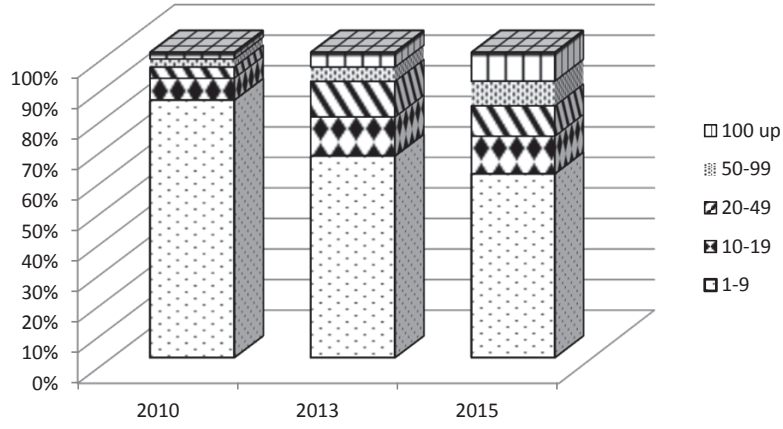


Source: Ministry of Agriculture and Foods 2016, own calculation.

Livestock structure during the last 10 years changed not only by subsectors, but as well there is an evidence for internal transformation. The new requirements of the regulations in agriculture forced the farm holders to invest or to leave the sector where they operated. The reduction of the farms between 1 and 2 cows is rapid. In 2013 the decrease is with 19%, and in 2015 compared to 2013, it is more than 50%. In next groups of farms, which have 3-9 cows the percent is [-44%], in the group with 10-19 cows [-17%]. It is observed a positive change in the farms, which are having more than 100 cows in 2015. This group increased with 21%, and the group between 50-99 cows per farm with 13%.

The sheep subsector transformed its structure according to number of animals per farm (Fig. 9).

Figure 9. Structural changes of sheep farms



Source: Ministry of agriculture and foods 2016, own calculation.

The transformation of sheep number per farm is having the same tendency as in the cattle subsector. The number of farms decreases with 64%. The inner transformation is directed to more heads per farm. Last years (2010-2015), the farm holders who have between 1 and 9 sheep decrease with 74%, between 10-19 sheep decrease with 17%. The farms who have more than 100 animals (sheep) increase with 54%.

17.3. Main findings

- Farms and land

Full-scale processes apply to our country where the restructuring processes are markedly dynamic. The number of farms is rapidly decreasing (only for 10 years more than 2 times compared to 2003). This is entirely at the expense of small farms with an area of up to 2 hectares, which have decreased from 591 thousand to 193 thousand. The number of agricultural holdings decreases for the observed period with approximately 60%.

Agricultural area is 5 202 752 ha (2015), which represents about 47% of the country's territory. Structural changes according to agricultural area size classes shows the dualistic distribution of Bulgarian agriculture, where in 2013 2,23% of agricultural holdings were cultivating approximately 80% the UAA. The number of farms between 0 and 2 ha decreased from 89% to 72% for ten years (as share).

- Specialization

After 2007 the processes of increasing ratio between livestock and plant production is intensive. The gap is around 3 times smaller outcome of livestock breading compared to crop production outcome. Comparing the results between Bulgaria and Poland outcomes of crops and livestock production there can be observed significant differences.

The large, narrowly specialized business organizations in the sector have led to the monoculture of production in several cereal and technical crops with all resulting negative impacts on soil, water and other local natural resources. These regions have the highest population decline and deterioration in their quality characteristics.

Close specialization, especially in the production of grain and some capital intensive technical crops, is also a prerequisite for reducing the return on land use. Replacing a unit of area with cereals means several times lower economic returns, fewer jobs and lower incomes for the population. According to data from the Bulgarian Ministry of Agriculture and Foods, replacing 1 hectare of tomato field production with 1 hectare of wheat or 1 hectare of sunflower means 14 and 15 times lower return on land use respectively [Ministry of Agriculture and Foods, 2013].

On the other hand, the substantial decrease in the number of animals leads to a change in the use of pastures in several rural areas, to reduced production and use of inexpensive manure, to increasing seasonal labour. In conditions of monoculture, the reduction of soil fertility is becoming a major problem. At the same time, researchers highlight the high risk that significant public and private investment in a "knowledge-based bio-economy" will continue to exacerbate these problems [EU SCAR, 2015].

Many of the authors [Knickel, 1990, 1997; Knickel et al., 2013] analyse and periodically review this problem for almost twenty-five years and claim that the concentration of production and well-being in some regions and farms contradicts to the goal of a more balanced overall development, as it is directly linked to the marginalization of other regions and farms. Other conclusions relate to concentration of production and environmental degradation as well as to the problems of increasing pressure, stress and indebtedness of farmers. Continued striving to reduce production costs to keep production competitive, puts constant pressure on food quality, on introducing environmental standards, and improving working conditions.

- Crop production

Cereals are with permanent trend of increasing their cultivated area and they represent around 40% of arable land. In structural level is observed the general trend of consolidation of the holdings, which are mainly large scale farms (they cultivate 90% of the land the sector). The sunflower is following the same trend of development. The berries and fruit orchards have an increasing trend during the last 10 years.

Potatoes are with decreasing trend and the total reduction is with 60% for the period 2015/2003. The same negative trend is observed by tobacco and vineyards.

- Livestock breading

Livestock breading is dominated in Bulgarian agriculture by sheep, cattle, pigs and goats. Livestock structure during the last 10 years changed not only by subsectors, but as well there is an evidence for internal transformation. The reduction of the cattle farms between 1 and 2 cows is rapid, but there is an increase in the number of those ones which are having more than 100 cows in 2015. This group increased with 21%, and the group between 50-99 cows per farm with 13%. The number of sheep farms decreases with 64%. The inner transformation is directed to more heads per a farm.

In a number of semi-mountainous areas, where sheep and goat breeding were leading productions, their number was drastically restricted, and a number of native breeds adapted to the natural and climatic conditions are endangered by extinction.

17.4. Conclusions

Since ancient times it is known that agriculture is not only a means of existing of the local population, but it is an engine for the development of the local economy and the well-being of its inhabitants. In this sense, the link between agriculture and regional development has always been assessed as strong and for these reasons has been a subject of political influence.

The observed changes in the type of produced products lead to the emergence of structural imbalances and strengthen the tendencies towards monoculture in part of the rural areas.

The negative downward trend in products, where are greater opportunities for creation of added value through storage, processing and marketing in the rural area continues. This is also the product that more efficiently uses natural resources (soil types of land with different natural fertility, water, etc.) and creates employment and higher incomes for rural residents. In fact, these are the products for the production of which Bulgaria has appropriate natural and critical conditions and competitive advantages.

The product restructuring is currently mainly under the influence of the CAP and it does not create conditions for a better use of the production potential of Bulgarian agriculture.

In view of the objectives of balanced rural development, it is essential to make structural changes in the direction that promotes more sustainable development in general and which contributes to tackling the social, environmental and economic imbalances and challenges outlined above. Thus, the transformation and adaptability of the agricultural sector and rural economies have become key issues.

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18. The role of a brand in recognition of agri-food products from Serbia

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Abstract[1]

The purpose of this paper is to consider the possibilities of branding agri-food products from Serbia, which contributes to their recognition and competitiveness increase. Development of sustainable competitive advantage refers to a logical understanding of advantages and flaws of a firm in regard to possibilities and threats on the market. Research on behaviour of buyers and appropriate targeting of the real segment provides input values for development of a special marketing mix. The essential connection of the consumers' needs with the firm's possibilities constitutes brand development. This process enables a firm to develop a special distinctive identity and to position itself on the market so as to differ from its competitors. The traditional economic theory is based on the assumptions of perfect competitive markets, on which numerous salesmen offer identical products for sale. It is assumed that all the products are perfectly replaceable; thus, by competition process, the prices become minimal up to the sufficient level to pay suppliers, in order for them to be able to continue operation on the market.

The research shows that the products differ with the level to which they can be differentiated. Most of the agricultural products are homogenous because of their basic market and commercial-technological features. In other words, agriculture, as an economic activity, is as specific as the most of raw agricultural products, and also some food products (raw meat), can be classified in the group of homogenous products, with small or no opportunities for differentiation. The exception is surely production of healthy, organic food, where there are significant opportunities for brand development and products differentiation. Generally, the agricultural products have insignificant opportunities for differentiation, but such products are the best to check the talent for marketing.

Keywords: brand, competitiveness, agri-food products, differentiation

JEL codes: Q13, Q18, M31

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18.1. Introduction

Brand development represents a focal point of production plans, prices, distribution and promotion of products and aims to win a unique position of products on the market. Branding is in the middle of a marketing strategy and its basic role is to protect a company from the impact of competition on the market. By differentiating its products and by giving unique values, a company simplifies the selection process to the consumers, who already have many similar products to choose from. That is to say, to create and to maintain a brand is one of the key tasks of marketing managers, because when selection on the market increases, the buyers doubtlessly prefer well-known companies and brands, and not to waste time to research and expose themselves to risk [Riznić, Dukić, 2010]. Marketing is a discipline which deals with market issues, the market needs and a way to satisfy those needs [Cvijanović, 2007]. Marketing is a dynamic process of realizing a close connection between a company's possibilities and demand which appears in the external environment. Everything that a company offers must continuously develop over time, in order to satisfy changeable needs in the internal goals of a company and in the external business environment. It is not enough for the company to only make a marketing plan which will work for a short time, but it will not succeed to realize long-term profits, owing to insufficient adjustment of the plan to the changes in the market environment.

Business history is full of marketing plans, which were too good to be true. The company can have very high sales level in a short term, but it will not to realize big enough profits in a long term. It can happen that the company has excessively decreased prices of products, not leaving sufficient margins to cover fixed costs. Or, it has excessively invested in design and promotion of products, but had not succeeded to realize sufficient sale, in order for these investments to be worthwhile. It is not difficult to make short-term marketing strategies, which, on the first glance look very successful when assessed from the level of sales. It is harder to make a long-term sustainable marketing strategy, achieving the appropriate levels of continuous profit. The main element in this long-term strategy is development of powerful brands, which will allow the company to charge higher prices for the products which continuously provide high level of a beneficiary-defined value.

According to the American Marketing Association, a brand is a name, a term, a sign, a symbol or a design or their combination, which aims to identify a product or a service of one producer and/or seller or their group, and to differentiate them from products and services of the competitors [Kotler, 2001]. It considers that one of the most important characteristics of marketers--professionals is their ability to create, upkeep, protect and empower a brand.

More precisely, brand creation could be defined as an art and a cornerstone in marketing. A brand identifies a seller or a producer, it gives them more freedom and power in forming prices; it is a special guarantee of quality and a seller's promise that he will consistently serve consumers with a specific combination of characteristics, benefits and services.

Historically, most of agricultural products are sold as generic products, without a brand. Agricultural products have often been described as products which can be easily replaced with the same products from different locations or from other producers. This is basically true. Until recently, most fruit and vegetables had no brand (for example, the same kind of oranges from Sri Lanka and India are substitutes for each other). The exceptions were sales of fruit and vegetables of some multinational companies, such as "United fruits" and the Chiquita and Geest brands [Crawford, 1997].

Finally, some countries-exporters have broken this tradition. For example, a brand of one kind of apple "Pinklady apple" was developed in Australia and presented in 1993. Starting from that, a new brand was launched and registered which realized a premium price on the export markets [Crawford, 1997]. Even if competitors eventually copy this type of product, which often happens in fruit and vegetable industry, they can only present it under another name. Some companies base their growth on acquisition and creation of a rich brand portfolio. For example, the Grand Metropolitan has created different Pillsbury's brands: Green Giant vegetables, Haagen-Dazs ice-cream and Burger King [Kotler, 2001].

As for development of Serbian agricultural products brand, it is important to emphasize that Serbia, nowadays, exports mostly unprocessed agricultural products and it does not have even one branded product in this sector that would be recognizable on the world or the European market. Serbia is at the very beginning of the road, and creating a brand, especially in the healthy food category, can take place only in direction of higher processing phases, with respect to all internationally known and recognized certificates, quality standards, food safety standards, etc.

18.2. Methodology

The research task used a desk data study, which refers to branding agri--food products as well as tendencies in agricultural production of Serbia. The research was done in two segments: (1) general trends in branding agri-food products in Serbia, and (2) the example of branding "cheese form Golija" in Serbia. This research implies using data from the official resources: data of the Serbian Statistical Office, data from the local and foreign literature, internal documentation. The research also used quantitative methods, first of all, the time

series analysis. Combination of the quoted research methods makes way for getting as reliable as possible response to the key questions which arose in the analysis of the role and possibilities of branding agri-food products in Serbia.

18.3. Results and discussion

Agriculture is one of the pillars of economic development of the Republic of Serbia, and its significance for the national economy, besides an economic one, has also a social and an ecological component. A basic characteristic of changes in the agrarian structure of Serbia during the transition is that it was realized by conversion of the state/ socially-owned property into private property (investors bought large-area properties with supporting infrastructure, mechanization and facilities), while land turnover between private owners was not recorded (private property was not a subject of more significant transactions in which participated significant, external capital accumulated outside of the agriculture).

This part of the paper will review the basic parameters which decisively affect or could have affect in the future the courses (whether positive or negative) of agricultural development in the Republic of Serbia. The factors of a positive impact on agricultural development include:

- Favourable natural resources (location, land). The Republic of Serbia has favourable natural conditions for development of heterogeneous agricultural production, since it is located in the most favourable area of northern latitude. Together with climate, land represents the most important natural condition for development and conduct of agriculture. According to data of the SORS (Municipalities and regions in the Republic of Serbia, 2013), agricultural land accounts for 65.6% of the Serbian territory. In accordance to the census of agriculture of 2012, the Republic of Serbia has at its disposal 5 346 597 ha of land (agricultural, forest, other land), of which 3 437 423 ha is used agricultural land (0.48 ha of used agricultural land per capita). Even 73% of the used agricultural land are arable lands and gardens (more precisely 2 513 154 ha).
- Regarding water resources, the Republic of Serbia has at its disposal sufficient amounts of water to satisfy its own needs, but only if it uses them rationally and protects them from accidental or deliberate pollution. Significant wealth is represented by mineral and thermo-mineral waters, whose diversity of physical and chemical characteristics puts our country side-by-side with some of the richest areas on the European continent in this respect. Of all disposable waters, less than 8% or 500 m^3/c originates from the national territory, while the rest 92% – are transit waters. In such conditions, cooperation with the countries in the Danube basin gets re-

markable significance, as well as development of regional cooperation in the field of water resources management.

- With numerous agreements on free trade (especially the CEFTA, preferential export to the EU market, Free Trade Agreement with the Russian Federation, General Preferential System for the USA), the Republic of Serbia had created favourable conditions for external trade in goods in the field of agri-food sector. Those agreements provide a chance for domestic producers and exporters to overcome the problem of small market and to increase the use of capacities, on the market several times larger than the domestic one, and to realize price competitiveness and increase in products quality. Objectively, Serbia has great chances to be the leader in agri-food sector on the territory of south-east Europe (export within the CEFTA), and the agriculture sector has already made its way toward the European Union market, because almost half of the total export is directed to the EU market and realizes a significant surplus in exchange (preferential export of agricultural products on the EU market). The Free Trade Agreement with the Russian Federation provides a higher export of Serbian products to the Russian market, and at the same time, it is one of the greatest assets of Serbia in attracting foreign investments. The preferential export of agri-food products from Serbia to the Russian Federation market (which enables, at the start, price competitiveness) and higher export of food to this market can contribute to a decrease in trade deficit that Serbia has with Russia and can help Serbian producers, especially producers and processors of meat, milk and fruit, to achieve, through greater export orders, an economy of scale, full capacity utilization and higher foreign exchange earnings. Serbia should benefit from all the advantages of free trade with the Russian Federation and other member countries of the Customs Union (Belarus, Kazakhstan), until it accesses the EU, because after that, the signed free trade agreements will become invalid.
- Construction and level of technical-technological equipment of food industry mostly was not a limiting factor of agricultural production increase, but it was significantly different in different the sectors. A certain number of companies are leaders of the technical-technological equipment market and they have at their disposal highly-educated personnel, while the other companies lag behind the modern technological and marketing requirements. From the beginning of the privatization process, the highest amount was invested in oil, beer, dairy industry, confectionary industry and water processing industry, while, on the other hand, the lowest investments and technological equipment involvement was registered in sugar, meat, fruit and vegetable processing industry.

The factors of negative impact on agricultural development include:

- Most of arable land is acidified, which results from uncontrolled use of chemicals, and in the Vojvodina region land is saline. Accordingly, the agri-technical measures are necessary aiming to improve the soil structure – soil liming, greater use of organic fertilizers, etc.
- Water regime, although favourable, was insufficiently used. River courses are of little use for irrigation. According to the Census of Agriculture of 2012, the irrigated area on the properties of agricultural husbandries (family agricultural husbandries, legal entities and entrepreneurs) amounts to 99 773 ha, or 2.9% of used agricultural area. Consequently, the agricultural production depends on precipitations, which depend on atmospheric processes and relief characteristics – unevenly arranged in time and space.
- Ownership structure of agricultural land makes a small and fragmented property (used agricultural land per agricultural husbandry amounts to 5.44 ha). The Census of Agriculture of 2012 shows that the average size of totally used land per an agricultural husbandry in Srem is 7.82 ha, and even 70.1% of husbandries have land up to 5 ha. The highest participation is of husbandries which use land up to 1 ha (34.26%).
- There is a relatively low use of food industry (the level of capacities utilization, projected for the ex-YU market, ranges from 30% to 50%). The highest level of utilization regards the capacities for production of mineral water, oil factories, mills, capacities for fruit and vegetable processing, production of confectionery products, breweries, dairies and sugar factories. The lowest utilization level regards the capacities for fodder processing and abattoirs, which causes inefficiency in business and poor competitiveness of this sector.
- Basic limiting factors for more significant and more efficient inclusion of food industry in the international market are: (a) insufficient assortment of food products in regard to supply in the developed world (insufficiently wide range of the existing products, poor introduction of completely new products or improvement of the existing products and processes, insufficient level of added values to the products through greater role of knowledge, innovations etc.; (b) varied quality of market products, whether due to lack of standards, or due to disrespect for and weak control of the existing standards; (c) absence of long-term and firm contractual relations or proprietary relations between food industry and producers of raw materials (primary agricultural production).
- Trade liberalization and decrease of tariff protection (within the World Trade Organization and the Stabilization and Accession Agreement).

- Low competitiveness and innovation of agricultural producers in Serbia. It is necessary to involve small producers into a modern market chain, because they are insufficiently competitive, they trade in informal channels, and they incur high costs of standards introduction.
- Current size and structure of agricultural production, its high extensiveness and oscillation, and low productivity, along with inefficient organization of trading channels and inefficient strategy of all types of agri--subjects which do not respect sufficiently the market signals – are the basic factors which limit the achievement of price competitiveness for domestic producers on the agri-food product market. Accordingly, it is necessary to reassess the existing and development of new business and marketing strategies of agricultural producers, based on developmental abilities and strengths of the producers themselves, but also on knowing producers' preferences, new technologies, marketing approaches and other modern market postulates of economy.
- Unattractiveness of the primary agriculture and food industry area for greater investments, due to undeveloped institutions, unfavourable/ business environment, high investment and political risk, high prices of capital and many other factors, i.e. the presence of numerous costs.
- Changes in buyers' requests, their demands or habits provoke also the changes in functioning of trade chains. It is expected that, during the economic crisis, these changes will be more expressed [USAID, 2009]. According to the same source, due to decreased demand on some markets, the producers must adapt their production to the new requirements; traders must find new markets and adjust to new sale conditions with long delay in payment, or find new points of sale or new funding sources.

Natural conditions and production opportunities, within which the production realization is planned, should be maximally used and developed, primarily by measures which will have a direct impact on production and which will bring effects directly affecting its size and quality. Changing the production character, its purposeful orientation at export, makes the necessary conditions for its more favourable social treatment and its acceptance in the sense of more significant factors of economic stabilization and evident and potential source of a significant foreign exchange inflow. Accordingly, it is essential to establish a market mechanism which will provide technological and production-economic connection between all participants in production all the way to the final consumption market.

In the future, an emphasis must be put on food industry development, which was focused on satisfying the needs and desires of consumers, with an emphasis on innovations, quality, high level of food hygiene and food safety stand-

ards. There are evident large possibilities and potentials of domestic food industry in production of healthy-safe food of high quality, in which the foreign market is very much interested, and which will mean introduction of the ISO standards and HACCP quality system in all processing capacities. A developmental policy of food industry must follow the global trends (such as concentration of capacities and capital, introduction of a highly sophisticated technology), and in these processes the role of a state is very important, especially from the perspective of insurance and competition protection, and control of monopoly position misuse, as well as from the perspective of the fiscal and investment support, above all, to small and medium processing capacities in rural areas of the country.

Taking into consideration the previously mentioned factors of positive and negative impact on the courses of agricultural development, as well as a need to brand the agri-food products in Serbia and, thus, make a connection with their geographic origin, the following part will research a possibility of branding the so-called "Cheese from Golija".

Successful marketing use of the available resources, with the aim of branding, implies a meticulous analysis of internal and external factors which affect cheese production. Also, since it is necessary for the cheese from Golija to be protected by the applicable legislation, it is useful to know the potential buyers with the specific geographic and other peculiarities of the environment in which the cheese from Golija is produced [Cvijanović et al., 2010].

That is to say, Golija is a mountain range in south-west Serbia, west of Raska, whose highest peak is Jankov kamen (1833 m). It is located 40 km south--west from Ivanjica and 32 km north from Novi Pazar [http://www.novipazar.com/turizam/golija/]. The national strategy for sustainable development of Serbia set the goals which protect and improve uniqueness of the Golija mountain range, but also other parts of the country with enviable natural wealth, in order to better develop the country's natural resources.

There are three nature protection reserves in the Golija region. An area of 30 ha of mixed forests of fir, spruce and beech located above Ljute livade has been protected since 1950 [http://www.novipazar.com/turizam/golija/]. There is also a protected forest reserve of fir, spruce and beech on the area of 8.5 ha in the vicinity of Jankov kamen. Due to an impermeable geological stock and abundant rainfall, the mountain is rich with water. The area is characterised by fresh summers and cold winters with lots of snow which last for a long time. Due to a significant impact of the Mediterranean Sea, the climate in the valleys of Ibar, Studenica and Moravica is much more favourable. What grows well in the Golija region are grains, potatoes, fruit, and in last few years there are also many raspberry gardens in the region, but still, the land is the most favourable for forests and meadows.

This mountain range probably owes its name to its size – *golema* means enormous. Huge areas, harsh climate and dense forests are the reasons why the inhabitants often say: "Golija doesn't know what a hero is!" (*ne zna Golija šta je delija*). Without an off-road vehicle or a horse, the mountain range is hard to cross, so you rarely see hikers here. The highest point of the mountain range is a flattened, unnoticeable Jankov kamen (1833 m). Tourist values of geo--morphologic characteristics of the Golija mountain range are reflected in spacious glades over 1200 m and peaks over 1400 m. The Golija range has a good base for ski pistes and for recreation in the form of leisurely walks and mountaineering in almost untouched nature. Tourism in the Golija region develops fast. In past 10 years modern ski-runs and cable cars were created and accompanying ski-events were organised in the Golija mountain range. During the winter season tourists from the entire Serbia and abroad come to the region. The tourists visit Golija region in the summer, too.

The discussed product belongs to the group of means of consumption, i.e. it is meant for final consumption. The cheese from Golija is an agri-industrial product, with very specific features, which is made by milk processing on the area of Novi Pazar municipality, and it is basically consumed by the local population [Cvijanović et al., 2010]. Beside the standardization of the Golija's cheese production technological process, it is also necessary to create and protect: a brand, a brand name, a brand sign, brand colours and a trademark.

It is considered that one of the most important characteristics of the marketer-professionals is their ability of creating, sustaining, protecting and strengthening a brand. More precisely, making a brand could be defined as an art and a cornerstone in marketing. A brand identifies a seller or a producer, gives him more freedom and strength in forming price, it is a sort of a guarantee of quality and a seller's promise that he will continually serve the consumers with the specific set of characteristics, benefits and services [Parausic et al., 2007]. Regarding the cheese from Golija, the brand is very important conceptual aspect of this product, since it is necessary to make the buyer recognize this product by quality and other distinctive characteristics, according to which it is possible to gain a competitive advantage.

It is necessary for the name of a brand to be articulated and written out in words. In case of the cheese from Golija there should not be any hesitation about the brand's name, it unquestionably should stay "the cheese from Golija". Because a brand's name has a significant impact on creating the product's image, the choice of letters, i.e. a logo, deserves special attention. Namely, the logo, first of all, should be easy to write and it should be recognizable upon printing on the Golija cheese.

Because a brand's sign is impossible to speak out, it should represent a recognizable visual identity of a brand – the cheese from Golija, in the form of symbols, design or characteristic lettering. A brand's colour is a visual part of a brand which increases recognition of the name and the brand's sign. In regard to the cheese from Golija, except white colour, there should be one more colour, which would make it uniquely recognizable against the competition.

A trademark is a legally protected and registered brand, a part of a brand or a legal entity, which provides an exclusive right to use basic elements of their visual identity to a legal entity [Cvijanović, 2006]. When all of that is done, it is necessary to gradually carry out strategic and market positioning of a brand, which usually goes through three phases comprising its three business qualities: identity of a brand, image of a brand and goodwill of a brand. At the same time, it is necessary to protect geographically the cheese from Golija by the applicable legislation, in order to preserve this very important name in our country's cheese-making.

A special attention regarding the cheese from Golija will be paid to introduction of the HACCP system, aiming to produce healthy-safe food. The packaging will contribute significantly to the goal.

The modern packaging is much more than the product's wrap or a carton for its transport. Materials which are used inside the packaging must be new, clear and of quality which prevents external and internal damage of the product. Several common elements of packaging should be mentioned: the buyers require packaging which is not harmful to health and which recycles; this is an item more and more highlighted worldwide, because buyers instantaneously take more care about the environment protection; variability is the next feature of packaging; there are no packaging standards in the world and there are numerous various packaging, which differ for small and large consumers; owing to retail trade there are more and more printed packaging in various colours with a visible logo, which attract buyers and connect with a local brand; modern packaging should be made specifically for a given kind of product in order to decrease losses, but at the same time to adjust to the needs and demands; packaging should be practical with very little free space, but it should also protect the product from mechanical damage during transport.

The packaging directly influences the cheese quality, since it protects and preserves the cheese in distribution and storage, and at the same time it significantly influences the decision-making process on buying a certain product. The packaging, in which the cheese from Golija is packed, must contain the basic information for buyers: name and origin of the producer; name of the product, i.e. the cheese from Golija; origin of the Golija cheese; quantity of cheese (weight

and volume); nutritive characteristics of the Golija cheese (energy value, content of fat, proteins, carbohydrates, etc.); manufacturing date; best-before date, etc. Moreover, the EAN code[2] should be clearly highlighted on the packaging.

In order to survive, the companies in a given environment must persistently change and develop [Mihailović, 2011]. Accordingly, the products differentiation is the act of designing a group of significant differences, so one company's products differ from the competition's products [Kotler, 2011]. The products differentiation can be based on a physical difference (features and design) or on psychological difference, made by the economic propaganda. In fact, when buyers are really motivated, the physical differentiation of products (for example, through adding some special features to the product in response to consumers' tastes, innovativeness in adding new features) is more significant, while the psychological differentiation is more important when buyers are emotionally motivated while buying the products, i.e. when they are driven by fashion, a trend in consumption, when consumption of some products is a status symbol, etc. It should be emphasized that not every difference is a differentiator. The difference is worth establishing, if it satisfies the following criteria: importance, emphasis, superiority, communication, impossibility of easy copying, affordability of the difference for buyers and profitability for the company.

The basic goal of products differentiation is to move a demand curve in favour of one's own products and to ensure more freedom in determination of prices [Todorović, Milisavljević, 2000]. The essence of the strategy is the ability and idea of the company that, through a successful creation and promotion of a distinctive product, the company will provide certain differential advantages for customers (in regard to the competitive products), i.e. a general sympathy and loyalty of consumers regarding their product's brand.

A concept of a brand appeared before modern marketing and generally it is believed that it derived from agricultural practices of the Middle Ages. Agricultural producers, whose livestock grazed in open fields, had to mark it to differentiate it from the livestock belonging to other owners. Therefore, they "branded" their animals with iron brands, leaving a visible mark on their skin, which clearly proved the owner's identity. The role of a brand in determination of products from special sources was used in the Middle Ages and it is also used in today's economy.

The economies in the initial phase of development are characterized by a small volume of production and relatively local markets. With bad transport conditions and small possibilities of business expansion outside the direct field of production, consumers could easily determine the source of assets. For exam-

[2] International Numbering System, i.e. the products identification number.

ple, in the beginning of the 19th century in Great Britain, most of communities had their own bakery, brewery and their carpenter. None of them could expand, due to bad roads and railroads, which disabled export of their products to neighbouring communities. People in the local communities knew from where their products derive and did not get them mixed up with competitive products from remote towns. The costumers could, from their own experience, learn how good, reliable and consistent are some producers, while the producers could adjust simple production methods to the needs of individual customers they knew personally. By the personal acquaintances and trust, the producer could probably judge the financial solvency of all their consumers.

The industrialization in the ninetieth century meant that many products can be efficiently produced in centralized factories, and not in small rural manufactories. The efficient centralized factory could produce quantities, which should be consumed by the whole local community. Improvements in transport infrastructure enabled transport of production surplus to the surrounding markets. Something that one company could make efficiently in one factory, the other company could probably repeat in some other factory. Hence, the companies have started to compete on remote markets. This, however, has led to a problem for consumers, whose purchase become more complete. The buyers were not probably very familiar with the remote firms, which had sold the products on their markets, so they were not familiar with neither the quality nor the value of their products. Branding appeared to simplify the situation on the markets where the buyers were facing competitive sources of supply. On the faceless markets of mass merchandise, the consumers who cannot evaluate the product according to a tested personal relationship with the supplier find it harder to get information from some other sources. A brand occurred as a means to provide information on the consistent quality to spatially dispersed consumers, who, due to the presence of intermediaries, had no direct relation with the producers.

On the market characterized by great and diverse selection, a brand is used to select a product, which has started from trust and which satisfies a user's needs because of its specific characteristics. Branding is a traditional way by which firms tend to persuade remote consumers on the consistent quality on their product, where the competitive advantage is realized by great production volume. However, the technological development in the field of data bases and the production management, now enables producers to remain in a direct contact with the consumers, and in that way to restore a relationship a brand has replaced.

Differentiation measures should be introduced which beside significant investments imply also that overstrained differentiation can lead to a situation when unique product is created which interests only a narrower group of cus-

tomers, and, at the same time, hinders selection to buyers. Besides, the activities of the competition through creative imitations can relativize the products distinctiveness, so it loses differential advantage.

A problem of the company's market behaviour conceptualization comes down to a question of selection of an optimal combination of a strategy of market segmentation and products differentiation. It concerns strategies which are used simultaneously, and which should be directed to gain competitive advantage for the company. Basically, it is about finding sufficiently distinctive supply package by the company, i.e. a combination of marketing instruments, and thereby gain a competitive advantage in a given market segment.

The chances provided by the market segmentation strategies and products differentiation are usually not available to agricultural producers, who produce the so-called stock products, i.e. homogenous primary agricultural products ("price-takers"), to which category belong almost all of the individual agricultural producers in our region. The exception is the farmer's market, where the individual agricultural producers can aim their products at the customers who prefer to buy their, rather than the neighbour's products.

Despite a general characteristic of agricultural products homogeneity and impossibility of differentiation, there are numerous agricultural products (especially food products) for which there are real possibilities of differentiation (for example fruit and vegetables, meat), but first of all in retail trade. In regard to a fact that a significant feature of a differentiated product is the producer's designation (trademarks, declaration of origin and quality of products, etc.), the products can be differentiated from the local point of view, from healthy, organic food point of view, etc. Finally, the strategy of market segmentation can be applicable only to agricultural companies, combines and cooperatives. Individual agricultural producers, except for the market or sale to combines and processors, have no opportunity to choose the sale segments of their production.

The quality of agri-food products is a very important aspect of branding. In developed countries, all aspects of agricultural products quality are precisely defined by the standards and the law, thus adherence to these standards preconditions the entry the developed markets. In order for food exporters to seriously compete on the world market, they have to adopt numerous international and European standards, which will greatly reduce the number of procedures and they will approach to those markets and they will remove the trade-technical barriers. For example, a document entitled "Hazard Analysis and Critical Control Points" (HACCP) is the world-renowned system and a sort of passport to export food, not only to the EU. The ultimate goal of this standard is the production of healthy-safe food in the "from farm to fork" chain. In the future, Serbia

will have to pay a special attention to the improvement in quality and to the quality control system. Presently, come into force the new laws in the field related to quality, i.e. the Law on Standardization as well as the adjustment of regulations to the EU legal standards.

Finally, as regards the fact that the quality is closely related to technology and technological changes, it is clear that, this segment follows the changes and harmonizes with the world. That is to say, in modern economy, the advantage is on the side of a company which successfully makes a connection between the technology and marketing in the strategic mix of the company's business functions. For now, the problems of Serbian exporters and the competitive appearance on the foreign market are of dual nature and manifest themselves in marketing concept inapplicability and technological stagnation.

18.4. Conclusion

The product is a very important instrument in the programme of marketing activities. Thereby, it is important to make a difference between the products meant for direct consumption, which are not processed, just cleaned, sorted and packed (e.g. fruit, vegetables, eggs), and other group, consisting of products meant for industrial processing, such as raw materials (cereals, sugar beet, livestock, etc.). Numerous products fall into both categories, they are used for direct consumption by households and big consumers as well as for industrial processing as raw materials.

In short, the peculiarities of products in marketing mix of agricultural products derive from the specificities of agricultural production, as a consequence of their biological character. The production programme of agricultural producers is, in great deal, caused by the land's characteristics, crop rotation, climate, vegetation periods in crop and animal production. Nevertheless, considering that the agricultural products are mainly homogenous, there are poor possibilities for the products differentiation, especially those products which represent inputs for food industry. Except for those agricultural products which are sold on fruit and vegetable markets and/or via supermarkets, there are certain possibilities for differentiation, first of all, through two important characteristics of a product: packaging and labelling. In case of the Golija cheese, it was noticed that it was important to link certain agri-food products to their geographic origin, for the purpose of product recognition.

The domestic firms in past several years have succeeded in establishing a high quality of packaging, promotional materials and have introduced quality certificates, necessary for successful competition on the global market. This is

one of the reasons to increase the consumers' interest worldwide in processed fruit and vegetables, fruit brandies, fruit juices, mushrooms, etc. Likewise, more and more firms from Serbia focus on the highly profitable segments of food market, organic and delicatessen, such as truffles and similar. What enjoys special interest on fairs are, *inter alia*, domestic mushrooms of the companies Igda and Marni, as well as aivar and jams of the firm Foodland, homemade frozen fruits of the Sicoberry from Kraljevo, dried fruits of the Agranela from Valjevo, juices of the company Nectar, as well as the products of the company Arex marzipan, Aroma, Libertas, Pionir, Polimark and Fidelinka. As a result of a successful presentation at fairs held so far, Serbia has been profiled as producer of delicatessen and organic food, and therefore our companies no longer negotiate only on trade exchange, but also on joint ventures.

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19. Small scale organic farmers – source of growth in the Bosnia and Herzegovina agri-food sector[1]

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Abstract

Bosnia and Herzegovina as a hilly-mountainous country, with mainly unpolluted environment, available labour resources, small mixed farms is considered to be very suitable for organic farming which is seen as a comparative advantage of the country. Even with all these preconditions, the sector remains underdeveloped. Therefore, the aim of this paper is to assess and point out main factors which stimulate or hinder farmer's decision to adopt organic agricultural practice. Structured questionnaire was developed and distributed to organic and conventional producers of medicinal and aromatic plants. Results of this study are profiles of both conventional and organic farmers, socio-demographic differences, differences in level of knowledge about organic agriculture production, openness for cooperation and capability to innovate. This will provide valuable inputs for policymakers responsible for shaping rural development policies that are tailored to the local conditions.

Keywords: organic farmers, comparative advantage, adoption of organic agricultural practices
JEL codes: Q12, O13

19.1. Introduction

Agriculture production is described as a key sector for economic growth of most of the developing countries [Venkat, 2012], while organic agricultural production, both land use and demand for products represent one of the fastest growing markets in the world [Morgera et al., 2012; Willer, Lernoud, 2016]. The demand for these agricultural products surpasses the supply several times, which enables small producers/countries to compete in a highly competitive global market. Supermarkets worldwide are increasingly more competitive to

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offer products which are produced, stored, processed without the use of synthetically produced fertilizers and chemicals [IFOAM, 2009]. Consequently, the value of the organic agriculture sector worldwide grew rapidly, from USD 15 billion in 1997 [Lockie et al., 2002] to USD 47 billion by 2006 [Morgera et al., 2012] and USD 72 billion in 2013 [Willer, Lernoud, 2016].

Organic agriculture in Bosnia and Herzegovina (B&H) is identified as a comparative advantage of the country [FMPVŠ, 2015] and still presents a great possibility for development of new economic activities, such as tourism, increased food exports or special food production. The country is mountainous where 62% of the land is more than 700 m above sea level, and it is situated between the continental and Mediterranean climatic zones. The varying climatic conditions in B&H offer wide possibilities to agricultural production, both in terms of crop choice and cultivation of land farming, fruit-growing, vine-growing, vegetable growing and forage crops and in terms of livestock production. Traditional production without usage of chemicals and heavy machinery keep soil fertile, unpolluted and easy to convert into organic soil. The B&H agricultural sector in the last period faced several changes, reforms and challenges, while the sector comprises only 8.3% of total gross domestic product [MVTEO, 2016], it at the same time plays a significant role in employment of B&H citizens. In 2015, 147 000 or 17.9% of the total population were employed in this sector [MVTEO, 2016]. The current unemployment rate is 27.9% [WB, 2016]. Shifting development of agricultural sector towards production of value added products, such as organic agriculture products, may have a significant impact on lowering unemployment rate of the country and, therefore, may influence overall growth of the economy in the country. Initial momentum for development of organic sector was provided by Universities, NGOs, private companies, governments and international donors in the 1980s, was not able to further facilitate development of the sector. In 2011, 343 hectare (ha) was under organic agriculture, which represents only 0.02% of total arable land in B&H. On contrary, 78 550 ha was used for wild collection of medicinal plants, berries, fruit and mushrooms [Willer et al., 2013], which represent a significant share of total organic production in B&H. This lack of progress took place notwithstanding the comparative advantage and big opportunity to improve economic situation in the country, while practicing organic farming can contribute also to the future protection of nature, biodiversity, people health and welfare of animals [IFOAM, 2009].

Even with favourable conditions for organic agricultural production, the sector still remains underdeveloped. The question is, why has the sector failed to make higher impact and which driving forces can facilitate growth and development of the organic sector in Bosnia and Herzegovina and, consequently, lead

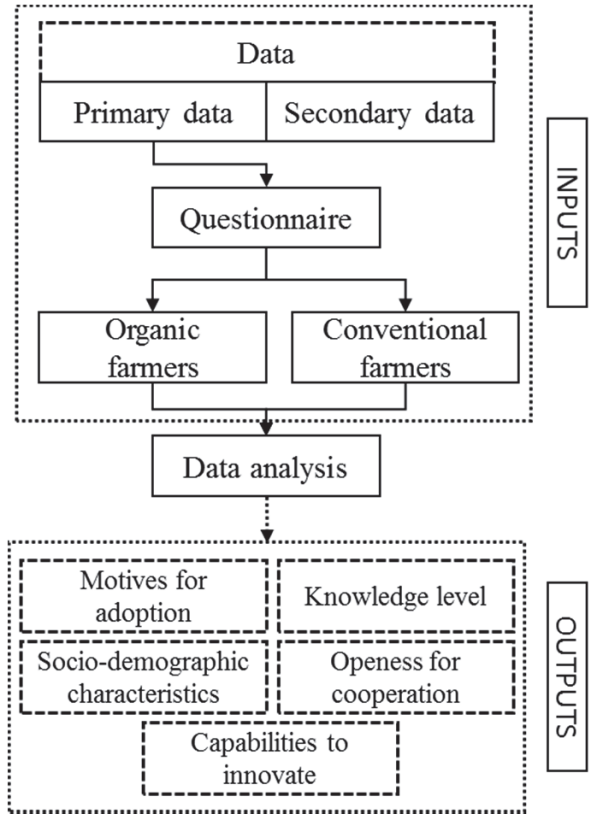
to the overall economic development? Therefore, the aim of this paper is to analyse: (i) profile/motives for adoption of both conventional and organic farmers, (ii) socio-demographic differences, (iii) differences in the level of knowledge about organic agriculture production, (iv) openness for cooperation and (v) capability to innovate. Answering the above-mentioned question will provide valuable inputs for policymakers responsible for shaping rural development policies that are tailored to the local conditions and, consequently, stimulate growth of the organic sector and overall situation in the country.

19.2. Research method

Various studies observed the relationships between farmers' adoption of organic farming, motivation for participating/membership in cooperation, capability to innovate and a variety of demographic characteristics. The current economic theory, which deals with the application of innovation and organic agricultural production, is considered as an innovation that is based on the assumption that the potential application of innovation depends on numerous factors namely: maximization of profit, the level of prices of inputs and outputs, the impact of specific policies, the behaviour of individuals, the availability of natural resources, etc. [Koesling et al., 2008]. In more detail, the application of innovation depends on the following factors, which are most generally classified into two groups: non-financial and financial factors [Serra et al., 2008]. Non-financial factors mostly include farmers individual characteristics, attitudes [Burton et al., 2008; D'Souza et al., 1999], life style, concern towards environment and animals [Best, 2010; Mzoughi, 2011], availability of technical and financial information, geographical/climate conditions and farm structure [Burton et al., 2008]. Group of financial factors mainly include market demand, subsidies and support, transactional costs, premium price. In addition, the level of knowledge and experience of farmers plays an important role in making a decision on the application of innovations in agriculture. As it can be seen, numerous factors can influence farmer's decision to adopt organic farming practice and while most of the studies are done in developed countries, only few are done in developing countries [Karki et al., 2011]. This study concerns a developing country and can be seen as a pioneer and pilot study in B&H as none similar study has been done before. The study was done using structured questionnaire which was developed and administered, with face-to-face interview, to an organic and conventional farmers. The questionnaire contains four parts, first part of the questionnaire was made of questions regarding: the socio-demographic characteristics of the respondents (type of farm, age, gender, education, membership status, access to the extension services and loan, access to the professional trainings, farm equipment, purchase of inputs, farm plan). The second part of the ques-

tionnaire is measured with a 5-point Likert scale, labelled from 1 (disagree with the statement) to 5 (totally agree with the statement) and was made of questions regarding: factors influencing farmer's decision to adopt organic or conventional agricultural practice, factors measuring the level of knowledge about organic agriculture production and factors measuring farmer's openness for cooperation and capability to innovate. The research model is presented on the figure bellow.

Fig. 1. Research model



Source: own elaboration.

Data analysis – Descriptive statistics, Chi-square test, Reliability analysis were used. The analysis was performed with IBM SPSS 20. Due to the low Cronbach's alpha values, lover than the minimum threshold of 0.70 [Nunnally, 1979] it was not possible to perform Confirmatory Factor Analysis (CFA) and Structural Equation Modelling (SEM). This provided the research limitation which implies the necessity to adjust/modify or change the presented model for further research in this area.

19.3. Results and discussion

There are numerous studies observing and investigating the relationships between farmer's behaviour and variety of sociodemographic characteristics. With fast changing demographic profile of farming population [Cole, Donovan, 2008; Hamblin, 2009], it is important to understand how these factors influence decision-making process in order to promote effective action [Below et al., 2012] and better designing and targeting environmental programmes [Lambert et al., 2007; Bohnet et al., 2011]. In this study, we tried to create a socio-demographic profile of both organic and conventional farmers in B&H. The main results and identified statistical differences are presented in the following Table.

Table 1. Socio-demographic profile of organic and conventional farmers

Factor	Organic farmers (%)	Conventional farmers (%)	Sig. (2-tailed)
AGE			
Younger than 25		6.3	
26-35	25.0	31.3	**.049***
36-55	75.0	50.0	
Older than 55		12.5	
GENDER			
Male	37.5	62.5	**.011***
Female	62.5	37.5	
EDUCATION			
Primary school	12.5	12.5	
Secondary school	62.5	43.8	**.020***
Faculty	25.0	37.5	
Higher degree		6.3	
Other			
MEMBERSHIP IN COOPERATIVES			
YES	87.5	81.3	
NO, I do not have information about them		6.3	.567
NO, we do not have any cooperatives nearby		6.3	
NO, cooperatives do not offer anything important for me	12.5	6.3	
LOAN ACCESS			
YES, I am satisfied	25.0	12.5	
YES, loan conditions are not good	37.5	25.0	.080
NO	37.5	62.5	
Other			
TRAININGS			
YES, I am satisfied	87.5	50.0	
YES, but most of the trainings are not good		37.5	.402
NO		12.5	
Other	12.5		
EXTENSION SERVICES			.133
YES, I am satisfied	75.0	31.3	
YES, but they do not offer new and important information	25.0	18.8 50.0	
NO			
Other			

Table. 1, cont.

Factor	Organic farmers (%)	Conventional farmers (%)	Sig. (2--tailed)
SALE OF PRODUCTS			
One-year contract	50.0	18.8	.563
Direct sale	37.5	68.8	
Other	12.5	12.5	
QUANTITY OF PRODUCTS			
Up to 25%		6.3	
From 25% to 50%	25.0	6.3	.140
From 50% to 75%	25.0	12.5	
Over 75%	50.0	75.0	
EXPORT OF PRODUCTS			
NO	75.0	75.0	
Up to 25%		12.5	.504
From 25% to 50%	12.5	6.3	
From 50% to 75%	12.5		
Over 75%		6.3	
FARM EQUIPMENT			
Excellent, have all necessary equipment	37.5	31.3	
Very good, have most of the necessary equipment		31.3	.140
Good, have equipment but often borrow equipment	25.0	37.5	
Bad, always borrow equipment	37.5		
FARM PLAN			
YES	50.0	81.3	.170
NO	50.0	18.8	
BUYING INPUTS			
Buying from certified producers	50.0	37.5	
Buying in local agricultural pharmacy	12.5	50.0	.528
Buying in cooperatives	25.0		
Other	12.5	12.5	

Source: own calculation.

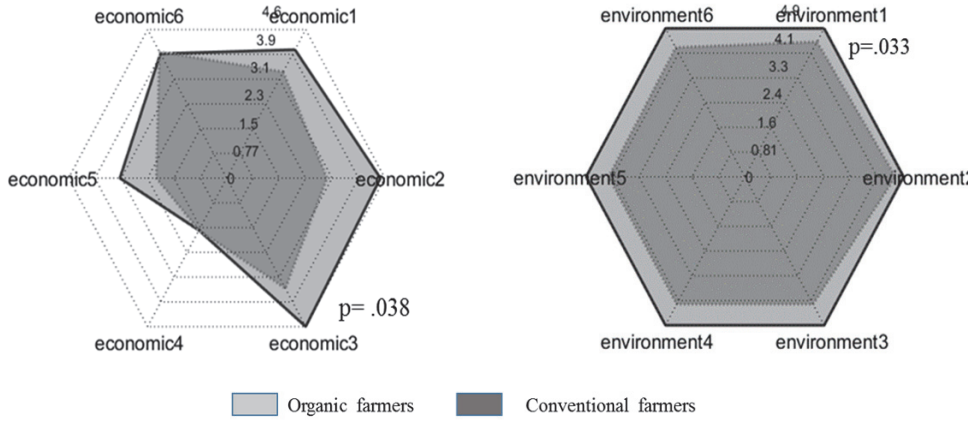
As it can be seen from Table 1 statistically significant difference between organic and conventional farmers profile are found in three factors, namely: age, gender and education. It seems from the profile of organic farmers that they tend to be older than conventional farmers, less educated and more women are involved in organic agricultural farming.

Similar results are already found in Koesling et al. [2008] research, while some other research identifies organic farmers with the following profile: small farms, younger farmers, high educational level, often from urban environments, with less experience in agriculture [Vogel, 1996; Lockeretz, 1997; Padel, 2001]. Common finding is that most of the organic producers are women [Burton et al., 1999; Jansen, 2000]. Some other interesting characteristics, identified in this research, which shape the profile of organic and conventional farmers (but have no statistically significant difference) are:

- Most of organic and conventional farmers are part of cooperatives;
- More of conventional farmers do not have access to loans, and both organic and conventional farmers are not satisfied with loan conditions;
- Both organic and conventional farmers participate in trainings, while more conventional farmers are not satisfied with trainings;
- More of organic farmers have access to the extension services;
- Surprisingly, more organic farmers have one-year contracts as a way of selling their products, while more of conventional farmers use direct sale;
- Most of organic and conventional farmers sell more than 75% of their products and most of the products are sold on domestic market, only small proportion is exported;
- Both organic and conventional farmers have good farm equipment, while more of the organic farmers borrow equipment;
- Surprisingly, more of conventional farmers have plans for their farms;
- Both organic and conventional farmers are buying inputs from either certified producers or from local agricultural pharmacy.

The second part of this study aimed to identify the main motives for adoption of organic or conventional agricultural practices. Investigating motives for adoption of different concepts has a long history and probably started with initial research that dealt with diffusion of innovation [Rogers, 1983] and theory of planned behaviour [Ajzen, 1991; Ajzen, Fishbein, 1980]. Later on, some of the studies focused on identification of factors that influence adoption of specific concepts and technologies that lead to sustainable development. What all of the above-mentioned concepts have in common is the presence of numerous factors, financial and non-financial that influence/shape farmers' decision/behaviour. As it is already stated, due to the low level of Cronbach's alpha values it was not possible to perform advanced statistical analysis like CFA and SEM and test the overall model. Therefore, we use Chi-square test to test statistical differences between organic and conventional farmers' motives to adopt specific agricultural practices. In this research, we found that economic, environmental and social motives play a significant role in adoption of organic and/or conventional agricultural practices. The main results are presented in the following figures.

Fig. 2. Economic (left) and environmental (right) motives for adoption of organic and conventional agricultural practices



Legend:

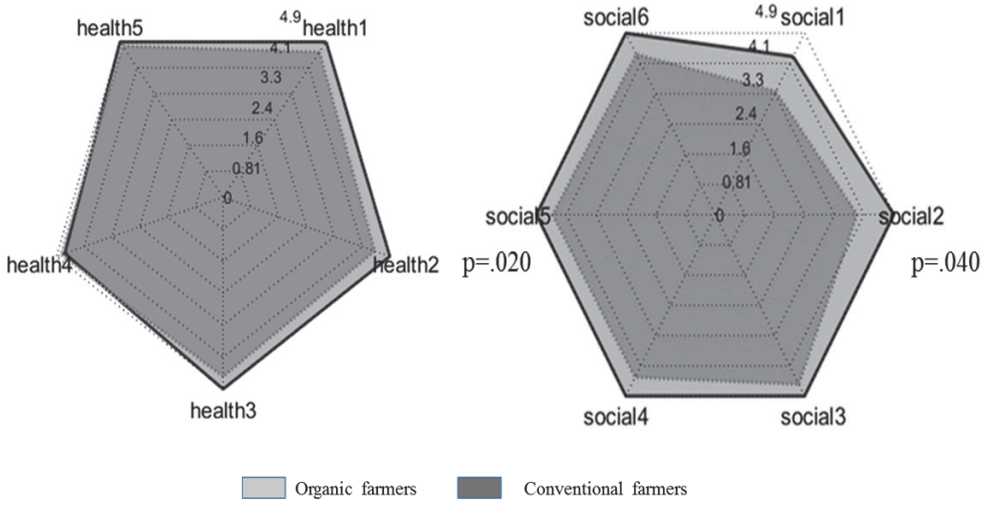
economic1 – The prices of the production materials are too high
economic2 – I can easily sell products
economic3 – Demand is constantly growing
economic4 – Financial support for this production is satisfactory
economic5 – Product prices are satisfactory
economic6 – There is a chance for export

environment1 – I care about biodiversity
environment2 – I care about the bees
environment3 – I care about prevention of soil erosion
environment4 – I care about prevention of land destruction
environment5 – I care about prevention of water pollution
environment6 – I care about animal welfare

Source: own calculation.

Economic factor named "Demand is constantly growing" is rated higher by organic farmers than conventional farmers and statistically significant difference is found here. Some authors find similar conclusions, stating that in developed countries, important reason for adopting organic agriculture are access to the market, consumer demand [Dabbert et al., 2004; Sepannen, Helenius, 2004; Bellon, Lamine, 2009] and higher generation of profit [Dabbert et al., 2004; De Cock, 2005]. In this study, we found that statistically significant difference exists in factor named "I care about biodiversity". Organic farmers, especially in later phase of their work are more motivated by non-financial factors comparing to the conventional farmers [Padel, 2001; Rigby et al., 2001; Flaten et al., 2006]. Environmental concern is identified as one of the main factors for adoption of organic agriculture in the research by Fairweather and Campbell [2003], Storstad and Bjørkhaug [2003], Koesling et al., [2008].

Fig. 3. Health (left) and social (right) motives for adoption of organic and conventional agricultural practices



Legend:
health1 – I care about consumer health
health2 – I care about my own health
health3 – I care about family health

health4 – I want to produce quality and health-safe products
health5 – I want to consume high-quality and safe products

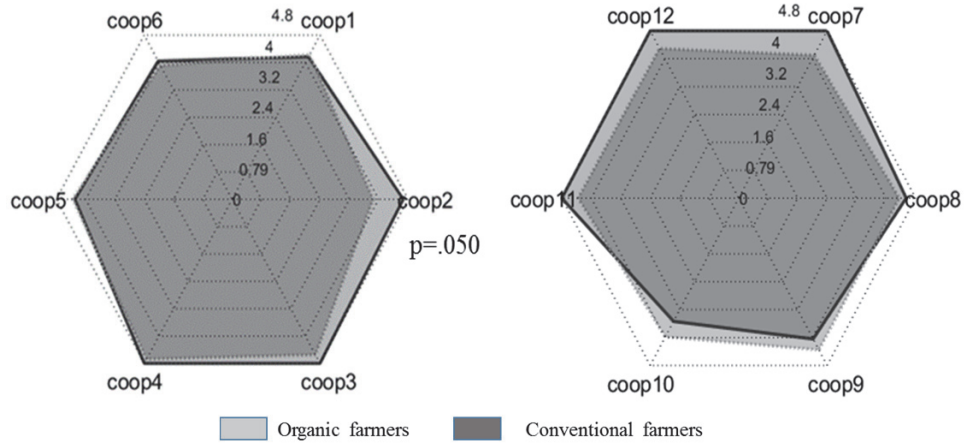
social1 – I have more time for the family
social2 – I live better
social3 – I have the opportunity to socialize with other agricultural producers
social4 – I have the opportunity to socialize with consumers
social5 – I feel safer
social6 – I set new goals and tasks
social7 – I have the opportunity to learn and acquire new skills

Source: own calculation.

Some authors state that the most influential non-financial factors are social [Mzoughi, 2011], concern towards health and environment [Padel, 2001; Koesling et al., 2008; Best, 2010; Cranfield et al., 2010]. Surprisingly, in this study health concern is not identified as important motive for adoption of organic or conventional agricultural practice. On the contrary, two social factors named: "I live better" and "I feel safer" are identified as statistically significant differences between organic and conventional farmers.

The most influential factors of farmers decision for joining cooperatives are opportunity to learn and build capacity to innovate, mainly through stakeholder interaction, farm demonstrations, experiments, on-site visits, etc. [Editha, 2016]. The main results from this study that aimed to identify organic and conventional farmer's reasons for joining cooperatives are presented in the following figure.

Fig. 4. Factors influencing farmer's decision to join cooperatives

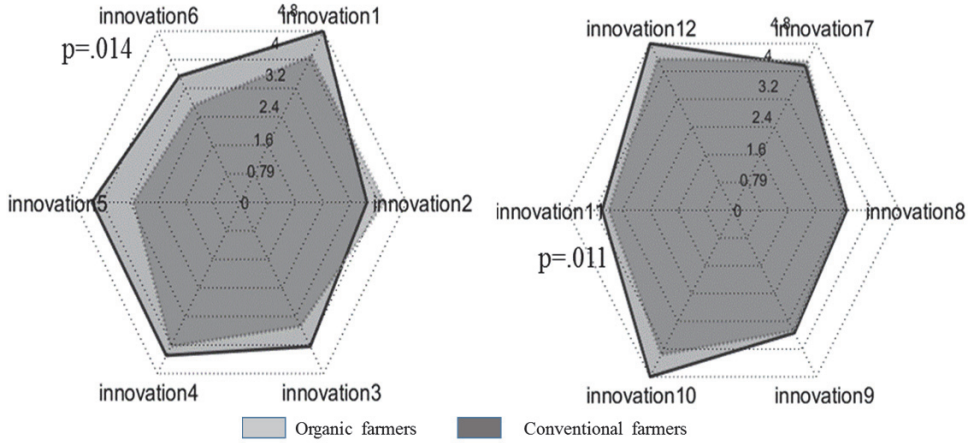


Legend:
cooperatives1 – Compared to other producers I am a very successful farmer
cooperatives2 – I earn more than most farmers
cooperatives3 – By joining cooperatives, we become more competitive
cooperatives4 – Joining cooperatives encourages better work and more productive farms
cooperatives5 – Joining cooperatives we can easier achieve subsidies in production
cooperatives6 – By joining cooperatives, we can easily get the loan
cooperatives7 – By joining cooperatives, we achieve higher prices for products
cooperatives8 – By joining cooperatives, we make discounts for the purchase of seeds
cooperatives9 – By joining cooperatives, we have discounts for the purchase of fertilizers
cooperatives10 – By joining cooperatives, we are achieving faster generation of revenues
cooperatives11 – By joining cooperatives, we build trust between manufacturers
cooperatives12 – By joining cooperatives, we build trust between consumers
Source: own calculation.

Only one factor named: "I earn more than most farmers" is identified as statistically significant difference. This result shows us that side-effect of joining cooperatives may include farmers' motivation to perform better than colleagues – "competitive spirit". The previous research showed that farmer's decision to join cooperatives is mostly dictated by better connection, building trust between members and working on mutual beneficial works. The above-mentioned activities should result in cooperation, increase in bargaining power, risk sharing of experiments and innovation application, etc.

When it comes to the farmer's capability to innovate, only two factors are identified as statistically significant differences between organic and conventional farmers. Main results are presented in the figure bellow.

Fig. 5. Factors influencing farmers' capability to innovate

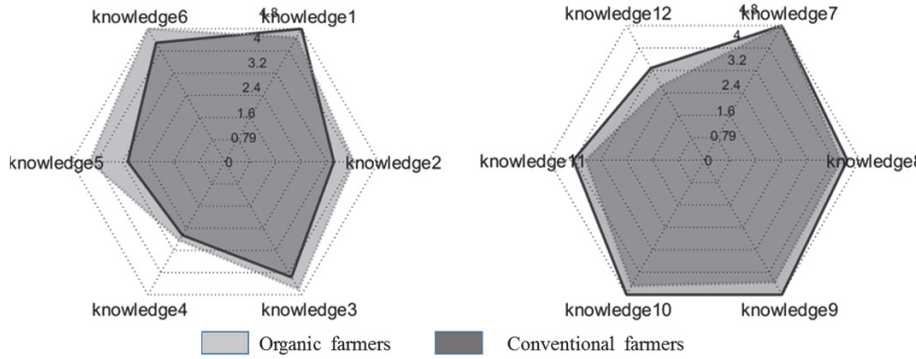


Legend:
innovation1 – Every year, I am visiting farm fairs where I get new ideas and advice
innovation2 – I prefer to produce products that are traditionally produced in my area
innovation3 – We generally believe in advisory services
innovation4 – The government does not encourage farmers' innovation
innovation5 - Credit funds are not satisfactory
innovation6 – I get the most important information by watching TV (news, documentary shows, etc.)
innovation7 – I get the most important information reading newspapers, agricultural journals, etc.
innovation8 – I get the most important information communicating with other farmers
innovation9 – I receive the most important information from counselling representatives
innovation10 – I get the most important information in the grabs / associations
innovation11 – I often go to training
innovation12 – Trainings are not tailored to the needs of farmers (topics are of no importance)
Source: own calculation.

In the previous studies it is identified that most of the farmers gain the knowledge reading different materials from mass media, doing the experiments, or visiting other farms and communicating with other farmers [Editha, 2016]. Similar results are found it this study, where most of the farmers get the most important information by watching TV (news, documentary shows, etc.) and by participating in different trainings.

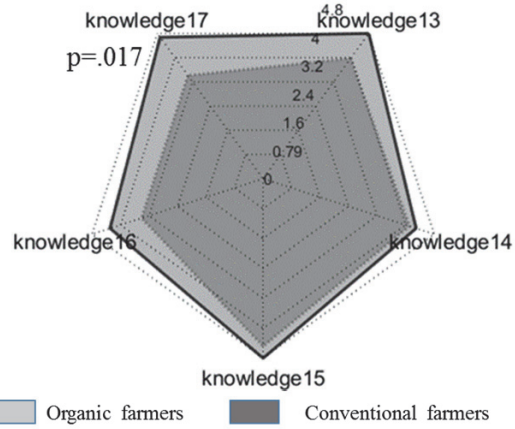
The last part of the study aimed to identify differences between the level of knowledge about organic agricultural practices of organic and conventional farmers. The main findings are presented in the following figures.

Fig. 6. Knowledge level of organic and conventional farmers



Legend:
knowledge1 – In organic agriculture there is no use for synthetic fertilizers
knowledge2 – In organic agriculture, yields are lower
knowledge3 – In organic agriculture, product prices are higher
knowledge4 – Organic is the same as traditional production
knowledge5 – Organic is the same as "healthy" production
knowledge6 – Organic production must be certified
knowledge7 – Seeds must be from organic farming
knowledge8 – Organic agriculture demands too much "paperwork"
knowledge9 – Organic products are of better quality
knowledge10 – Organic farming is labour-intensive
knowledge11 – Organic agriculture is modern agriculture
knowledge12 – Special machines are used in organic agriculture
Source: own calculation.

Fig. 7. Knowledge level of organic and conventional farmers



Legend:
knowledge13 – In organic farming plants and animals are better exploited
knowledge14 – Organic farming uses techniques, sorts and breeds better adapted to local agro-ecological conditions
knowledge15 – Organic farming is based on biological cycle monitoring
knowledge16 – Organic agriculture has more contacts with consumers
knowledge17 – Organic agriculture has more contacts with processors
Source: own calculation.

As it can be seen from Figure 6 and Figure 7, only one factor named "Organic agriculture has more contacts with processors" is identified as statistically significant difference. This can be connected with previous statement that most of the organic farmers have one-year contracts as a way of selling their products, probably to processing industry and consequently have more contacts with them. The last two figures also can point out that the level of knowledge about organic agriculture is pretty much the same as for organic and conventional farmers. This implies existence of some problems that hinder farmers' decision to adopt organic agricultural principles and, therefore, further research in this area is necessary.

19.4. Conclusion

With available and unpolluted land, available labour, favourable weather and geographical conditions, and small and diversified farms, Bosnia and Herzegovina have all preconditions for organic farming. Unfortunately, the sector remains underdeveloped and healthy food, environmentally sound agriculture, which is rooted in local economies, seems not to be prioritized by the government, NGO's, processing industry, etc. This pilot study aimed to identify the main factors that hinder/stimulate farmer's decision to adopt organic agricultural practice and contribute to the further development of organic agriculture in B&H and, therefore, to stimulate overall growth of the economy. In addition, there are significant differences between numbers of studies as well as between factors that influence adoption of organic agricultural practices in the developing and the developed countries. Therefore, it is important to conduct more studies in the developing countries.

Study limitations, mostly due to the low level of Cronbach's alpha values imply the necessity to provide further model testing, some modification, additional questionnaire testing or separate analysis of each part that is done in this study. Main results show that organic farmers' profile is as following:

- Older than conventional farmers, less educated and more women are involved in organic agricultural farming;
- Economic, environmental and social motives play a significant role in adoption of organic and/or conventional agricultural practices;
- Reason for joining cooperatives may be farmers' motivation to perform better than colleagues – "competitive spirit";
- Capability to innovate depends on availability of information and availability of different trainings;

- Same/similar level of knowledge about organic agriculture within organic and conventional farmers.

This pilot study provides some information that can be used as valuable inputs for policymakers responsible for shaping rural development policies that are tailored to the local conditions and, consequently, to stimulate development of organic sector as well as overall economic situation in Bosnia and Herzegovina.

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Annex I

List of conferences organised by the Institute of Agricultural and Food Economics – National Research Institute from 2005 to 2017 under the three editions of the Multi-Annual Programme and conferences proceedings related thereto.
All publications from research held under the Multi-Annual and monographs of proceedings from conferences organized by the Institute are available on the website: www.ierigz.waw.pl.

Multi-Annual Programme 2005-2009
"Economic and social factors conditioning Polish food economy development after Poland EU accession"

Conference	Conference Proceedings
Economic and social factors conditioning Polish food economy development in the first year after Poland's accession to the EU, 12-13 December 2005, Warszawa, Poland	
Polish rural areas and agriculture two years after Poland's accession to the EU, 31 May 2006, Pułtusk, Poland	
Economic and social factors conditioning Polish food economy development after Poland's accession to the EU, 11-12 December 2006, Pułtusk, Poland	
The Polish agro-food economy after the four years of the EU membership, 12-14 December 2007, Pułtusk, Poland	Series: Multi-Annual Programme 2005-2009, no 67.1
Farms in Central and Eastern Europe – today and tomorrow, 4-6 June 2008, Białowieża, Poland	Series: Multi-Annual Programme 2005-2009, no 98, 98.1
Development of the agri-food sector in Poland at the background of global trends, 8-10 December 2008, Pułtusk, Poland	Series: Multi-Annual Programme 2005-2009, no 101
The structural changes in the rural areas and agriculture in the selected European countries, 1-3 June 2009, Sterdyń, Poland	Series: Multi-Annual Programme 2005-2009, no 128, 128.1
Economic and social conditions of development of the Polish food economy after Poland's accession to the European Union, 30 November – 2 December 2009, Pułtusk, Poland	Series: Multi-Annual Programme 2005-2009, no 184, 184.1

Publications are available on the website:
https://www.ierigz.waw.pl/publikacje/raporty-programu-wieloletniego-2005-2009

Multi-Annual Programme 2011-2014
"Competitiveness of the Polish food economy in the conditions of globalization and European integration"

Conference	Conference Proceedings
European Union food sector after the last enlargements – conclusions for the future CAP, 14-16 June 2011, Rajgród, Poland	Series: Multi-Annual Programme 2011-2014, no 6.1
Expectation and challenges for food sector from the EU enlargements perspective, 17-18 November 2011, Warszawa, Poland	Series: Multi-Annual Programme 2011-2014, no 31.1
Competitiveness of food economy in the conditions of globalization and European integration, 5-7 December 2011, Pułtusk, Poland	Series: Multi-Annual Programme 2011-2014, no 60, 60.1
Proposals for CAP 2013+ and competitiveness of food sector and rural areas, 18-20 June 2012, Kazimierz Dolny, Poland	Series: Multi-Annual Programme 2011-2014, no 61, 61,1
Economic, social and institutional factors of agri-food sector growth in Europe, 10-12 December 2012, Ciechocinek, Poland	Series: Multi-Annual Programme 2011-2014, no 67, 67.1
The new solutions of the CAP 2013+ to the challenges of the EU member states agriculture, 12-12 June 2013, Suchedniów, Poland	Series: Multi-Annual Programme 2011-2014, no 91, 91.1
The new EU agricultural policy – continuation or revolution?, 9-11 December 2013, Jachranka, Poland	Series: Multi-Annual Programme 2011-2014, no 99, 99.1
Achievements and challenges in the food sector and rural areas during the 10 years after EU enlargement, 12-14 May 2014, Rawa Mazowiecka, Poland	Series: Multi-Annual Programme 2011-2014, no 123, 123.1
The CAP and competitiveness of the Polish and European food sectors, 26-28 November 2014, Józefów, Poland	Series: Multi-Annual Programme 2011-2014, no 146, 146.1

Publications are available on the website:
https://www.ierigz.waw.pl/publikacje/raporty-programu-wieloletniego-2011-2014

Multi-Annual Programme 2015-2019
"The Polish and the EU agricultures 2020+. Challenges, chances, threats, proposals"

Conference	Conference Proceedings
Economy versus the environment – competitiveness or complementarity, 23-25 November 2015, Jachranka, Poland	Series: Multi-Annual Programme 2015-2019, no 23
Competitiveness of the economy in the context of social policy measures, 22-24 June 2016, Jachranka, Poland	Series: Multi-Annual Programme 2015-2019, no 26, 27.1
Risk in the food economy – theory and practice, 23-25 November 2016, Jachranka, Poland	Series: Multi-Annual Programme 2015-2019, no 48, 49.1
Strategies for the agri-food sector and rural areas – dilemmas of development, 19-21 June 2017, Licheń Stary, Poland	Series: Multi-Annual Programme 2015-2019, no 52.1

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