The CAP and national priorities within the EU budget after 2020

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INSTITUTE OF AGRICULTURAL AND FOOD ECONOMICS NATIONAL RESEARCH INSTITUTE

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The CAP and national priorities
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The Common Agricultural Policy of the EU (CAP), which dates back to 1962, is a political and social partnership between Member States and farmers, between city dwellers and rural residents, between the non-agricultural population and those living from agriculture. Its aim is to: support the improvement of agricultural productivity, care for good living conditions and stable farmers' income, support actions to preserve the climate, sustainably manage natural resources, protect rural areas and landscape, maintain multi-functionality of rural areas, as well as retain jobs in agriculture and agri-food industry. Achieving these goals is financed from the EU budget and Member States' budgets through a range of different programmes and support activities. This diversity results from the fact that there is no monolithic model of the European agriculture. Its contemporary characteristic is the growing deagrarianisation of the national economy, including the rural economy. The role of agriculture is the inalienable necessity to produce food, but it is being marginalized in the national economy, in the process of creating added value and participation in employment. Agricultural policy consists, thus, in multifunctional development of agriculture and rural agriculture.

European agriculture is characterised by strong polarisation. At one extreme, there are economically strong, modern, large, commercial farms, and at the other – small farms, where non-agricultural employment remains an additional or main source of income. The evolution of social and economic structures in agriculture and in rural areas, which we observe today, and which we will see in the near future, will consist in a decrease in the number of the so-called "middle-level" farms and, at the same time, moving the released production resources to one of the two extreme groups, most often the larger ones. This process aims at the optimisation of the production scale.

Agriculture is a sector of the economy strongly dependent on atmospheric conditions and weather. There is a time gap between the demand for agricultural production and consumer demand. On the local and global scale, there is an increasingly stronger impact of human activity on climate change. Business uncertainty in agricultural activity and its impact on the environment justify intervention activities of the public sector in agriculture. The following actions are taken under the CAP:

- Supporting agricultural income – direct payments aim to stabilize income and reward farmers for production with respect for the natural environment or supply of public goods;

- Stabilising agricultural markets - intervention buying and storage, tariff restrictions, food aid, production labelling, influencing rapid changes in prices and demand as a result of oversupply of production or threats resulting from other premises, e.g. health-related;
- Supporting development and transformations in rural areas – to influence, through national or regional programmes, how diverse challenges and needs are faced by Member States' rural areas.

The instrumentation of impact on agriculture and rural areas in the EU-28 is extremely comprehensive. Only general objectives remain common for all Member States, while each country has the full freedom to choose the implementation of those activities which it considers the most urgent. National operational programmes, although based on the EU framework regulations, are implemented on the basis of internal regulations, which means that the responsibility for their implementation remains in the competence of national authorities. The agricultural policy for 2014-2020 has the characteristics of an interdisciplinary rural development policy and cohesion policy, a policy whose final shape within the framework of certain powers has been determined by the Member States. However, does it comprehensively solve all the problems of agriculture, food economy and rural areas in all Member States?

The challenges that make the next reform of the CAP and rural development policy after 2020 necessary include: limiting the risk in agricultural activity, striving to improve productivity and counteracting low income in agriculture, preventing outflow of people from peripheral areas and maintaining agricultural activity in areas characterised by difficult natural conditions for agriculture, shortening distribution chains and support for small farms, protection of the natural environment (including soil, water resources, and biodiversity) and cultural landscape, adaptation to climate change (including limiting greenhouse gas emissions, counteracting effects of extreme events), development of renewable energy sources, food safety and quality as well as animal welfare.

Some of these challenges are related to the objectives of the CAP already identified in the Treaty of Rome, others have emerged as a result of social, economic and environmental evolution of agriculture. They are also often the result of human activity, population growth and agricultural activity. This applies to biodiversity, soil fertility, air and water quality, as well as climate change. After 2020, all Member States will face the challenge of achieving simultaneous improvement in resource efficiency and restoration or maintenance of natural capital on rural areas. In addition to the basic function of agriculture, i.e. food production, it will play a major role in the actions aimed at bio-economy and environmental protection, social, environmental and economic sustainability, renew-

able energy production, waste reduction, as well as biomass and nutrient recovery. It will also be important to strive to maintain a proper balance between agriculture, forestry and spatial development, as well as striving to reduce greenhouse gas emissions.

The debate on the new shape of the CAP after 2021, and the budget of the European Union for 2021-2027, already shows which problems and contradictions will need to be addressed by the Member States and the Community authorities. They concern the instruments and policy objectives as well as financial possibilities. The draft budget presented by the European Commission clearly highlights the connection between its shape and compliance with the rules adopted by the Member States in the Accession Treaties. There are also other new challenges ahead of the EU: the migration crisis and border protection, strengthening the defence potential, need to increase expenditure on research and innovation, creation of new perspectives for young people, protection against catastrophic risks, etc. Rural areas and agriculture, and the development of food production remain the priorities in the EU policy, and the budget for these objectives will certainly be adapted to the new realities and opportunities.

The draft Regulation of the European Parliament and of the Council on the financing, management and monitoring of the CAP and its proposals is not yet binding. Consultations are ongoing in all EU countries, and final decisions will be made in 2019. The Commission wants to present the draft agricultural budget after the completion of negotiations and arrangements. According to the current proposals, the Common Agricultural Policy in 2021-2027 will be financed from two funds: European Agricultural Guarantee Fund (EUR 286,195 million) and the Agricultural Fund for Rural Development (EUR 78,811 million), a total of EUR 365 billion. The whole EU budget in the next programming period will amount to ca. EUR 1279 billion, including the CAP share of approximately 28.5 percent. This means a reduction in agricultural spending (in the current programming period, it amounts to 37.6% of the whole budget). In real terms, the budget for agricultural expenditure, compared to the current period, will decrease by about 5%, and for direct payments – by about 3.9%. Another important change is the reduction of the value of direct payments per one household up to EUR 100,000. In the new CAP budget, Poland can expect financing for the first pillar expenditure in the amount of EUR 21.2 billion and for the second pillar – EUR 9.2 billion.

The agricultural policy after 2021 will bring e.g. a new (in relation to the 2014-2020 period) approach to the implementation of the agricultural budget. One of the most important decisions is to oblige the Member States to develop a CAP national strategic plan, which will require better coordination of activities

under this system. This means a commitment to carry out an in-depth assessment of needs at local, regional and national levels. It is also important to ensure compliance of the aid with the WTO provisions. As regards these decisions, it should be emphasised that the new regulations are aimed at improving the efficiency of financial outlays for aid in selected agricultural sectors. The project of providing financial support for selected production lines only for recognised producer organisations and their associations is also a new idea. The possibility to suspend payments in the event of non-compliance of the planned expenses with their implementation is also a new notion. It is assumed that unspent money shall be transferred to countries that implement investment programmes more effectively. Goals such as support for the direct payment system of sustainable development, income of young farmers as well as voluntary services for climate and the environment have been particularly highlighted in the new budget perspective. It is also proposed to maintain, up to 10%, budget transfers between the first and the second pillar of the CAP. Maintaining the principle of monitoring rural areas, but at the same time limiting their nuisance shall also be a very important condition for subsidising agriculture. It will be important for Polish agriculture to support the transformation of the agrarian structure by providing development assistance to small and medium-sized farms.

International scientific conference "The CAP and national priorities within the EU budget after 2020" organised by the Institute of Agricultural and Food Economics – National Research Institute from 11 to 13 June 2018 in Lidzbark Warmiński was one of the most important national debates on how the oldest and some of the most basic EU policies on rural areas and agriculture will be implemented under the changing external conditions. The conference was not only an opportunity to meet scientists and experts from different countries, but it also had the advantage that it was characterised by multithreading, covering discussions on issues such as: interdependencies between finances, the budget and agri-food and rural policies, national agri-food strategies and rural adjustments to financial and budgetary constraints, reactions of farms, domestic rural households and food industry enterprises to financial and budgetary constraints, modern paradigms of the EU agriculture and their operationalisation, adaptability of farms in the EU countries to the economic and social processes taking place in the global food economy, or budget constraints in the new EU financial perspective. The aim of the conference was also to present the national priorities of the selected EU Member States with regard to the CAP after 2020. In 6 plenary sessions, featuring 28 papers and panel discussions, scientists from over a dozen countries made a joint assessment of the effects of the EU agricultural policy and pointed to main objectives and challenges in the future. In particular, the issues discussed included:

- Challenges and assumptions for the EU budget after 2020 – Prof. Andrzej Kowalski;
- Transformations of the Polish agriculture in retrospect – Prof. Józef Zegar;
- Risk management in agriculture as a response to budget restrictions – Prof. Jacek Kulawik, PhD Joanna Pawłowska-Tyszko, PhD Michał Soliwoda, MSc Grzegorz Konat;
- Effectiveness of the budget allocated to sustainable agricultural and rural development under the CAP: financial and economic analyses perspectives – Prof. Masahiko Gemma, Prof. Mihály Vörös;
- Financial dimension of the CAP in the light of the public choice theory – Prof. Szczepan Figiel, PhD Marek Wigier;
- Examples of failures in the current Czech system of investment subsidies allocation – PhD Marie Šimpachová Pechrová, MSc Ondřej Chaloupka, Prof. Tomáš Doucha;
- Impact of the CAP reform at farm level in Italy. Lessons from the past and matters at stake for the future – Prof. Fabio Pierangeli, Prof. Andrea Povellato, PhD Maria Rosaria Pupo d'Andrea, PhD Alfonso Scardera, PhD Francesco Vanni;
- The Common Agricultural Policy of the European Union – main challenges for a new budget – Prof. Anatol Pilawski, PhD Justyna Góral;
- The adoption of agricultural insurance to manage farm risk: preliminary evidences from a field survey among Italian and Polish farmers – PhD Elisa Giampietri, Prof. Samuele Trestini, PhD Magdalena Śmiglak-Krajewska;
- The Common Agricultural Policy and the farm households' off-farm labour
- supply – PhD Jason Loughrey, Prof. Thia Hennessy;
- The U.S. Margin Protection Program: a simulation of the potential effects on dairy farms profitability in Veneto (Italy) and Wielkopolska (Poland) – PhD Cristian Bolzonella, MSc Federico Vaona, Prof. Martino Cassandro, Prof. Tomasz Szwaczkowski;
- The possible implementation of the income stabilization tool in Wallonia – Prof. Philippe Burny, MSc Ludovic Andres, MSc Christine Fadeur, Prof. Philippe Lebailly;
- The risk management and the insurance of agricultural production – Prof. Drago Cvijanović, Prof. Željko Vojinović, Prof. Otilija Sedlak, Prof. Dejan Sekulić;
- Economic and social features of contemporary development of the Czech agriculture and rural areas – Prof. Věra Majerová, Ing. Tereza Smékalová;
- To whom belongs the future of rural prosperity 2020+? – PhD Rita Vilkė, PhD Živilė Gedminaitė-Raudonė;

- Reasons for integration of the cohesion policy and rural development policy planning process in the regions – PhD Paweł Chmieliński, Prof. Marcin Gospodarowicz;
- Estimation of multiplier effects for agricultural economic security of Poland, Ukraine and Azerbaijan in the conditions of budget decentralization – Prof. Vasyl Zalizko, MSc Kanan H. Salayev;
- The model of innovative rural entrepreneurship development designing – Prof. Lesia Zaburanna, Prof. Tetiana Lutska;
- Specificity of economic integration processes in agriculture – Prof. Julian Krzyżanowski;
- Agricultural policy in the service-driven economic system – PhD Dalia Vidickiene, PhD Zivile Gedminaite-Raudone;
- State and opportunities of the Hungarian and Polish agricultural trade in the light of CAP budgetary restrictions – PhD Tamás Mizik, MSc Zoltán Rádai
- Russia: on the way to Agriculture 4.0 – Prof. Boris Frumkin;
- Implementation of innovation projects in the context of "Agribusiness 4.0" in Ukraine – Prof. Lesia Kucher;
- Direct producer support measures and level of harmonization with Common Agricultural Policy in Bosnia and Herzegovina – MSc Alen Mujčinović, Prof. Sabahudin Bjramović, MSc Merima Makaš;
- Dilemmas of support for short food supply chains in the context of their economic, environmental and social sustainability – PhD Agata Malak-Rawlikowska, Prof. Adam Wąs, Prof. Edward Majewski;
- Smart manufacturing – the potential of new digital technologies and large data sets in the food industry – PhD Katarzyna Kosior;
- The role of organic farming in the CAP, the rural development programme, with particular regard to subsidies – PhD Gyarmati Gábor;
- Land concentration and competitiveness of agricultural enterprises in Ukraine – PhD Anatoliy Kucher;
- The impact of globalization on farmers income: evidence from Romanian and Poland agriculture – MSc Anca-Marina Izvoranu, MSc Henriette Cristiana Calin, MSc Ioana-Claudia Todirica.

The discussion held during the conference shows that the agriculture and food economy of the EU Member States is in a period of prosperity, but also has many fundamentally different problems that should be solved in the near future. They concern, e.g.: structural conditions, including growing economic diversities of farms, development disparities between the North and the South of Europe, disproportions in regional development, increasingly visible environmental

and climate challenges and related risks in running agricultural activity, sustainable and multifunctional development of rural areas, depopulation of these regions, in particular of peripheral nature, competitiveness and innovativeness of farms or food quality and safety. All these challenges require a change in the way of social thinking at all levels of the decision-making process. It seems necessary to redefine the assumptions of the EU agricultural policy and cohesion policy and their implementation at the national and regional level, change the forms and conditions of co-financing of these policies by the EU budget, national budgets and private entities, change mentality at the level of the entire societies and ensure greater acceptance of integration activities, including the rejection of extreme national aspirations. The above postulates cannot be implemented as instructions. Finding the right path requires discussion to be able to create a better decision-making system.

This monograph consists of 22 chapters, separate in terms of content, but substantively consistent in presenting the main theses of the papers delivered by their authors at the Lidzbark Warmiński conference, as well as a short introduction and conclusion. Articles in the monographs provide material and substantive arguments in the discussion that may serve future political decisions regarding the future of the EU's CAP after 2020. These solutions may prove useful in the experience of various countries resulting from the evaluation of previous solutions, especially due to the high diversification of their level of economic development, the structure of agricultural economy or challenges related to environmental protection and multi-functionality of rural areas.

The conference in Lidzbark Warmiński was the 23rd international scientific conference organised by the Institute as part of the Multi-Annual Programme. The list of conferences and related publications organised by the Institute, as part of the Multiannual Programme series so far has been included in the Annex, at the end of this monograph. All publications from previous conferences, scientific monographs and other materials are available at www.ierigz.waw.pl. The first Multi-Annual Programme implemented by the Institute in 2005-2010 was called "Economic and Social Factors Conditioning Polish Food Economy Development after Poland EU Accession". In the second edition of the Multiannual 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 strategic at the same time, because it creates real premises for supporting decision-making processes for public policies.

At the end, I would like to thank all those who contributed to the organisation of the conference in Lidzbark Warmiński and the publication of this monograph, i.e. the scientific and organisational committee, authors of the papers, reviewers and technical correction staff. We are aware that despite the huge scientific and organisational effort, we have not exhausted all the problems related to the analysed issues. One thing is certain - this subject is so important that these issues should be the subject of further scientific research and public debate, and the conclusions should be passed on to the public, administration and politicians.

I cordially invite you to continue reading through the publication.

Dr Marek Wigier,

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1. CAP between 2020 and 2027 – legislative proposals of the European Commission

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Abstract

The stage of making arrangements for the CAP financing rules in the new financial perspective (2021-2027) is nearing its completion. In May 2018, the European Commission has presented the proposals for Multiannual Financial Framework and draft regulations. Informal legislative proposals of the European Commission provide for sweeping changes in terms and conditions of the CAP implementation.

The major elements of the stance of the European Commission do not imply the end of works on the shape of the CAP in the coming years. The toughest part is still ahead and it is very likely to finalize only after the elections to the Parliament and election of a new Commission. But we might risk to state that the direction of changes charted in the discussed legal acts will be continued.

Keywords: Common Agricultural Policy, financial perspective 2021-2027, strategic plans, market regulations, direct payments

JEL codes: Q18, Q14

1.1. CAP financing

The stage of making arrangements for the CAP financing rules in the New Financial Perspective (2021-2027) is nearing its completion. In May 2018, the European Commission has presented the proposals for Multiannual Financial Framework (Table 1) and draft regulations. Informal legislative proposals of the European Commission provide for sweeping changes in terms and conditions of the CAP implementation. Draft regulations impose on Member States the obligation to develop strategic plans. This obligation will require the Member States to apply a far more coordinated approach to both the support areas and the implementation system. So far the programme-based implementation of support in the CAP was used only in the 2nd pillar (RDP), but in the next perspective it is tabled to apply the programme-based system also to the 1st pillar, integrating the

entire preparation and implementation process. In line with the proposals of the Commission, the plan preparation will require e.g. analyses as regards the specific objectives selected for country-level implementation. The analytical part will require more justification, in the aspect of the needs identified for a given area and application of the given type of intervention. These actions will enforce in-depth assessment of the needs at the local, regional and national level.

The obligation to ensure compliance of the realised aid with the WTO's decisions and principles of granting State aid is to fall to the Member States submitting their CAP strategic plans. This will require time-consuming analytical process, involving higher administrative and financial burdens. Development of a seven-year implementation plan specifying targets as well as annual targets will necessitate, especially as regards the outcome and impact indicators, to use detailed and actual data at the programming stage. Any possible breaches in this respect may result in sanctions, including financial ones, at the stage of annual settlements.

Table 1. Multiannual Financial Framework 2021-2027 (liabilities, EUR million)

Specification	2021	2022	2023	2024	2025	2026	2027	Total
Agriculture and maritime policy	52,536	52,782	53,066	53,227	53,389	53,552	53,712	372,264
European Agricultural Guarantee Fund (EAGF)	40,300	40,527	40,791	40,931	41,072	41,214	41,357	286,195
European Agricultural Fund for Rural Development (EAFRD)	11,259	11,259	11,259	11,259	11,259	11,259	11,259	78,811
European Maritime and Fisheries Fund	827	843	860	877	895	913	926	6,140

Source: data of the European Commission.

Analysis of proposals of draft regulations governing the principles of granting aid co-financed from the CAP and cohesion policy budget points to a major reconstruction of the implementation model, especially as regards the CAP.

Projects assume financing of agriculture from two funds:
− the European Agricultural Guarantee Fund,
− the European Agricultural Fund for Rural Development.

In order to spend agricultural funds from the EU budget it is essential for a Member State to have an operational management and control system allowing for reliable settlement and approval of expenditures.

The proposals of the Commission assume refinement of the definitions especially of:

– irregularities,
– governance structures forming institutions involved in the process of financing, management and control of the CAP,
– force majeure to properly interpret the possibility of departure from rules without financial consequences for the beneficiary.

The draft regulations also give a possibility to suspend payments in case of:

– failure to submit the annual statement of expenditure,
– unsatisfactory progress in implementation of the objectives of the National Strategic Plan for Common Agricultural Policy,
– improper functioning of the governance structures.

The proposals included in the regulations impose on Member States an obligation to develop strategic plans. The CAP strategic plan is to be developed with regard to all agricultural sectors that a Member State decided to cover with support. This means that it will be a very broad and multithread document.

The plan has to include indicators and a monitoring system. The propounded solutions closely tie the monitoring system for implementation of the CAP strategic plan with assessment of its realisation by verification of the achieved and planned targets in four categories:

– output indicators,
– outcome indicators,
– impact indicators,
– context indicators linked to different aspects with respect to the trends in the economy, environment and social aspects.

Sanctions are envisaged for failure to perform the annual plans.

1.2. Market regulations

Informal proposals of the European Commission do not anticipate greater changes in market regulations. A large part of the changes in the regulations is technical. The proposals call for deletion of the reference to the sugar definition, deletion of the article establishing marketing years for respective agricultural sectors, making more flexible the authorization system for vine plantings (does not apply to Poland), deletion of the obligation of the European Commission to report to the European Parliament and to the Council of the EU, which has al-

ready expired, deletion of the detailed provisions concerning the sugar sector, including sugar production quotas, approval of enterprises, which as a result of the last reform ceased to apply as of October 1, 2017.

The new proposals include e.g.:

– introduction of provisions regarding *control and sanctions* with respect to trade standards,
– introduction of an abridged one-step procedure for objection to registration of a geographical indication,
– harmonisation and facilitation of registration procedures for geographical indications of agricultural products, foodstuffs and flavoured wines,
– change in rules of application of the wine grape varieties to make wine by taking into account the possibility to use *Vitis Labrusca* varieties and their hybrids with *Vitis vinifera*,
– addition of the possibility to complete some names of wine categories of wines with the term "de-alcoholised" or "partly de-alcoholised".

The Commission proposed also instruments to extend the range of possibilities of influencing the situation conducive to the crisis on agricultural markets and improving the risk management methods. A Member State will be able to use such measures / interventions as: setting up and/or supplementing mutual fund by recognized producer organisations, investments in tangible and intangible assets, joint storage of products manufactured by producer organisation or by members of a producer organisation, withdrawal of products from the market for free distribution, etc. Also the inclusion of commercial quality issues with regard to the control and sanctions system is a positive element falling within the scope of market management policy.

The possibility to use support to e.g. pigmeat, milk and dairy products, eggs, poultry meat and hops represents a flexible approach aimed at the needs of a Member State. However, because the possibilities of support are limited to the producer organisation only, in case of Poland this support will not be realised. In Poland such organisations do not exist at present, expect for the fruit and vegetable sector.

Many controversies are raised by the announcement concerning liquidation of export refunds, because of overproduction on many EU markets and tightening competition on the global market.

1.3. Direct payments

Informal proposals of the Commission provide for changes in the system of direct payments. Five types of payments are planned:
1. basic income support for sustainable development (BISS),
2. Complementary Redistributive Income Support for Sustainability (CRISS),
3. Complementary Income Support for Young Farmers (CIS-YF),
4. voluntary schemes for the climate and the environment ("Eco-schemes"),
5. coupled income support (CIS).

The basic income support for sustainable development will be granted to genuine farmers per each eligible hectare as an annual decoupled support, instead of the Basic Payment Scheme (BPS) and the Single Area Payment Scheme (SAPS). Member States determine the definition of "genuine farmer" and "eligible hectare". Member States would be obligated to allocate at least 60% of the national financial envelope (excluding capping) for BISS, at least for direct payments.

BISS is to be awarded basically without using entitlements. However, the Commission provides for the possibility to award support also based on entitlements for the Member States that applied the BPS under the regulation No. 1307/2013.

The Member State will have the option to award to small farmers (defined by the Member State) a lump sum that will replace all other direct payments.

Complementary Redistributive Income Support for Sustainability is to be a mandatory instrument for Member States which is to ensure redistribution of support from larger to smaller or medium-sized farms. The payments will be paid out as annual decoupled support. The flexibility for Member States will consist in establishing the amount per hectare and the maximum number of hectares per farmer for which the redistributive support will be paid. The amount granted per hectare cannot exceed the average national amount of direct payments per hectare.

The presented documents do not clarify how much funds can be allocated to this support and whether the funds obtained from capping are to be the only source of financing this support. The draft also does not show any maximum level for which it will be possible to award support. It is also unclear whether it will be possible to set a minimum threshold (as currently 3 ha in Poland).

Complementary Income Support for Young Farmers will be voluntary (but including the 2nd pillar, at least 2% of the direct payment envelope has to be appropriated for alternation of generations). It will be granted to farmers that start operations (there is no indication of when the start of operations would be expected). The support is to be paid as annual decoupled area support. The Mem-

ber States will be flexible as regards defining the eligibility criteria and the definition of a young farmer should include: (1) maximum age limit – no more than 40 years, (2) conditions referring to the fact of being a farm manager, (3) requirements regarding trainings or relevant skills.

Presently, the payment for young farmers is a mandatory instrument which is entitled to farmers who start their operations on an agricultural farm for the first time or who have already started such operations within 5 years prior to the first submission of the BPS / SAP application and whose age in the first year of the application submission does not exceed 40 years. In Poland, the payment is awarded to an area greater than 50 ha. Moreover, it is necessary to explain whether on the basis of the proposed regulations it will be possible to exclude from support young farmers who are legal persons.

Voluntary schemes for the climate and the environment. The Member States can, but do not have to implement the instrument. The payment may be awarded to "genuine farmers" who will undertake to observe on the eligible hectares agricultural practices favourable to the climate and the environment which were defined by the Member State. These practices are drawn up to meet one or more detailed environmental or climate objectives of the CAP. The support has the form of an annual payment to eligible hectares such as: additional payments or compensating payments for the whole or part of the incurred additional costs or lost income. The payments refer to liabilities which go beyond the basic management requirements (SMR) and good agricultural and environmental conditions (GAEC) that:

– go beyond the minimum requirements concerning the use of fertilisers and plant protection products, animal welfare and also other obligatory requirements specified by the national and the EU law,
– are other than the obligations under the "Payments for management of liabilities regarding the environment, climate and other" (but cohesive with them).

The proposal to execute Eco-schemes as an additional, non-mandatory instrument for a Member State to support pro-environmental measures enables to make CAP more flexible and development of national obligations compliant with the diagnosed needs.

Coupled income support may be awarded in the same sectors as at present (cereals, oilseeds, legumes, flax, hemp, rice, nuts, starch potato, milk and dairy products, seeds, sheepmeat / goat meat, beef / veal, olive oil, silkworms, dried fodder, hops, sugar beet, sugar cane and chicory, fruit and vegetables and short rotation coppice). The maximum percentage of the financial envelope for support will be 13% with an option to increase it by a maximum of 2%, on condition that this increase will be allocated to support protein crops. Annual payment

per hectare or animal may be awarded only to these sectors which are important because of economic, social and environmental aspects and are in a difficult situation. Support in these sectors is to impact better competitiveness or sustainable development and quality. Coupled payments are very important in the family farm support system and also to maintain the diversity of the EU agricultural production or to maintain jobs in agriculture and sustainable production systems. Among the new proposals, what should be noted is the possibility of taking into account improved quality as one of the objectives of coupled support use. The proposal restricting the possibility of granting support only in selected sectors is controversial. Poland has repeatedly advocated the extension of the list of sectors whose support in this form is permissible or called for complete abandonment of such a list in favour of an open catalogue.

The draft regulations institute a *mandatory reduction of direct payments*, direct payments (in total) would be granted to the limit of EUR 60,000. Remunerations (and equivalent costs) related to agricultural activities would be deducted from the payment amount, while the amounts obtained as a result of the reduction would be used for the redistributive payment. In the event that the result of the *ex ante* analysis shows that they cannot be fully utilized in this way, the surplus could be used for other decoupled payments. If as a result of such management, there would still be some funds left, they could be used for the second pillar measures.

The mechanism of payment reduction will result in changes in the level of funding of individual direct support instruments and possibly an increase in the funds of the second pillar of the CAP at the expense of direct payments (it is unlikely that the deduction of labour costs would completely neutralize the results of coupling). At the same time, the payment reduction mechanism redistributes funds from a relatively small group of the largest beneficiaries to the other farms, and so, to some extent, it reduces the diversification of the level of support for respective farmers.

The proposals of the Commission uphold the possibility to shift funds (up to 10% of the national envelope) between pillars. In case of a transfer from the direct payments to the RDP, the European Commission provides for a possibility to increase the shift by: (1) 10 percentage points as far as additional funds will be used for measures related to the climate and the environment, (2) 2 percentage points provided that this increase concerns funds for the implementation of measures to support young farmers by at least 2%. The proposed level of the shift (10%) is much lower than the one presently used in Poland (25%).

1.4. Rural monitoring

Draft regulations introduce also an obligation for the Member States to **monitor rural areas** (rural area monitoring system). The system is to enable observations of the activities performed by the farmer on the field with the use of e.g. data from Sentinel satellites. Rural land monitoring is to replace the present control system in place. Acquiring images for inspection is possible to be every few days (5-6), and access to them is to be full and free.

The European Commission already in 2018 introduced a possibility of voluntary use of the area monitoring by the Member States. According to the opinions, the optional possibility of using the new approach will enable the Member States to prepare for the full implementation of monitoring, including adaptation of IT procedures and tools from the beginning of the new financial perspective.

The rural monitoring system means a 100% control level. The control will cover agricultural activity, without the need to conduct time-consuming and burdensome for farmers on-site controls. Field inspections will be necessary only in special cases.

The major elements of the stance of the European Commission do not imply the end of works on the shape of CAP in the coming years. The toughest part is still ahead which is very likely to finalize only after the elections to the Parliament and the election of a new Commission. But we might risk to state that the direction of changes charted in the discussed legal acts will be continued.

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2. Holistic risk management as a response to budgetary constraints

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Abstract

The latest perspective of the Common Agricultural Policy (CAP) focuses in particular on risk management (RM) issues due to the need for aligning the CAP to the new agricultural operating conditions. The future of agricultural policy has become, as never before, increasingly climate-dependent and threatened by typical agricultural issues of concern, including strong dependence on weather conditions, price volatility, natural disasters or risk of new diseases that can potentially destabilise the farmers' income. Changing tendencies of the existing agricultural policy can also underlay the uncertainty of farm functioning. The on-going debate focuses on income stabilisation tools and shifting from the existing programmes oriented at direct payments and other agricultural support measures. Thus, reorientation of agricultural policy brings the risk of losing the existing support and the need for seeking the new income stabilisation tools. The CAP proposes a holistic approach to risk management and a set of instruments addressing the budgetary constraints. It is, therefore, appropriate to state that limiting budgetary support may contribute to development of a more comprehensive risk management system in agriculture.

2.1. Introduction

The next CAP perspective will be most probably related to budgetary constraints that may substantially reorientate the existing agricultural development policy in the European Union (EU). These changes bring the risk of losing the existing support and the need for seeking the new income stabilisation tools.

Thus, the newest CAP perspective focuses on risk management issues as the area to seek solutions that could ensure financial security with minor support from the state budget. The newest CAP 2020+ perspective is largely oriented towards such issues as: supporting private management strategies by enhancing farm advisory, aligning the management systems with the individual sectors and regions or development of the new financial instruments supporting risk management. The issue of risk management in agriculture is not new. Nevertheless, despite numerous concepts of risk management, vast majority of them focuses only on the most common types of risk, including production, financial or market risks. Such approach fails to consider the interlinkages between the individual risk groups as well as impact of risk on the organisation's objectives or strategy [Krysiak, 2011]. The holistic risk management concept that can respond to budgetary constraints presents a completely different approach.

The purpose of this study is an attempt to assess the possibilities of implementing the holistic approach to risk management in agriculture. The study assumes that the OECD's holistic concept is currently the most relevant to position the political interferences in risk management in agriculture.

2.2. The holistic risk management concept

The contemporary concept of holism has been introduced in many scientific fields and refers to a philosophical development theory and social science methodology. Holism is a theory that establishes the primacy of viewing the social phenomena as wholes. In ontological terms, it emphasizes that a whole should be perceived more comprehensively than only as a collection of elements due to interconnections, dependencies and interactions between them, which leads to development of a new structure of specific dynamics. In methodological terms, holism is a theory that establishes the primacy of viewing the social events as wholes and claims that the focus in explaining social phenomena should be on analysing the whole rather than individual elements, since such elements – viewed autonomously without a reference to the whole – can be wrongly understood.

Thus, holistic risk management is an all-encompassing approach, requiring management of all types of risk to which an organisation can be exposed. According to J. Lam, analysing of individual risk groups separately, paying no attention to their interconnections, is ineffective due to dynamic structures of different risk groups and strong interlinkages between them [Lam, 2014]. These interlinkages are addressed by G. Monahan who notes that there is an inextricable link between risk and strategic objectives of an enterprise [Monahan, 2008].

For the purposes of this study an assumption was made that the holistic risk management covers, for instance, comprehensive identification (along with interaction analysis) and reduction of risk by way of implementation of risk coping instruments and strategies in agriculture into the conventional and sustainable approach frameworks.

The holistic approach to risk management was proposed by the OECD in 2009. It stands up to a conventional linear concept perceiving each type of risk on a farm as a separate problem, seeks autonomous strategies for risk reduction and includes public policies into this system. The essential problem with linear approach is that is it misses any interconnections between the elements, thus, it is difficult to expect that the analysis will go as planned. Therefore, the OECD proposes the holistic risk management concept constituting the integrated system composed of a set of relations between different risk groups, available management tools and strategies and public policy measures. One should note that in holistic approach all risk groups affecting the farm are interconnected and perceived as a single issue of concern that enables selecting the best possible risk reduction strategy. To perform such risk management, all elements (risk, strategies and policies) should be handled as a whole, including also interactions between these elements. Linear and holistic approach to risk management is presented on Figure 1.

Figure 1. Linear vs. holistic risk management strategy
Linear concept
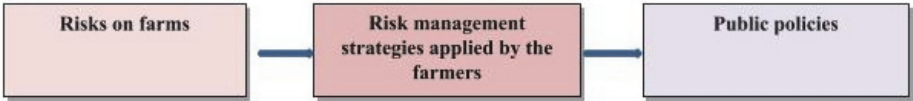
Holistic concept
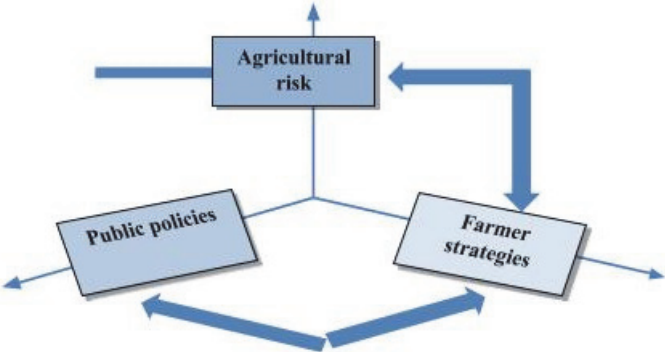
Source: own elaboration on the basis of Managing Risk in Agriculture: A Holistic Approach, OECD, Paris 2009.

One should strongly emphasize that the economic practice does not generally recommend a single and universal risk management method. On the contrary, each country needs to establish its own holistic system aligned to its preferences and primarily to its budgetary, organisational and administrative capabilities. Conceptual framework of the holistic risk management system is presented in Table 1. It shows that, while establishing such system, one needs to consider many different risk layers at different management levels, starting from normal risks of high probability and relatively low losses via market transferable risk to catastrophic risk that is infrequent, but causes a large amount of damage. In addition, the presence of catastrophic risk in agriculture is among the justifications for budgetary support, but it can be reduced within the farm by applying e.g. relevant agricultural techniques. This means that a farmer is able to face these groups of risks by optimal selection of coping strategies, which, however, requires accounting for correlations between these risks. This task may be difficult without an explicit support of public institutions.

Table 1. Framework of holistic risk management in agriculture

Risk management instruments and strategies	Risk layers		
	Normal risk – low but repeatable losses	Market transferable risk	Catastrophic risk – infrequent but large, systemic losses
farm-located (diversification, savings, innovation)			
market (insurances, options and futures)	Each country needs to establish its own holistic system		
ex ante **policies (principles of *ad hoc* aid)**			
ex post **policies (providing support)**			

Source: own elaboration on the basis of Evaluation on the EU Common Agriculture Policy (CAP) 2014-2020, OECD, Paris 2017.

Each country seeks to establish the holistic risk management templates to follow the interactions between the individual risk groups. Exemplary extreme solutions for selecting the risk management strategy are New Zealand and Spain (Fig. 2). In New Zealand, the state budget remains uninvolved in the risk management system, which leaves a large margin for free market functioning. The Spanish risk management policy has been shaped differently. Risk management policies and strategies dedicated to agriculture in this country are burdensome to the budget and the subsidies displace the other risk management instruments. The examples of risk management systems presented on Figure 2 demonstrate that the holistic approach enables establishing unique solutions, strongly correlated with the strategies and directions of agricultural development in a given country.

Figure 2. Risk management strategies and policy in the New Zealander and Spanish agriculture

a) New Zealand

Strategies and policies	Type of risk		
	catastrophic	market	normal
Farms			• financial management • grazing and feed management • flexibility in making business decisions
Market instruments		• forward contracts • interest rate security • shares in coopeatives	
ex ante policies	biosecurity water and pest management counteracting undesired events	framework for free market functioning and regulations	
ex post policies			

b) Spain

Strategies and policies	Type of risk		
	catastrophic	market	normal
Farms			• production diversification • financial management
Market instruments		• forward contracts • shares in coopeatives	
ex ante policies	hybrid insurances under the public-private partnership		direct payments and price gap support under the CAP
ex post policies	ad hoc aid in case of disaster		

2.3. Holistic risk management in agriculture – key issues of concern

One of the key CAP orientations applied in risk management system is the diversification strategy that may be used as an equivalent of greening under the Common Agricultural Policy. Data presented in Table 2 demonstrate that the income volatility coefficient in diversified farms fluctuated between 0.12 in Germany and 0.42 in Spain, while in monoculture farms the value of this coefficient reached between 0.16 in Germany for sugar beet and 0.69 in Canada for

wheat and oats. According to the provided data, the farms of diversified crop structure demonstrate lower income variability comparing to monoculture farms. This applies to practically any analysed country. There is a need to emphasize that trade-off that may be reflected by the selected sowing structure, has its limitations since in many cases it requires reorientation of the existing farm development strategy. Thus, explicit and simple recommendations for the most optimal RM systems are difficult to form, since the risk is always correlated with trade-off, where on the one hand, selecting a given strategy enables the delivery of specific goals, while on the other, it may limit the benefits gained in effect of implementation of the other strategies.

Table 2. Income volatility per 1 ha for monoculture and diversified crops (volatility coefficient)

Crops	Germany	Great Britain	Estonia	Netherlands	Australia	Canada	Spain
1. Monoculture							
• wheat	0.20	0.31	0.42	0.64	0.47	0.69	0.48
• barley	0.31	0.33	0.41		0.54	0.45	0.47
• oleaginous	0.31	0.33			0.46	0.47	
• rye	0.29		0.50				
• sugar beet	0.16			0.27			
• oats			0.45			0.69	
2. Diversified	0.12	0.29	0.29	0.35	0.33	0.37	0.42

Source: own elaboration on the basis of Managing Risk in Agriculture. Policy Assessment and Design, OECD, Paris 2011.

Table 3. Trade-offs in risk area

crowding-out (substitutability of risk management instruments)	vs.	crowding-in (complementarity of instruments)
crop and production diversification (lower volatility)	vs.	benefits of specialisation (better effectiveness and competitiveness)
business and life safety	vs.	satisfaction from professional successes and life
risk	vs.	innovation
insurance risk (focus on in minus deviations) (*downside risk*)	vs.	financial risk (accounting for in minus and in plus deviations) (*upside risk*)
crop diversification plus negative correlation between crops and prices (*natural hedging*)	vs.	farmers' income and revenue stabilisation programmes

Source: own elaboration.

Table 3 presents different areas of risk trade-off. For example, budgetary support in a form of subsidies may enhance and even displace (crowding-out) the other risk management instruments as in the case of Spain. Nevertheless, the subsidies can complement the other RM instruments. The issue of greening referred to above (strategic CAP orientation) reflected by crop and production diversification and resulting in measurable and trade-off-related benefits in the form of risk decrease constitutes another example of such dilemmas. One should remember, however, that the benefits from diversification can displace the benefits of specialisation.

Another issue to be addressed is the presence of catastrophic risk in agriculture being the key argument for existence of the public support policy in the EU agricultural policy. Figure 3 presents three basic types of risk – normal, market and catastrophic. Analysis of the latter one could benefit from the probability density function being an alternative approach to the holistic concept. It should be underlined that there are some events of very low probability of occurrence, but of enormous potential damages. This is the case of catastrophic risk, in which the state involvement may become necessary and even desired. It should be added that the boundary (a specific demarcation line) between catastrophic and market risk (blue vertical line), similarly as between market and normal risk, is blurred and established on arbitrary basis, frequently with a view to social and political factors. On the example presented on Figure 3 this boundary is established by the state on arbitrary basis.

Figure 3. Probability density function and risk management layers
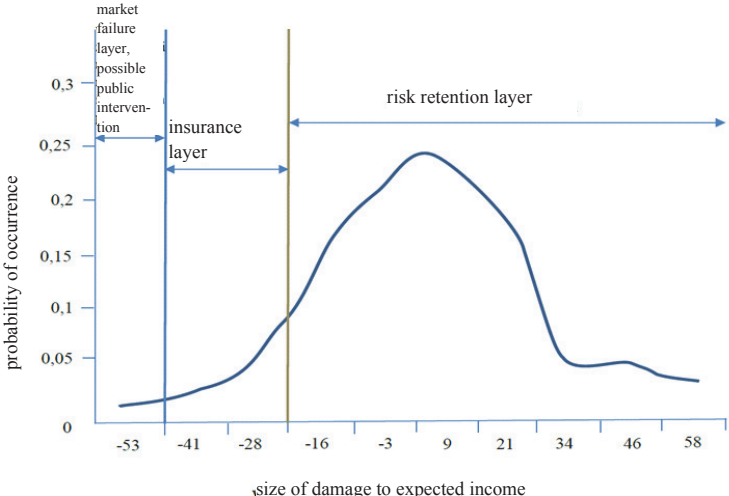
According to the literature review, we can distinguish two catastrophic risk management models applied by the governments of the EU Member States (Table 4). These include [Garrido and Bielza, 2008]:

- model I – free-market, functioning in the Northern and Central Europe states with a significant role of the market based mechanism in catastrophic risk management and additional focus on trainings;
- model II – pro-intervention, functioning in the Mediterranean states with a moderate role of market based mechanism and specific support for development of new and innovative forms of insurances.

According to comparative analyses performed by the IAFE-NRI "virtually extreme approaches to catastrophic risk management in agriculture can be distinguished even within the EU: at one extreme there are countries enhancing the effectiveness of *ex ante* and risk transfer instruments, while at the other – the states with a dominating role of *ex post* instruments implemented in the case of catastrophic events" [Soliwoda, Pawłowska-Tyszko and Gorzelak, 2017, p. 685].

Table 4. Catastrophic risk management models in Europe

Specification	Model I	Model II
Countries	Northern and Central Europe (Germany, Great Britain)	Mediterranean states (Spain, Italy), Austria
Role of market based mechanism	↑↑↑	
Comments	trainings and other farmer--oriented forms	supporting development of innovative forms of agricultural insurances (e.g. index-based)

Source: adaptation of typological approach after A. Garrido, M. Bielza (2008). Evaluating EU risk management instruments: policy lessons and prospects for the future. In: M.P.M. Meuwissen, M.A.P.M. Van Assel-donk, R.B.M. Huirne (ed.), Income stabilisation in European agriculture. Design and economic impact of risk management tools. Wageningen: Wageningen Academic Publishers.

Taking account of extremely high costs related to occurrence of catastrophic event, there is a need for diversification of catastrophic risk including in particular its market facilitation – considering the fact that in many countries this is the state that takes responsibility for covering the resulting losses. The methods for involving the market based mechanism in catastrophic risk management may include [Michalski and Pajewska, 2001]:

- Reinsurance of risk transfer or its part from the other insurances (assignors) to the insurer (assignee/reinsurer),
- Co-insurance – division/distribution of risk to at least two entities at the side of the insurer.

Reinsurance capacity of the insurance market may pose a barrier, which brings the need for support by the international companies. Internationalisation leads, however, to the new issues of concern, including the occurrence of foreign exchange risk that will require addressing.

2.4. Holistic risk management in agriculture on the example of the United States of America

Apart from the previous examples of the countries such as New Zealand or Spain, which adopted the models of risk management in agriculture that can be considered holistic, it is worthwhile to have a closer look at the US agriculture being an example of continuous evolution and development of the risk management system. Let us start with emphasising the fact that since the second half of the 1940s, the share of agriculture in the United States' GDP has continued to drop (Fig. 4). Following the growth period in the 1940s and early 1950s, the share of expenditures for agriculture in total federal budget expenditures has been also decreasing on quite regular basis. Interestingly, the trend for maintaining the share of expenditures for agriculture in total budget expenditures below the agricultural share in GDP has been observed in the US for the last several years.

Figure 4. Share of expenditures for agriculture in total federal budget expenditures of the United States in 1940-2017 (%).
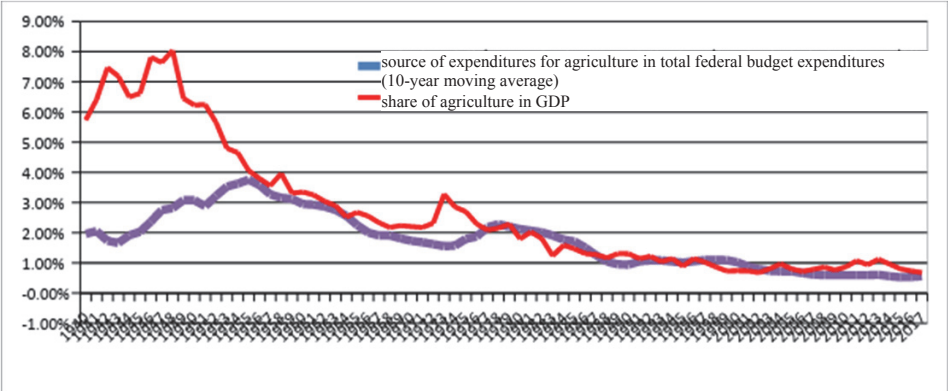
Source: own elaboration on the basis of BEA and Office of Management and Budget of The White House data.

Long-term quantitative trends described above are accompanied by qualitative changes, including in particular in the area of subsiding the property insurance in agriculture. The history of governmental support for insurances in the US agriculture dates back to the 1930s, when, in effect of the Great Depression and the so-called Dust Bowl, it was decided to take actions in this area (Fig. 5).

At the same time, in 1933, the first agricultural act (the so-called Farm Bill) was enacted, followed by establishment of the Federal Crop Insurance Corporation in 1938 – to manage the first federal crop insurance programme. The next four decades account for the period of primarily *ad hoc* disaster payments under subsequent Farm Bills and experiments with the governmental crop insurance support. The situation has begun to change since 1980s with implementation of partial subsidies for crop insurance premiums. Since 1996, the crop insurance support programmes have been managed by dedicated Risk Management Agency. Since the early 1990s, a regular growth of a group of insurance products supported by the federal government has been observed. After several decades of supporting only the multirisk insurances, the last twenty five years brought the support for reinsurance, catastrophic risk, revenue and index insurances, followed by – in the last two years – income and surplus insurances. This extension of the range of supported instruments can be considered an evolution towards the holistic approach to risk management in the US.

Figure 5. Evolution of the governmental support for insurances in agriculture of the United States
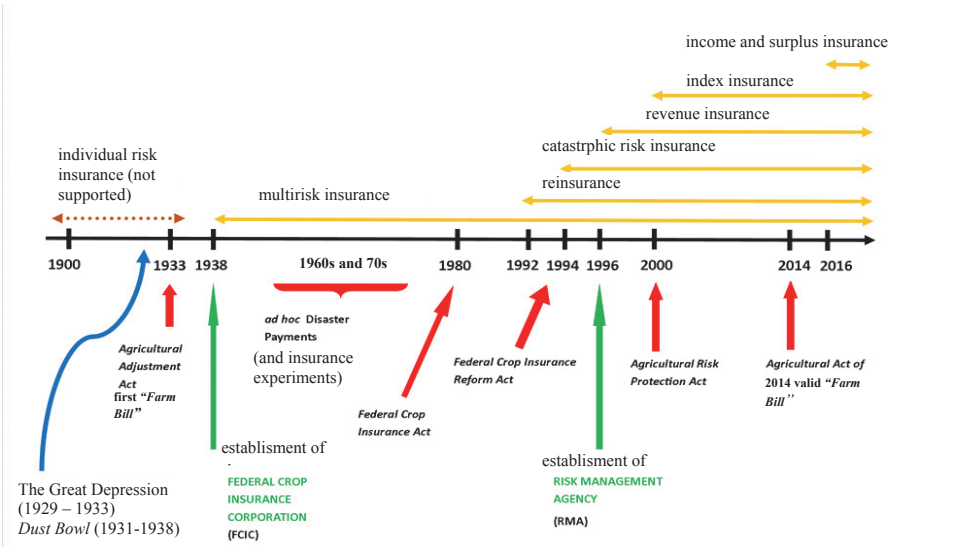
Source: own elaboration.

The changes that have taken place in the agricultural support system in the US since the 1980s were reflected primarily in the increasing support for insurances that resulted in higher interest of the US agricultural producers in insuring their crops. According to Figure 6, this interest – measured by a size of insured arable lands – is closely correlated with the amount of governmental support

measured by the share of subsidies in the value of insurance premiums. This correlation poses a challenge to the economic authorities in the US that must face one still unsolved issue: how to decouple the interest of the farmers in property insurances from the value of related federal support.

Figure 6. Subsidies and insured arable land for six main crops in the United States in 1981-2011

share of subsidies in premiums (%, left axis)   insured arable lands (millions of acres, right axis)
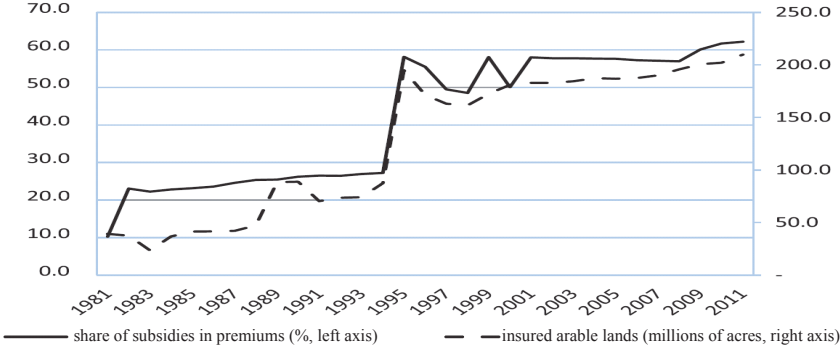
Source: K.E. Coble, B.J. Barnett, "Why Do We Subsidize Crop Insurance?", American Journal of Agricultural Economics, 95(2), January 2013, p. 502.

Figure 7. Governmental support provided to agriculture in the United States in 2008-2017 (USD billion)

■ *Ad hoc* and emergency payments
■ PLC/ARC
■ Total payments for agriculture
■ Direct payments (for 2008-2010 including anti-cyclic payments)
■ Total payments for agriculture + subsidies for crop insurances
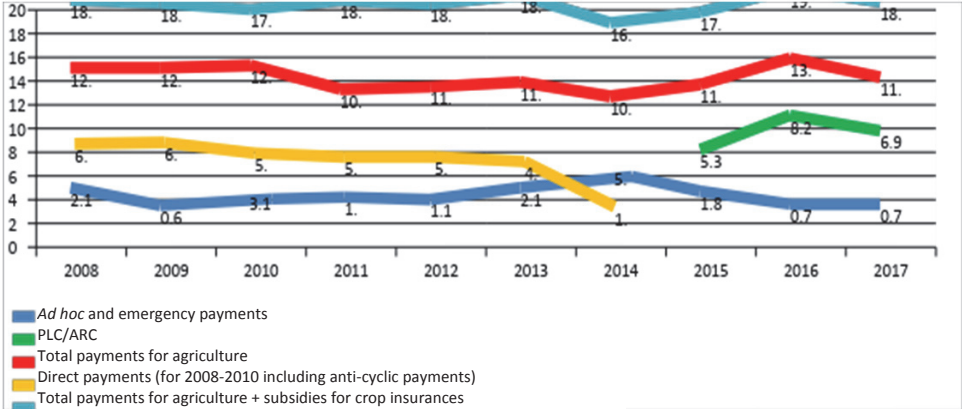
Source: own elaboration on the basis of U.S. Farm Income Outlook (2015, 2018) and Federal Crop Insurance Corporation Summary of Business Report (2005-2014, 2015-2018)

The changes to the support system for agriculture in the USA have been taking place not only throughout decades but also within the last years. According to empirical data, during the term of the latest agricultural act [Farm Bill, 2014] the US Government managed, for instance, to reduce the scale of emergency and *ad hoc* payments and simultaneously increase the involvement of

federal government in the promotion of non-insurance risk management instruments to replace the existing direct payments; subsidies to crop insurances maintained at the stable level (Fig. 7).

2.5. Summary and conclusions

The key conclusions from the possibility of applying the holistic management system are as follows:

- The policymakers and agricultural administration take the primary responsibility for making use of the potential of reasonable expenditure of public funds contained in the holistic risk management concept.
- The EU farmers, brought up in a specific subsidy culture are reluctant to accept the recommendation that managing normal risks lies upon them.
- The occurrence of catastrophic risk in agriculture justifies the budgetary support, however, the amount of this support and ratios between the individual risk management instruments depend on financial capacities and preferences of individual countries.
- Budgetary constraints in the new CAP perspective may pose an incentive for development of a comprehensive risk management system in which each stakeholder will hold a set of mutually complementary instruments.

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3. Economic and social features of contemporary development of the Czech agriculture and rural areas

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Abstract

The paper is focused on rural development in the Czech Republic. The contemporary situation is influenced by global megatrends as well as by inner factors. Lifestyle of the Czech rural population has been reshaped, recently. Because the factors are changing every decade, it brings a lot of challenges in rural development. This article is based on secondary data and shows social and economic situation of the Czech rural areas with reference to agriculture, labour market, consumption, quality of food, etc.

Keywords: rural development, rural population, social farming, quality of food, consumer behaviour of household, food autarchy concept

JEL codes: R00, J43, A13

3.1. Introduction

Globalisation has reshaped the condition of economic and social development in the worldwide framework, including that of the Czech Republic. The European CAP (Common Agricultural Policy) is reacting to these processes and trying to create a comprehensive concept of co-operation and solidarity, linked by mutual ties. Co-operation and solidarity primarily have a social feature, which cannot continue without the massive support of economic tools. Certain European countries are on a different level of economic development. This concerns, above all, the old and new EU Member States. The development of rural areas and agriculture is determined by the relevant economic tools, as well as by their social impacts. The Czech Republic is at a stage of economic growth at present, with a record low rate of unemployment, and also with changes in the consumer behaviour of the population. Considerable accent is put on the frugal usage of natural resources and the improved quality of life of the population. The role of social farming and its significance for the sustainable development of the Czech countryside is increasing.

3.2. Globalisation and its effects (consequences)

The features of the optimal development of rural areas have gradually changed during every decade. Since the beginning of the 1990s, exogenous theories of rural development have been replaced by theories of endogenous development. A leading role is focused on mobilisation of inner territorial potential and the strengthening of bottom-up impulses, which implies the activation of the human, social and cultural capital of the regions. There are two conflicting concepts in the discussion on the European future – one can scarcely discern to what degree they are compatible and, above all, viable.

The first concept concerns the ideas (constructs), such as tradition, patriotism, identity, territorial rootedness, local cultural symbols, neighbourly solidarity, etc. This concept features the endeavour to utilise all factors which have their roots in the past, towards the stabilisation of the contemporary village in such a way as to be viable under the changing economic and social conditions. It stands to reason that these factors partly have a different form as well as content, but also remain as a symbol with their own significance and meaning for the contemporary generation of the rural population.

The opposite concept is closer to the ideological interpretation of the common Europe. Nevertheless, these concepts do not otherwise refute each other. In addition, the pressure of the pending question of migration gives them content. Modernisation of the regional development paradigm is seen in the minimalisation and unification of distinctions among the characteristic signs of particular national and social groups.

It could be stated that positive and negative patriotism exists simultaneously. On the one hand, the relationship of humans to a certain territory is stressed and the historically created approach of this territory to defend itself and its offspring is accepted. On the other, patriotism is perceived as being egotistical. There is a refusal to share territory, its rooted identity is preserved by the demands of the original population's privilege to appropriate the conditions and factors of future territorial development. Nevertheless, it is evident that, without a certain form of frankness towards the outside world, stabilisation will change itself through the non-viable conservation of the economic and social environment.

To determine the level of change and to create a balance between the need for stabilisation and the need for change is very difficult. Above all, political and ideological arguments are purposefully introduced into the discussion. Contemporary theories of regional development [e.g.: Bock, 2016; Neumeier, 2016; Haan et al., 2017], thus far do not reflect the economic and social implications of recent years at a sufficient rate. It rather seems that they linearly extrapolate the impacts of a previous transition from the exogenous to the endogenous view. Nevertheless, there is agreement on stressing the importance and meaning of human, cultural and social capital. People are builders and users of the environment in which they live.

3.3.   Characteristic features of contemporary development

Antagonistic dissent of social development is the subject of discussion within the context of the incidence of global megatrends. Global megatrends (GMT) were popularised by J. Naisbitt in the 1980s. Since that time, many and varied definitions have existed, which differ in some aspects. However, it is possible to deduce that they are identical "...in the long-term processes of transformation influencing our thinking, activities, social organisation as well as future world reality in long period. Their mutual dynamics are usually induced by the common incidence of inner driving forces, which represents a new paradigm of change with the probable impact on the political decision, economic relations, environmental processes, future strategy creation, innovation and technology" [Naisbitt, 1982].

M. Havránek and O. Pokorný, authors of the study, itemise 29 main megatrends, which can be divided into five principal categories: social, technological, economic, environmental and political. In short, there are five main ranges in which their effects markedly manifest themselves. Division is, however, only for orientation purposes, because a megatrend, as a collector of many fractional trends, very often cross over these categories [Naisbitt, 1982; Havránek and Pokorný, 2016].

On a general level, we may mention other significant conceptual changes where global and local interests are antagonistic. Examples could be democracy versus censorship, freedom versus safety, multiculturalism versus nationalism, economic globalisation versus neoprotectionism, and the growth of expectations from international institutions versus seeking prospects in national governments [Kuž, 2018].

A classic model of rural areas, where the crucial role is played by agriculture, is changed step by step by the many different kinds of rural ways of living and employment. The lifestyle of the rural population is also evident in the way of life. Employment in agriculture is gradually decreasing, the structure of agricultural enterprises is changing. This process is naturally long-term and shaped by the most important milestones of the last century (agrarian crisis, collectivisation, privatisation in the 1990s, transition to a market economy, and membership in the EU). Implications of globalisation create an environment out of which antagonistic discrepancies between global and local interests also develop.

Almost all the above-mentioned megatrends affect the Czech rural areas and agriculture directly or vicariously. The most significant changes are represented by decline of workers in the basic agricultural industry, growing competition on the labour market, a change in the food autarchy concept, a change of household consumer behaviours well as a change in lifestyle.

Economic and social factors are mutually implicated. At present, there is a very low rate of unemployment in the ČR (about 3%). It is the lowest rate in the EU as well as in the OECD. It is the result of long-term marked economic growth. Unemployment is also reduced by the share of seasonal work in services, agriculture and the building industry. On the one hand, the demand on the labour force (especially qualified) is growing. On the other, a certain percentage age of the population remains unemployed. There are different reasons – some unemployed people have no interest in accepting the offered jobs, because they do not want to forfeit their claims to a job title and salary; others have no interest in requalification, they do not want to commute or have no intention of working at all and depend on social benefits (often in combination with the grey economy sector).

Rural areas concern, above all, a lower willingness to commute and a lower interest in requalification. The offer of vacancies for employment is limited by the physical demand and seasonal character. Possibilities of other jobs are connected with the size of a village. Small localities indeed suffer from an inferior offer or a lack of facilities. However, at the same time, the number of customers is insufficient to use them and they are unprofitable. The inferior quality of life in these villages, a lower interest in residency, the increasing average age of the population and, thus, inferior conditions of active local development are, therefore, the social impacts.

3.4. Change of food autarchy concept

Before 1989, the goal of almost all socialist countries was to achieve a food autarchy. It was presented as one of the main arguments of the socialist regime autarchy and, at the same time, the expression of independence from the capitalist countries. This model was developed, above all, by the ideological publicity campaign, because all socialist countries, including USSR, more or less struggled with a lack of foodstuff supply, as well as of consumer goods. A classic example in the ČR was the persistence of small farming. On the one hand, since collectivisation in the 1950s, they had been presented as an anachronism of ownership, but on the other, until 1989, without smallholdings, the country would have been unable to supply the market especially with meat, fruit and vegetables.

After 1989, the concept of the food autarchy receded. Agricultural enterprises were transformed, merged into a market economy and searched for optimal economic methods. A considerable number of agricultural producers ceased their activities, because they could not beat the competition of the non-profit plants.

At present, agricultural enterprises are in the situation of being bound to search for a certain balance between the pressure of the European (and global) market and national interests. Consumers of course prefer an adequate combina-

tion of food quality and price. In the framework of an integrated European market, the achievement of the food autarchy is essentially impossible. Nevertheless, the majority of European countries try to support local production by various marketing activities and capital subsidies (i.e. advertising of regional products) [Retail News, 2015]. After accession to the EU, in the ČR the food autarchy declined and was maintained by only a portion of products. The autarchy in the production of pork in 2017 was about 47%, poultry 58%, and beef 79%. In milk production, it was 117%, and in eggs 78% [Lidovky.cz, 2018]. There are swings in fruit and vegetable production, connected with climate impacts. The Czech Ministry of Agriculture advanced the opinion that autarchy could not drop under 80% and, above all, that basic agricultural products (i.e. milk) could not be exported, and commodities with higher added value (i.e. yogurt, cheese, etc.) could not be imported.

3.5.   Consumer behaviour of households

The Czech economic development in recent decades is reflected in the consumer behaviour of households. The relatively good economic situation contributes to buying more high quality foodstuff, putting the accent on healthy nutritional principles and affecting also the fashion trends and marketing strategies of producers. The consumption of fruit and vegetables is increasing, including that of imported products.

In the ČR, the long-term consumption of meat is approximately 80 kg per person/year. In comparison with 1950, it has increased two-fold. Nevertheless, since 1989 the consumption of all types of meat, with the exception of poultry, has declined. The consumption of poultry has increased. The production of mutton and goat meat has increased, but this production accounts for about 0.04% of the total meat production in the ČR. The structure remains similar – pork is most favoured, the popularity of beef has been replaced by poultry, while other kinds of meat (including fish) remain at relatively low rates [Bureš, 2018].

Prices do play a major role. Although fish is propagated as being conducive to health, its price discourages shoppers.

The National Health Institute of the ČR is engaged in the EU project (HORIZON 2020 programme), which intends to formulate the basic dietary recommendations for the population of specific EU countries. The consumers' choice of foodstuff is accentuated, combined with the market accessibility.

From the current partial results, it follows that the ČR lags behind other EU countries in the consumption of vegetables, fruit and fish. On the contrary (similarly to France), there is a high consumption of beef, meat products and sweet beverages. This diet is not ideal and makes itself felt in the health status of

the Czech population. Together with other influences (lack of sporting activities, consumption of alcoholic drinks, increasing overweight among ever younger people, etc.), we may mention an unhealthy development trend.

The consumption of foodstuff and its structure also depends on the financial situation of households. However, almost 30 years have passed since 1989. The difference is slowly being eliminated among countries of the former socialist block (new EU members) and the old Member Sates of Western Europe. Average hourly earnings in the ČR are far behind the average of the EU countries.

From the perspective of minimum wages, European countries are divided into three major groups, which also imitate the relationship between the old and new EU Member States. The ČR is about midway in the first group (Bulgaria, Romania, Lithuania and Latvia are worse off). But then there are higher minimum wages in Hungary, Croatia, Slovakia, Poland and Estonia. The difference in both previous groups in comparison with the third group (with the highest minimum wages) is marked.

3.6. Dual quality of food

Among the criticised practices of producers and sellers is the dual quality of food in some old and new EU Member States. Such debatable goods appear identical at first sight, due to the same brand and packaging, but their composition is different from that in other (often Western) countries [Vilhanová et al., 2014].

The European Commission is now also realising the importance of an equal approach to importing food for all European countries. The Policy area for Justice, Consumers and Gender Equality, started to investigate this issue at the end of 2017. The publishing of the Commission's guidelines should help national authorities of the EU countries to be better equipped to deal with unjustified dual standards. In accordance with the main rules, new requirements which should help in the practical application of the existing EU laws were settled and also would assist businesses with their marketing strategies, so as not to be in conflict with the EU Directive on Unfair Commercial Practices (UCPD).

In April 2018, a proposal for the better enforcement and modernisation of the EU consumer protection rules was published, with some changes put forward. Rules which concern the dual quality of products were clarified; the Fitness Check detected a few gaps which inhibited its effectiveness. Traders and consumers are not aware of these rules and consumers have insufficient opportunities for enforcement and consumer redress. For this reason, the Fitness Check recommended an increase of penalties for breaches of consumer law and introduced consumer remedies for consumers who have been victims of unfair commercial practices infringing Directive 2005/29/EC [EC, 2017].

The steps of the EU Commission are in conformity with global social trends, and have led consumers to become more aware of the importance of food quality, which also affects their quality of life. There is an emphasis on the respect for public health, quality of life, protection of natural resources and biodiversity, resulting in food choices of increasingly marked orientation towards sustainability and the generation of new demand dynamics.

3.7. Social farming

The logical effect of the endeavour to improve the living conditions of the population is the growth of interest in all social groups, including disadvantaged persons. The social dimension is the primary economic aspect, which echoes with all European countries. However, each country is on a different level of development. The theme of social farming is not new. It has also appeared in a certain form in the past (i.e. in connection with various educational and church activities). The theme of social farming is only in its early stages in the Czech Republic.

Social farming is defined as the complex of activities which uses agricultural sources, plant as well as animal, with a view to creating an adequate environment for healthy or socially handicapped persons, as well as the general public. The goal is to provide the possibility of training at work, to assist the integration of people into society and, by means of education and leisure time activities, contribute to their relationship to the countryside and Nature. In this sense, its aim is to create the conditions within the framework of agricultural enterprise or agricultural activities, which make possible the involvement of persons with specific needs in mutual agricultural activities aimed at their development and support and improving their wealth [Chovanec, 2016].

Common elements of social farming are activities with a close link to agricultural activities or agricultural enterprises. They are directed at persons who have some specific temporary or permanent needs. This means that, in comparison with the rest of the population, they are disadvantaged in some ways. They may be either physically or mentally handicapped, people returning from imprisonment, migrants, people undergoing therapy for drug or alcohol dependence, etc. [Chovanec et al., 2015].

The participation of the general public (children, youth, adults and seniors) is an important precondition for taking part in the social activities within the framework of the cultural or educational process or leisure time activities. Only if social farming is not an isolated activity of a few interested persons, but a shared experience of a rural community, can it have a permanent nature and contribute to local development. In the Czech Republic, the problems of social

farming are dealt with by four ministries: Agriculture; Work and Social Affairs; Education, Youth and Physical Training; and Local Development.

The Ministry of Agriculture is the architect and gestor of agricultural policy in the ČR and, in the concept of social farming, enacts the regulations for farmers, through Law No. 252/1997 Sb., on Agriculture (§2e the relevant law establishes who is an agricultural entrepreneur and is also concerned with their activities).

The Ministry of Labour and Social Affairs is the creator and administrator of connected social policies concerned with the concept of social farming. The realisation of these policies is important regarding the goals of social farming. Their practice arises, above all, from Law No. 435/2004 Sb., on Employment, above all § 67 on Employment of Persons with a Health Handicap and §104 on the active policy of Employment. Further from Law No. 108/2006 Sb., on Social Services, above all § 32-96, which encompasses the types of social services.

The Ministry of Education, Youth and Physical Training applies the goals of education and other activities in the framework of the social farming concept. It deals with the accreditation of educational institutions and educational programmes according to §25 and §26 Law No. 563/2004 Sb., on Pedagogical Workers and the change of some laws, focused on activities, education and enlightenment of the general public in the sphere of the preservation and sustainability of Nature, food sources, etc. These activities are determined by framework and school educational programmes, determined by Law No. 561/2004 Sb., on School Law.

The Ministry of Local Development within the framework known as the Common Strategic Framework, co-ordinates social farming programmes. Specific support programmes are created and governed by the relevant ministries for 2014-2020 programme period. These are, above all, programmes of the European Fund for Regional Development, the European Social Fund, the Cohesion Fund and the European Agricultural Fund.

Social farming programmes are, thus, supported by European as well as national sources. In 2017, a total of 121 projects were supported.

3.8. Summary and conclusions

The cohesion of particular elements of the economic and social environment of the Czech countryside implies that development towards the protection and sustainability of the living environment is an urgent precondition to increase the quality of life. The contribution by the European structural funds is indispensable. Without this, the majority of rural development projects could not be realised. The institutional procurement of a development programme is created by the government on the basis of experience of the old EU Member States and the implementation is continuously controlled. The institutions of civic society in

the ČR are gaining experience and self-confidence step by step. The difference between the old and the new EU Member States is always evident in many economic and social indicators.

The Czech Republic ranks among those countries which are at present in the stages of economic growth. There is trust that the economic, social as well as environmental sustainability is of a long-term nature and rather compensates for the global megatrends which express themselves negatively in the development of society.

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4. To whom belongs the future of rural prosperity 2020+?

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Abstract

The broad society had already issued the question about the EU support distribution principles for agriculture of ongoing period with regard to chief beneficiaries from direct payments and other support measures. The changing understanding of responsibilities, which arise alongside the farming activities, keep shaping the industrial meaning of agriculture as public goods' provider. This study argues that the upcoming EU agriculture 2020+ will inevitably be guided by much broader understanding of 'innovating', 'networking' and 'giving back to society'. The key driver of success in the upcoming period will be innovations, especially in its soft, i.e. social, sense, which will enable networked collaboration between the small and flexible in the countryside, and the smart and quick in the city.

Based on original empirical data, collected in Lithuanian in 2017, this study gives evidence for the variety of activities in the name of 'innovating', 'networking' and 'giving back to society' in the countryside are most often the work of small farmers, in contrast to the large ones, despite the actual amounts of absorbed EU support. Therefore, it is suggested to broaden the variety of support schemes for the EU agriculture 2020+, focusing on small innovative farms, that 'gives back to society' and thus adds more to prosperous rural development.

Keywords: innovations, networks, social responsibility, rural prosperity, farmers
JEL codes: M14, O18, O31, R11, D85

4.1. Introduction

The new rural development paradigm faces new challenges due the greatly changed overall development in the world. Since the establishment of the Treaty of Rome and Common Agricultural Policy (CAP), the overall development in rural areas underwent numerous transformations. Industrialization greatly affected work processes due to mechanization, farm electrification, installation of irrigation and amelioration systems, chemical production technologies, including artificial fertilizers, herbicides, insecticides, fungicides, etc., thus composing grassroots for later side effects to arrive. The so-called progress in

these processes is lately exponentially accelerated by growing application of various knowledge and new technology-based soft (non-technical) and hard (technical) innovations in agricultural processes and production.

These and many other transformations caused significant changes both in rural landscapes and everyday life in the countryside, which is referred in scientific discussions as a shift in rural paradigm. Systemic explanation of social, cultural and economic transformations in terms of a shift from industrial to post--industrial phase of development is often addressed to the increasing role of knowledge and its empowerment [Vidickiene and Melnikiene, 2014].

Established agricultural policy and support schemes shaped the activity and well-being of farmers and rural residents. Recent statistics from the European Commission give evidence that >1/3 of the EU budget goes to CAP and Rural Development [European Commission, 2017]. Direct payments to farmers had reached 70% of the total EU CAP expenditure. Farmers are responsible for the provision of public goods on more than half of the territory of the EU [European Commission, 2018]. Thus, the understanding of responsibilities, which arise alongside the farming activities, keep shaping the industrial meaning of agriculture as public goods' provider. Future rural prosperity highly depends on political drive with precisely defined new direction, taking into account previously described dramatic shift in rural development paradigm.

The changed understanding of quality of life in rural areas raises the discussion about future value for rural prosperity 2020+, demanded by rural residents. Some studies argue that educated and skilled people in the countryside communities with innovative success baggage, filled-in with abilities to network, innovate and share acquired advancements with local residents, significantly affect the development of rural areas. However, there is still lack of scientific discussions in literature related to future rural prosperity with regard to the combination of new success factors, i.e. networking, innovating and 'giving back to society' by sharing gained advancements with local residents.

The main aim of this study is to explore major factors that are promising to moderate the rural prosperity in 2020+. To reach the aim, theoretical assumptions made through scientific literature analysis are proved with representative empirical evidence, collected using survey method in Lithuanian farms in 2017.

4.2. Theoretical assumptions for rural prosperity

Systemic explanation of social, cultural and economic transformations in terms of a shift from industrial to post-industrial phase of development is often addressed to the increasing role of knowledge and its empowerment [Murdoch, 2000; Mather, Hill and Nijnik, 2006; Horlings and Marsden, 2014; Vidickiene

and Melnikiene, 2014; Lavesson, 2017], which greatly change the rural development paradigm and give new set of elements for success. Modern conditions for rural prosperity from various sources of literature might be summarized under the three major factors that call for rural prosperity: networking, innovating and 'giving back to society'. Therefore, future prosperity and success in modern conditions might be illustrated through continuous movement on the infinite pathway of networking, innovating and giving back to society (see Fig. 1).

Success in modern conditions arises through networks, which compose particular quick-response platform to innovate and spread innovation by sharing – giving back – knowledge and experiences in the quickest way through networking channels.

Figure 1. Continuously interacting factors for rural prosperity 2020+

Source: prepared by authors.

Networking is perceived as an important strategic tool in attaining innovation. It is beneficial to capture ideas, reduce distance with policy makers, prevent them from insulation, know the right people and places to obtain information [Lambrecht et al., 2015; Madureira et al., 2015]. Networks give access to complementary resources, skills, capabilities, and knowledge that are not internally available [Pittaway et al., 2004; Vacaro et al., 2012; Whitby and Willis, 2017]. Knowledge networking and multi-actor knowledge networks that facilitate knowledge exchanges, joint learning and the generation of new, more integrated solutions, are crucial if agriculture is to become sustainable and resilient [Liu and Li, 2017; Sumane et al., 2017].

Many authors state, that innovativeness is often referred as the key success factor in modern world [Chrisman et al., 2015; Dunne et al., 2016; Kusano, Wright and Conger, 2016]. Farmers that focus on innovation as a core value are finding success in business [Madureira et al., 2015; Reimers-Hild and Dye, 2015a; 2015b; Neumeier, 2017; etc.]. Innovative rural communities are creating better quality of life [Pittaway et al., 2004; Vaccaro et al., 2012; Esparcia, 2014; Salemink, Strijker

and Bosworth, 2017]. However, a lot of innovative initiatives fail and there are numbers of reasons behind that [von den Eichen, Freiling and Matzler, 2015].

Innovating calls for a need to compose appropriate network – this might serve as a platform to exchange most important information among actual stakeholders. Network might be elaborated from personal, informal and formal contacts, taking into account actors in the field from both close and remote environment. Literature suggests that networks normally cover colleagues, input industries, traders, researchers, extensionists, government officials, civil society organizations, etc. [Pittaway et al., 2004; Vacaro et al., 2012; Lambrecht et al., 2015; Madureira et al, 2015; Sumane et al., 2017].

Innovations in the field of rural development are specific, but not as exceptional as it might at first appear. For the spread of innovative knowledge concerning rural issues modern networks in all their forms perfectly serve for ensuring the sufficient flow of information regarding innovative products and services proposed by farmers and rural communities to the customers [Vacaro et al., 2012; Lambrecht et al., 2015]. According to Sumane et al. [2017], the most important accelerator is putting together actors from different spheres into one network and organization of knowledge sharing among network members. There is no need for any specific infrastructure (e.g. electronic devices, software, etc.) to get involved in innovative rural networks. Using ordinary software applications for modern communication equipment, various popular applications compose successful joint local community and farmers' contact system [Madureira et al., 2015; Salemink et al., 2017]. The system might become successfully moderated by community leader to become a platform for innovating together.

The dynamic contexts, complexity and the local specificity of the current challenges facing agriculture, and the many roles it is being asked to fulfil, require more inclusive, flexible modes of governing the generation, integration and sharing of knowledge [Pittaway et al., 2004]. All stakeholders, including farmers, need to be recognised as equal co-authors of knowledge generation, and all kinds of knowledge, both formal and informal, need to be brought together in innovation processes [Sumane et al., 2017].

However, there is one more essential factor, which should exist aiming to accelerate rural people, including local community and farmers, for prosperity – willingness to 'give back to society' in a form of shared knowledge and experiences through networks. The initial idea of 'giving back to society' stems from business literature of the mid-1950s [Bowen, 1953] after the emergence of the theory of corporate social responsibility (CSR). The main idea of the theory is that every operating unit holds responsibility for the society at a large or locally in its operating area [Schwartz, 2017; Carroll and Brown, 2018]. CSR theory

says that the way of running business beyond the law is equally important to the aim of earning profits and increasing productivity. Most often CSR is explained as a three-fold responsibility of any operating unit, including economic environmental and social responsibility [Carroll and Brown, 2018]. In agricultural literature CSR appeared in the first decade of the 21st century and is referred to as a toolbox which might help implement the sustainable development goals [Mazur-Wierzbicka, 2015].

'Giving back to society' is tightly related to the so-called 'openness' of innovation, which conditionally determines the willingness to innovate together in close and remote environment. It overwhelms the spread of the affected area thus giving evidence on both internal and external effects of innovation for local community implementation, especially with regard to distanced social systems in regions with the help of networks. This sometimes also refers to 'responsible innovation', as it is intended to make a positive change for society in the region. Therefore, it becomes evident how important is innovating together - spreading the externally acquired knowledge to local community members when raising its potential to innovate [Duh and Kos, 2016; Specht, Zoll and Siebert, 2016]. Local farmers may become a networked driving force for bringing innovations to and sharing them with local community, thus making a tremendous contribution to the development of rural regions and local communities itself. In this research openness for local rural community and willingness to share acquired knowledge and skills is called 'giving back to society'.

The above-implemented theoretical studies of recent actual scientific literature helped elucidate, that there is still lack of scientific discussions on the impact of infinite networked collaboration for innovation and its spread thus 'giving back to society'. It has never been defined before in such continuous relation and interaction. Therefore, it is suggested to use proposed theoretical model (see Fig. 1) to define the future rural prosperity 2020+ as a combination of new success factors, i.e. networking, innovating and 'giving back to society', by sharing gained advancements with local residents. Proposed theoretical model is further supported with empirical findings.

4.3. Methodology

Research is based on positive methodology approach. Conceptual framework was built using scientific literature review, systematization and theoretical modelling methods. Focused review of scientific literature in the field of issue-specific innovations, networking theories and conception of social responsibility as 'giving back to society' helped identify relevant themes and possible influencing factors for rural prosperity 2020+.

Reliability of primary theoretical findings was checked with the help of two-stage expert evaluation. Nonprobability criterion sampling procedure was applied when attracting voluntary international experts, who proved suitability of theories and selected factors to be employed in the agrarian discourse. The first stage of expert evaluation consisted of rating the theoretically selected approaches towards rural prosperity from most suitable to least suitable concerning innovations, networking and social responsibility theories in the agrarian discourse. The second stage was devoted to test the probability of theoretically selected most relevant factors in this discourse. Sufficiency on the agreement among expert opinions was assessed using Kendall's coefficient of concordance W which was found close to 1. Therefore, aggregated expert evaluation results approved theoretical findings.

The research question was formulated as follows: "Which factors are promising for rural prosperity 2020+?". The three main themes theoretically approved for further empirical investigation of rural prosperity research for 2020+ were 'networking', 'innovating' and 'giving back to society':

- 'Networking' theme was encompassed in relation to innovations (networking with universities) and giving back to society (sharing acquired knowledge with local community), as well as channels used to sell products (5 options of both ordinary and networked channels and open position for listing other).
- 'Innovating' theme was researched by questioning farmers, how often (i.e., less than 1 time per year, 1 time per year or more than 1 time per year) they buy new and upgrade the existing technical infrastructure as well as processes in their farms.
- 'Giving back to society' theme was researched by asking whether farmers consider their self as local community members who may contribute to its development using polar (yes or no) question and list of more concrete 10 activities (1 to 5 Likert scaling) to be performed in the name of 'giving back to society'.

Scientists' team performed pilot face-to-face interviews with 100 Lithuanian farmers. After insignificant corrections original representative empirical data was collected by experienced subcontractor. General population of Lithuanian farmers equals to 138.9 thousand [Agriculture and food sector in Lithuania, 2016]. Calculated representative population under statistical conditions of 3% error (ε=0.05) and 95% (p=0.5) confidence level is n=1059 [Schwarze, 1993]. Respondents were selected using systemic sampling of research subcontractors' database. Data were collected using telephone interviews of Lithuanian farmers in January--February 2017. Potential respondents had been telephoned 3211 times, 1491 times without response, 612 farmers rejected the suggestion to take part in the interview. Finally 1108 interviews were acknowledged suitable for further investigations which satisfies defined statistical conditions.

The obtained data was processed with descriptive statistical analysis. The percentage age distribution of respondents' answers was calculated, comparing data between the groups by using χ^2 test (significance level $p<0.05$). The sample size of the study allows ensuring that the statistical error of the results does not exceed 3.1%. Statistical analysis of data was performed using the SPSS 22.0 program. A two-stage variable χ^2 independence test was performed to determine whether the respondent's characteristics (sex, age, etc.) affect the distribution of answers to questions. Only those answers are used as evidence, in which the test showed that the distribution of answers depends on the respondents' characteristics.

The interviewed Lithuanian farmers represent all the municipalities of the country, different natural areas; reflect various farming conditions and the corresponding characteristics of farmers and farms: sex, age, education of the farmer, size of farm, duration of farming activity, and type of farming [Agriculture and food sector in Lithuania, 2015].

4.4. Results and discussion

Implemented research results reveal important role of all three theoretically explained counterparts of rural prosperity 2020+, including infinite flow of knowledge, creating innovations through networks and bringing it back to society.

The necessity of Lithuanian farmers to network is simply defined by the size of farms. It is evident, that almost half of Lithuanian farmers (48.1%) hold less than 5 hectares of land (ha) and are too small to compete on the market equally in gaining knowledge and innovating with the large farms with great resources to innovate. All in all, 21.8% of Lithuanian farms hold from 5.1 to 10 ha, 13.5% of farms hold 10.1-20 ha, 8.9% holds 20.1-50 ha, and only the rest 7.7% of farmers hold 50 ha and bigger farms that have enough resources and potential to act in knowledge market and innovation process their self, without advantages assured through networking.

'Networking' theme was also covered in relation to innovations as networking with universities – acquisition of innovative knowledge through direct knowledge creators and providers. Research reveals that Lithuanian farmers quite rarely consider universities as networking and innovation partners, since they are very passive in collaboration with universities. Only 3.4% of farmers continuously collaborate with universities and research laboratories, 8.3% stated they do this often. Rare collaboration was stated by 13.6%, very rare by 9.4% or Lithuanian farmers, 65.3% of farmers responded, they have never collaborated with any university or research laboratory.

Another important part of networking, included in parallel with 'giving back to society', helped to show openness of acquired knowledge and innovation through networks. Sharing acquired knowledge with local community was defined as 'never done' by 36.7%, 'very rare' – by 9.0% and 'rare' by 18.3% of Lithuanian farmers. 9.7% farmers constantly share their knowledge with local community, and 26.3% do this quite often.

Everyday networking activity, implemented by Lithuanian farmers was also investigated using more practical aspect – channels used by farmers to sell their products (see Fig. 2).

Figure 2. Types of networks used by Lithuanian farmers to sell their products
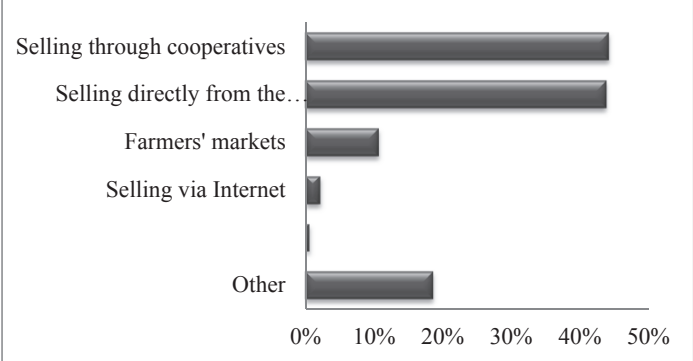
Source: prepared by authors.

Figure 3. The intensity of upgrading and installing facilities and organizational processes as innovations in Lithuanian farms

Source: prepared by authors.

Most of Lithuanian farmers sell their products via cooperatives (44.0%) and directly from farms (43.7%). Small farmers' markets are acceptable for 10.5% of farmers. Among the other product distribution network possibilities (18.5%) most often mentioned co-operators were found processors of agricultural raw materials. It might be summarized, that all researched types of networking are most actively used by farmer's who hold 20.1-50 ha of farms, have turnover of up to EUR 4000, are aged between 40-64 years and hold professional or higher education, acquired before 1990.

'Innovating' part helped to show, that most of Lithuanian farmers are passive innovators due to upgrade of organizational processes and technical equipment (see Fig. 3).

In upgrading the existing production facilities dominant position, represented by 76.1% of farmers, is less than once a year. Organizational processes are also very rarely upgraded – 85.2% of interviewed farmers said they do this less than once a year. The question concerning the purchasing of modern production facilities was mentioned as performed rarer than once a year by 90.2% of respondents. Installing innovative organizational processes less than once a year is done by 84.3% of Lithuanian farmers.

Deeper descriptive analysis of research results reveals, that experienced farmers who hold the farm for 11 and more years are those farmers who responded that they use innovative activities once per year and more than once a year. Innovations are more acceptable to install and apply on mixed farms (56.77%), than on crop farming (25.54%) and livestock farms (17.69%). It was unexpected to find that the bigger the farm is due to its annual turnover, the less it is active in upgrading equipment and organizational processes. Similar situation was found with purchasing new equipment and installing innovative organizational processes. It became evident from this point of view that most active innovators both using technical and organizational innovations are farms with turnover up to EUR 50 000. Research results demonstrate that most active innovators are between 45 and 65 years old.

'Giving back to society' part results were diverse. The first part of findings demonstrates farmer's intent to 'give back to society' from farm size (economic units and plot area in hectares), farmer's sex, age and education perspectives. Research results reveal that the greater the farm size (both in economic and plot area aspects), the greater the farmer's consideration to contribute to the local community development (see Fig. 4).

Figure 4. The relation among farm size and farmer's self-consideration as contributor to its local community development by 'giving back to society'
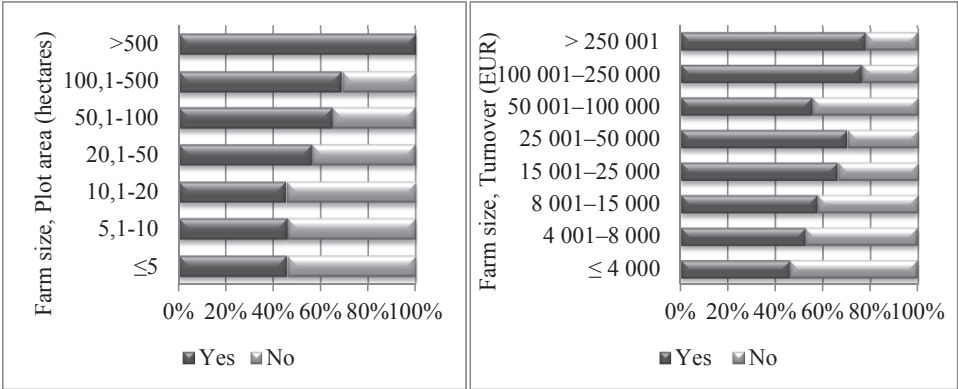
Farmers who consider themselves as local community development contributors (53.8%) or non-contributors (46.2%) were divided almost equally half--by-half. In depth descriptive analysis reveals that men-farmers consider themselves as community developers more often (57.0%) than women (49.5%). It was found that age acted as a significant factor for 'giving back to society'. The younger the farmer was, the greater intent to contribute to local community development he/she held: positive answers were received from 83.3% of respondents under 35 years old. Education was also found among significant factors: the higher the farmer's education level was, the stronger his consideration to contribute to local community development rose. Significant finding was made with regard to the relation between period of time when first higher education was acquired (i.e. before Lithuanian regained independence in 1990s; before Lithuania's accession to the EU 1990-2004; after Lithuania's accession to the EU – 2005 and later) and farmer's intent to contribute to local community development. It was found much greater intent to contribute to local community development for farmers, who acquired their higher education level in 2005 and later.

The second part of results helped rate the activities performed by Lithuanian farmers for local community development in the name of 'giving back to society'. Among the proposed 10 options of possible activities top three ranks (according to Likert scale accumulated results of 'frequently and 'often') were: first – supporting transparency and keeping public-interest-protecting position in relations with local government representatives (47.2%); second – taking into account the interest of local indigenous people when developing a farm (42.0%); third – taking active role in local events and traditional festivals in the community (39.8%). All in all, 36.0% or questioned farmers constantly and often share ac-

quired knowledge and experiences with local community. However, given the fact that Lithuanian farmers pay the least attention to cooperation with various research laboratories and universities (the last position: 'never', 'very rarely' and 'seldom' – 88.3% of farmers), it can be argued that so far Lithuania farmers are more likely to share their practical experiences with community members than innovative knowledge acquired through seminars and other educational events organized by universities and research laboratories as knowledge dissemination activities.

4.5. Summary and conclusions

Rural prosperity 2020+ calls for collective, innovative and responsive actions via networking which might help accelerate the access and acquisition to brand new knowledge as well as spreading these ideas for community in the region, which in total would lead to opening the innovation. Rural prosperity 2020+ might come into action in case of existence of the 3 main factors: first – accelerated networking – the size of farms and rural enterprises due to the limited number of employees; second – the shift from technical to organizational innovations; third – the shift from individual development actions to responsive territorial rural development strategies by sharing advancements with local people.

Empirical investigations suggest that the dominance of small farms in Lithuania leads to the use of cooperation and networking as tools for success of their activity. Farmers of small farms should focus to the implementation of the collaboration strategy, to use various two-sided networks and its platforms to start close cooperation between farmers and users of their products. The state of technical (production facilities) and organizational (farm organizational processes) innovations in Lithuanian farms demonstrate poor farmer's attention as well as inputs with regard to these innovations. The measured intensity to acquire new knowledge and experience through collaboration with research laboratories and universities and willingness to share this knowledge and experience with local community defined the nonexistence of the shift from sectoral to territorial strategies in the name of local community involvement in innovation and rural prosperity process due to the 'giving back to society'.

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5. The specificity of economic integration processes in agriculture

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Abstract

Theories of economic integration refer to the benefits of creating a free trade area (trade creation effect, the effect of shifting trade flows). While observing the economic reality, it seems that it is difficult to limit the benefits of integration agreements only to the issues of foreign trade. The paper states that economic ties create added value in the form of economic, social and environmental effects in many areas, including agriculture. Another manifestation of the so-called European Added Value is the financing of non-agricultural measures from the CAP. Integration agreements may, however, also cause negative phenomena, e.g. through the possibility of lowering standards in terms of product quality, food safety and animal welfare.

Keywords: economic integration, added value, quality of products, safety, food, animal welfare

JEL codes: A10, E00, F10, F15, F53, Q18

5.1. Introduction

Economic integration is the process of tightening economic cooperation by at least two countries through gradual elimination of barriers limiting economic cooperation [Budnikowski, 2006]. To be more precise, one should talk about international economic integration on a regional scale, or regional integration. This term is used for integration processes related to a specific region or subregion [Adamowicz, 2008].

The most mature form of regional integration is the European Union. Using the example of the European Union as a model, one can follow which processes take place in other integration agreements. Integration ties in the European Union are particularly strong in the broadly understood area of agriculture (including rural development) and it can be argued that in this sector joint actions have brought the most visible effect in the form of creating the Common Agricultural

Policy, the only truly common policy, and enabling 60 years of its activity. Integration in the agricultural sphere is specific also because agriculture and rural areas in the EU perform many tasks for the benefit of the whole Community.

Figure 1. Contribution of the CAP funds to various spheres of activity

CURRENT **CONTRIBUTION**
OF THE EU AGRICULTURE

CLIMATE AND CLEAN ENERGY AND THE ENVIRONMENT

MANAGEMENT OF 48% OF LAND IN THE EU

BIOECONOMY AND CIRCULAR ECONOMY

44 MILLION JOBS IN THE FOOD SUPPLY CHAIN

FOOD SECURITY OF 500 MILLION CONSUMERS

SINGLE MARKET

EU EXPORT OF AGRI-FOOD PRODUCTS WITH A VALUE OF **EUR 131 BILLION**
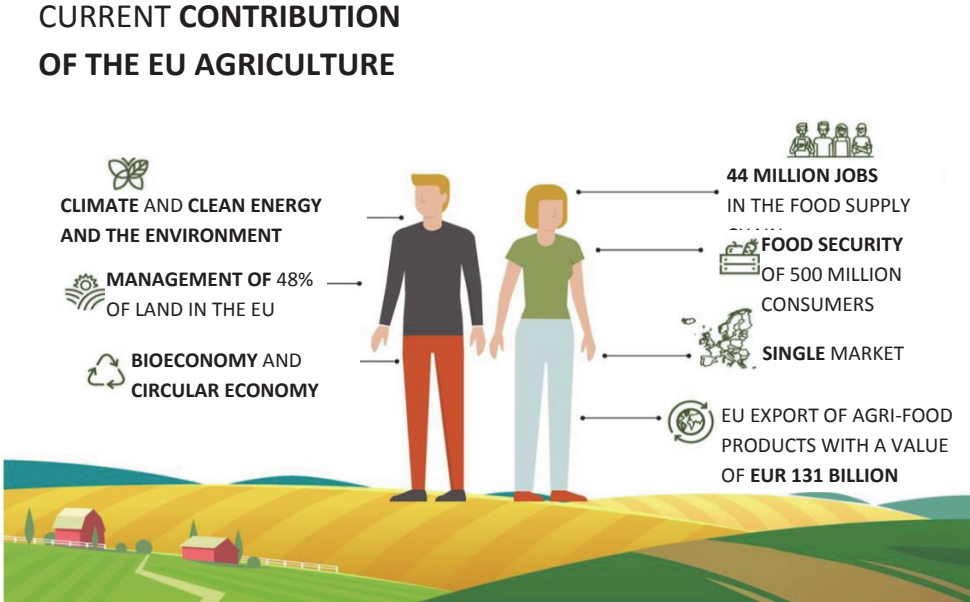
Source: The Future 2017.

The theory of economic integration was developed, e.g. by Tinbergen [1954], Meade [1953; 1955] and Balassa [1961]. It was the latter who defined five stages of economic integration of which, according to him, the earliest one[1] is the free trade area.

Theories of economic integration [Viner, 1950; Balassa, 1961; Dalimov, 2009] refer to the benefits of a free trade area (trade creation effect, the effect of shifting trade flows). While observing the economic reality, it seems that it is difficult to limit the benefits of integration agreements only to the issues of foreign trade. Some of the authors dealing with the issues of economic connections are convinced that some additional effect appears in the integration processes – added value [Robson, 1998]. It can manifest itself in various areas of economic, social and scientific life.

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[1] For example, according to Crowley [2001], trade agreements are the first stage of integration. The difference between this level of integration and the next form is that in agreements countries reduce tariffs but they do not abolish them completely. The Free Trade Area (FTA) covers entire trade as opposed to agreements which do not have such a wide range.

Literature on the integration of agriculture also mentions benefits but passes over negative effects, such as the possibility of reducing or grouping the standards in force in a given country. It is due to the fact that high and uniform requirements related to food safety, quality and image of the EU food are one of the most important competitive advantages of the EU agri-food sector created thanks to the CAP. In order for the EU to maintain the leading position in world food production, at least the current level of requirements needs to be maintained. Multiple standards related to broadly understood food safety and animal welfare also determine the specificity of integration processes in agriculture. However, this will not be the subject of this study.

The integration in agriculture in the economic sphere creates added value in the sector itself, in the form of economic, social and environmental effects also outside it. Integration may, however, also cause negative phenomena, e.g. through the possibility of lowering standards in terms of product quality, food safety and animal welfare.

5.2. Objectives and methods

The paper is an introduction to a broader study, it defines the research problem which is to be solved. The main goal of a wider study is to show that the creation of added value in integration agreements is the third effect of these agreements, in addition to the two indicated in the literature. In this sense, it is a contribution to the theory of economic integration.

The objective of this work is to indicate the specificity of integration activities and its manifestations. In our deliberations, we will limit ourselves to the European Union, undoubtedly the most mature international organisation in terms of economic and administrative links. We point to the emergence of the European Added Value (EAV) category and the examples of its manifestation. Particular attention will be paid to the creation of the EAV in various areas of economic and social life in the EU, thanks to the actions financed from the Common Agricultural Policy.

The work uses analysis of literature on the subject and documents of the European Union, as well as comparative studies.

5.3. Research results and discussion

Generally, the European Added Value (EAV) means additional value (benefits) of measures (policies) implemented at the European level in relation to the effects which would be achieved by separate policies of individual Member States in a given area [European, 2013]. When looking for the origins of introduction of

the concept of European Added Value, we must go back to 1992/1993 and the provisions of the Maastricht Treaty establishing the European Union. The concept of the EAV follows from three principles: subsidiarity, proportionality and additionality, the first two of which are set out in Article 5 of the Treaty [Treaty, 1992], and then additionally interpreted in a special protocol [Protocols, 1997].

Under the principle of subsidiarity, in areas which do not fall within its exclusive competence, the Union acts only if and in so far as the objectives of the intended action cannot be sufficiently achieved by the Member States, either at central level or at regional and local level, but can rather, by reason of the scale or effects of the proposed action, be better achieved at the European Union level. Under the principle of proportionality, the content and form of the EU action shall not exceed what is necessary to achieve the objectives of the Treaties.

Protocol No 30 to the Treaty states that for Community action to be justified, the principles of subsidiarity and proportionality should be met: the objectives of the proposed action cannot be sufficiently achieved by Member States' action in the framework of their national constitutional systems and can therefore be better achieved by action on the part of the Community.

The possible creation of the EAV is the result of respecting the above principles. However, the concept of added value has a broader character than both of the above concepts. Subsidiarity and proportionality are intended to legitimise the EU action in the legal sense. One of the aspects of manifestation of the EAV is its economic significance. The conditions for its formation and the type of value created are important. The creation of the EAV is also not limited by the Union's borders. A new value can be created, e.g., in the form of development assistance.

The concept of the European Added Value was strongly emphasised during the discussion on the EU budget for 2014-2020 [European, 2017]. According to the European Commission, the EAV is the best defined as "the value resulting from the EU actions which are additional to Member States actions" [Ex ante, 2001].

Parallel to the creation of added value, attention was drawn to the theory of regional economic integration [Robson, 1998]. European Added Value means an additional value obtained due to the fact that given action was not taken on the part of Member States, but at the level of the European Union. The mere establishment of a common approach for all Member States to deal with a given issue can be considered an added value since it creates a single framework for action and ensures the functioning of the EU common market, which is considered an example of the EAV.

The specific trade structure of the EU Member States, in which trade in goods with other EU countries is greater than with third countries, is also seen as a manifestation of added value [Gorzelak et al., 2017].

However, it can be concluded that the EAV is not a simple added value. In fact, the EAV is a manifestation of the synergy effect, i.e. in this case cooperation at the regional level[2]. Currently, the EAV is more and more often identified with the synergy effect.

Actions at the Community level created the EAV because:

1. Many elements are of a cross-border nature, i.e. concern other sectors, for example, the CAP is connected with the operation of the single market whose operation depends, in turn, on the situation on the global markets. Climatic issues, water and air quality are clearly of cross-border nature.

2. Actions related to common issues are more effective at a higher level of centralisation.

3. The solidarity activity is built thanks to the joint budget. This way projects, even those lacking local resources, can be implemented in the Member States or regions.

It is in the case of the budget which makes us assume that these funds bring more benefits than if they were spent by individual Member States. In this case, we can use the theory of fiscal equivalence [Olson, 1969]. According this theory, the structures of the state should be organised in such a way that when the state provides a public good, there should be similar interests of beneficiaries, decision-makers and taxpayers. If this is the case, there are no cross-border (negative) externalities and public goods are provided in an effective manner.

Hence, one can encounter statements that European public goods should be provided at the EU level [ECORYS, 2008; Collignon, 2011]. This includes:

- border control,
- defence policy,
- internal security,
- regulations concerning the common market,
- trade and competition policy,
- environment, counteracting climate change, energy policy,
- research and development and education policy.

It can even be argued that European integration creates new European public goods which can only be provided effectively at the European level. They include, e.g. lowering trade barriers, migration policy, flows of production factors. It can also be proved that managing the implementation of tasks from the

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[2] **Synergy** (synergistic effect, from Greek *συνεργία* "cooperation") – cooperation of various factors the effect of which is greater than the sum of individual separate actions. For example, as a result of synergy combined enterprises generate higher profit than the sum of profits of individual enterprises before the combination. The main reasons for the emergence of synergies is the reduction of costs and the expansion of each enterprise's sales area.

EU level allows Member States achieving greater results than when they are performed through the sum of actions at the national level and, above all, reduce (save) funds. That is when the EAV is created [Heinemann, 2011].

Regarding the EAV generated in broadly understood agriculture (i.e. including actions and measures in the field of rural development), the Common Agricultural Policy is one of the few EU policies implemented mainly at the EU level and closely related to the principle of subsidiarity.

The European Added Value realised thanks to the existence of the CAP has its specificity:
1. It creates new values in the countryside and agriculture.
2. It creates economic, social and environmental effects also outside agriculture.

RE 1. The CAP pursues the objectives included in the Treaty of Rome, among which the key one is to ensure Europe's food security. The CAP provides consumers with food at affordable prices, thanks to which households' expenditure on food (and non-alcoholic beverages) in the EU gradually decreased, in 2014 accounting for 12.3% of the total expenditure (while in the 1960s this percentage was over 30%) [Eurostat, 2017]. This is undoubtedly an added value. Similarly, according to calculations, EUR 23 billion a year is saved in the EU in comparison to the situation if there was no CAP [European 2013][3]. The Common Agricultural Policy is the guarantor of the European agricultural model, which is an important social good. Without the CAP, in many European countries, there could start rapid concentration and intensification of agricultural production (as in the US, for example) and agricultural enterprises with industrial scale production could emerge, which would have specific social and environmental effects. Today, apart from food security, Common Agricultural Policy provides the EU citizens with access to many public goods related to agriculture [Cooper, 2009; What, 2011], such as: appropriate state of the natural environment (including water and air quality, proper functioning of the soil), vitality of rural areas, animal welfare, landscape elements and structure, and biodiversity. Many of these goods are of "non-market" and cross-border nature (e.g. air quality, climate, water). They are an integral part of the high standard of living of the EU citizens and one of the key elements of an integrated approach to public health. The CAP facilitates effective prevention and reduction of negative ef-

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[3] In a case study carried out for 21 Member States covered by the CAP, the authors of the study "The European Added Value of EU Spending: Can the EU Help Member States to Save Money?" stated that "since 2007, likely national agricultural policies (instead of the CAP) would exceed CAP spending. Expenditure incurred by national agricultural policies could be EUR 23 billion higher than the CAP spending in 2010 alone". See *The European Added Value of EU Spending: Can the EU Help its Member States to Save Money*? Exploratory Study, Bertelsmann Stiftung 2013, pp. 47-49.

fects of adverse natural and climatic events occurring more and more often in recent years, as well as crises related to plant and animal diseases which cover more than one EU Member State.

RE 2. The CAP is no longer just a sectoral policy. Subsequent reforms of this policy, taking advantage of the multifunctionality of agricultural activity, have included in the scope of the CAP's tasks various areas important for the EU, inter alia, related to environmental protection (e.g. preventing loss of biodiversity) or preventing climate change.

In subsequent financial perspectives, as part of the Treaty objectives, the CAP is implementing the priorities important for the entire EU, determined in the political process. In 2014-2020, these are:
- Viable food production, with emphasis on agricultural income, agricultural productivity and price stability;
- Sustainable management of natural resources and climate action, with emphasis on reducing greenhouse gas emissions, maintaining biodiversity, protecting soil and water;
- Ensuring balanced territorial development (with emphasis on rural development, economic growth and poverty reduction in rural areas) [Communication, 2010].

The CAP is playing an increasingly important role in introducing a new economic model in the EU which is a circular economy, being an alternative to the linear model of the economy ("produce, use and discard"). The CAP also creates a common framework for the functioning of the agricultural sector in the EU [Mariniello, 2015]. The absence of the CAP would prevent the emergence of an efficient common agri-food market in the EU as Member States would compete with each other with the level of agricultural support, which could also lead to an increase in (total) expenditure for agriculture from national budgets [European, 2013]. Distortions of competition would result from differences in the amount of aggregated budget support and the instruments used.

The operation of the single market is also facilitated by the quality standards of agri-food products introduced by the CAP. Lack of common standards of food safety and quality would significantly hinder trade within the European Union. The CAP provides cross-border public goods at the EU level which cannot be replaced. The CAP also effectively counteracts external effects of agricultural activity and provides European citizens with protection against global threats.

5.4. Summary and conclusions

Using the example of the European Union as a model, one can analyse at subsequent stages of research whether added value is created in other emerging economic groupings, at a different stage of development of integration links. If

the answer was affirmative, it would confirm the hypothesis that the creation of added value is a universal process resulting directly from integration actions.

What is the specificity of integration processes in agriculture? It should be assumed that it manifests itself in the creation of strong added value, both for the needs of the agricultural sector and outside, creating new entries in other areas of the economy and social life. The second specific determinant of pan-regional integration is difficulties in agreeing on food quality and safety standards between individual countries or groups.

Trying to make generalisations about the entire economy, one could argue that the value-added effect is the third result, apart from the effect of trade creation and the shifting effect, of the creation of integration agreements. Such a statement would constitute certain contribution to the theory of regional economic integration.

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6. The Common Agricultural Policy of the European Union – main challenges for a new budget

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> *"Don't tell me where your priorities are. Show me where you spend your money and I'll tell you what they are"[James W. Frick]*

Abstract

Many factors (refugees, climate change, problems of the euro zone, Brexit, etc.) have an impact on the decisions of public support donors, who try to rationalize CAP expenditure and look for savings after 2020. The legitimisation of further continuation will be obtained only by the most effective instruments that fit into the assumptions of horizontal policies. The most important challenges regarding the future policy were characterized, referring to the trends of changes as a result of endogenous and exogenous factors. Developments over recent years have shown that the EU budget has had to provide support to response to specific problems. There is a need to explore the right balance of instruments in the future CAP between policy measures and financial envelopes, grants and financial instruments and risk-management tools to cope with risk and unexpected adverse events in the agricultural sector. Finally, authors gave several reasons for further reform of the CAP. It is a review article and it is a synthesis of current knowledge in this area.

Keywords: agricultural policy, SWOT analysis, agriculture, challenges

JEL codes: D78, Q14, Q18

6.1. Introduction

The world is moving fast. The challenges concern not only farmers but society as a whole. Farmers are constantly adapting to changing circumstances (climate change, price volatility, political and economic uncertainty, embargoes, animal illnesses, law changes). To this time, it has been argued that the Common Agricultural Policy (CAP) must continue to evolve (see: Fig. 1).

Figure 1. Evolution of the CAP instruments (1990-2020)
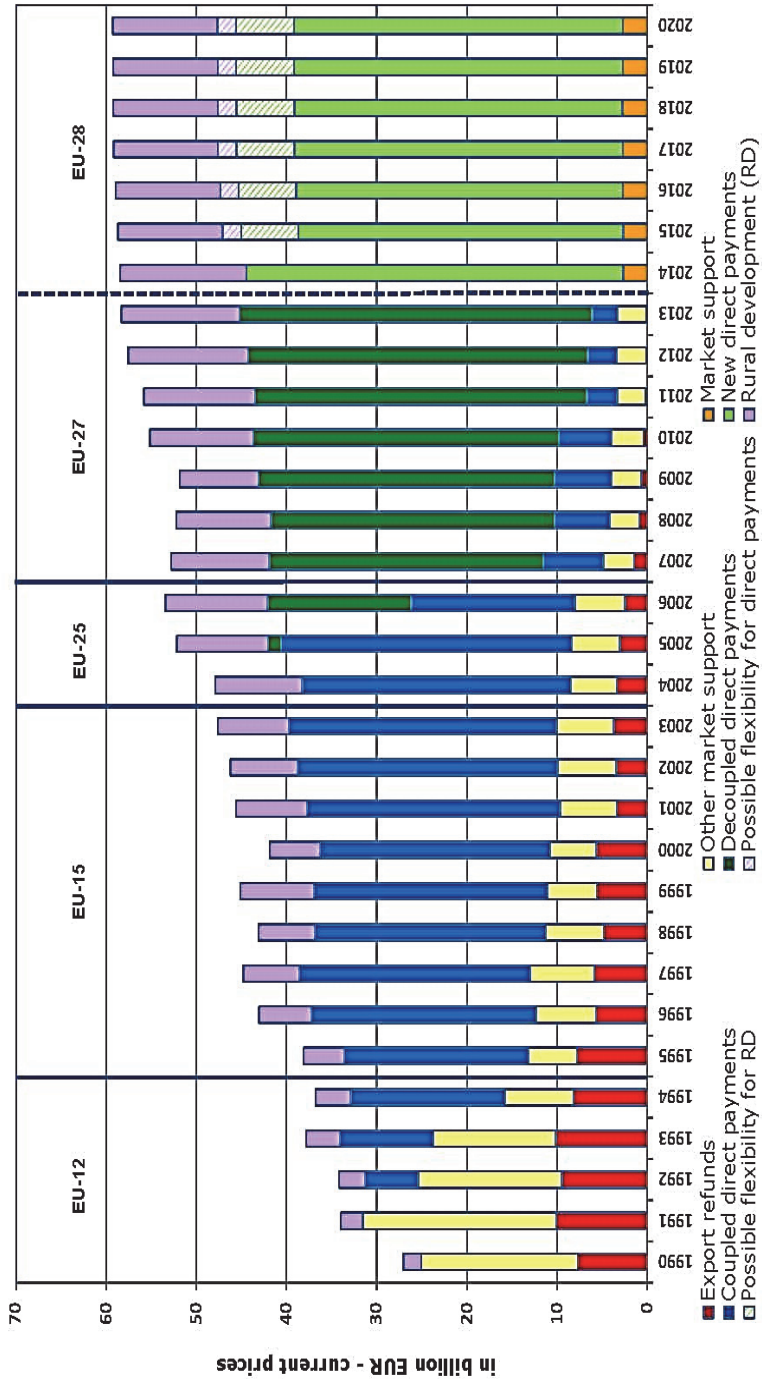
Source: http://ec.europa.eu/agriculture/policy-perspectives/policy-briefs/05_en.pdf (access: 5.05.2018).

The CAP was created by the Treaty of Rome of 1957. It made agriculture part of the so-called common market of the European Economic Community (currently: the European Union). Thus, farmers were ensured income support and encouraged to increase production (the Community achieved food self--sufficiency). In the meantime, the EU agricultural policy has been subjected to several major reforms (MacSharry reform, Agenda 2000, Luxembourg reform of 2003, Health Check of 2008) which were a form of the CAP evolution (direction of changes: productivity → competitiveness → sustainability) due to changing conditions of functioning and new challenges.

Although the reforms adopted in the 1990s and in 2000 changed the nature of the CAP, experts convince that further reforms are necessary [Tomczak, 2009; Wilkin, 2009; Ferrer and Kaditi, 2006; Wróbel, 2015]. In their opinion, supporting markets and farm income is not a sufficient justification for allocating almost 40% of the EU budget for the agricultural policy and the historical payment distribution criteria are not much related to the current needs. As the redistributive policy, the CAP has been very soon burdened by all negative consequences of the rent-seeking activity [Kosior, 2011; European Commission, 2005]. This phenomenon has been described by the theorists from the public choice school [Schmitz, Furtan and Baylis, 2002; Wilkin (ed.), 2005; Wichern, 2004; SER, 2006].

As a result of the Community's enlargement (e.g. in 2004), new problems started to emerge. The basic one was and is the comprehensive assessment of the efficiency of support from the CAP funds, with which even the countries of the so--called Old Union (EU-15) have large difficulties. Another problem is the unwillingness of the more developed countries to continue to finance the development of agriculture in poorer countries (see: Brexit [Mathews, 2016; Helm, 2017; McMahon, 2018]). Thus, the discussions between supporters of the Neo-Keynesian doctrine (assuming the use of state interventionism) and supporters of the Neo-liberal doctrine (based on the market rights only) are heated and continuous.

Currently, it is stressed that the agricultural policy should focus more on the competitiveness and innovation, climate protection, natural environment and economic, social and territorial coherence. The report by A. Buckwell[1] contains the proposals to remunerate farmers and rural residents for provided public goods and services. It stressed a need to concentrate support on several targets strategic to the EU (targeting policy). According to J.Ch. Bureau and L.P. Mahé [Bureau and Mahe, 2008; Król, 2013], the EU agricultural policy should in the

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[1] Report entitled *Towards the common agricultural policy and rural areas* prepared by experts under the leadership of Prof. A. Buckwell from the University of London, with participation of economists, sociologists, ecologists and political scientists.

future be completely based on the contracting system. The contracting system would replace the current single payment system. Current solutions lead to over-capitalisation of subsidies in prices of land. Moreover, to guarantee the environmental protection, of importance is not only the "provider gets" principle but also the "polluter pays" principle. According to J.Ch. Bureau and L.P. Mahé, the "polluter pays" principle should be applied in a more restrictive manner.

The two principal aspects of the CAP require more attention – land management and risk management (Fig. 2). The third element (rural development policy) is less in need of radical over-haul [Buckwell, Matthews, Baldock and Mathijs, 2017; Chlebicka, Fałkowski and Wołek, 2009; Londero, 2017; Boulanger and Messerlin (ed.), 2010].

Figure 2. Proposed structure for a modernised CAP

Holistic risk management – prevention – mitigation – coping	**Integrated land management**	**Investment support** – productivity innovation and skills – high quality food – food chain relations – rural development – Community-led development
	Tier 4. Higher level environmental payments	
	Tier 3. Agri-environment and climate measures	
	Tier 2. Help for environmentally and socially marginal areas	
	Tier 1. Transitional adjustment assistance	
	Reference level	

Source: A. Buckwell, A. Matthews, D. Baldock, E. Mathijs, CAP: Thinking Out of the Box: Further modernisation of the CAP – why, what and how? RISE Foundation, Brussels 2017.

In 2018, the discussion on the shape of the agricultural policy post-2020 became more heated. What largely contributed to intensifying debates on the future of the CAP, was the result of the British referendum (23.06.2016) on the withdrawal from the EU structures. The United Kingdom was a net payer[2]. Their annual contribution was nearly EUR 10 billion. The calculations show that Brexit may result in a gap of EUR 60 billion in the European Union's budget. This is an important problem for the EU budget which may affect the agricultural budget to the greatest extent.

The above-mentioned phenomena and events resulted in looking for a new state of balance for the Community. Turbulence around the future EU budget induced to improve the current policies, to strengthen them and to verify

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[2] https://businessinsider.com.pl/finanse/makroekonomia/brexit-dziura-w-budzecie-ke-po-wyjsciu-wielkiej-brytanii-z-ue/f0f2ehw (access: 18.09.2018).

their validity. This applies to the agricultural policy as well. Therefore, the objective of this paper is to indicate the most important challenges for the agricultural policy post-2020. In other words, the authors are looking for an answer to the question: What priorities and challenges are considered when shaping the new CAP budget?

6.2. Agricultural policy post-2020

The European Commission (EC)[3] published "Reflections Paper on the Future of EU Finances: Five Scenarios – Implications". There are five basic options for the future of the EU finances:

- Carrying on: the EU-27 continues to deliver their positive reform agenda.
- Doing less together: the EU-27 does less together in all policy areas.
- Some do more: the EU-27 allows groups of Member States to do more in specific areas.
- Radical redesign: the EU-27 does more in some areas, while doing less elsewhere.
- Doing much more together: the EU-27 decides to do more together across all policy areas [European Commission, 2017].

Figure 3. Agriculture in all scenarios of the EU finances

Scenarios	Carrying on (1)	Doing less together (2)	Some do more (3)	Radical redesign (4)	Doing much more together (5)
Policy priorities	Taking forward current reform agenda	Mainly financing of functions needed for the single market	As in scenario 1; additional budgets are made available by some Member States for the areas where they decide to do more	Financing of priorities with very high EU value added [Gorzelak et al., 2017; Ferrer and Kaditi, 2008]	Doing much more across policy areas
Agriculture	**Lower share**	**Lower amount**	**Same as in scenario 1**	**Lower share**	**Higher amount**

Source: European Commission COM(2017) 358 of 28 June 2017.

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[3] The Commission proposal for the multiannual financial framework (MFF) 2021-2027 includes EUR 365 billion for the CAP (in current prices). This corresponds to an average share of 28.5% of the overall EU budget for the 2021-2027 period (EUR 265.2 billion for direct payments, EUR 20 billion for market support, EUR 78.8 billion for rural development and an additional EUR 10 billion will be available through the Horizon Europe research programme). See: *Reflections on the agricultural challenges post-2020 in the EU: preparing the next CAP reform,* European Parliament's Committee on Agriculture and Rural Development, Brussels, 2016.

In all scenarios except the fifth one (which assumes a commitment to a significant step up in the degree of European integration), the CAP budget will be lower. The CAP will take a smaller share of the EU budget, and in some scenarios the overall budget will also be reduced (Fig. 3-4).

Figure 4. Evolution of main policy areas in the EU budget
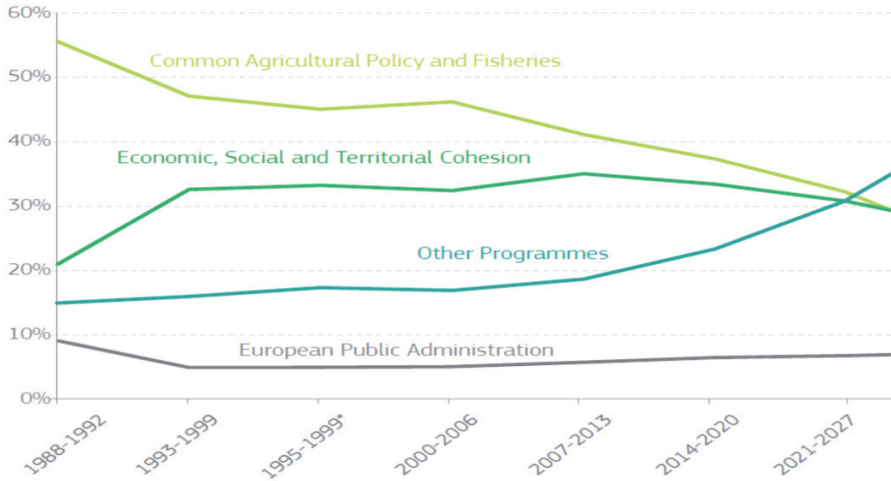
*Adjusted for 1995 enlargement.
**Other programmes: research and innovation, external actions (space, education and youth, justice and home affairs, competitiveness, other).
Source: European Commission COM(2017) 358 of 28 June 2017.

The confirmation of the above processes (tendencies) seems to be the same as the findings contained in Cork (Cork 2.0 Declaration, 5-6 September 2016) in Bratislava (The Bratislava Declaration, 16 September 2016) and in Rome (The Rome Declaration, 25 March 2017).

In the EC opinion, the future CAP will focus on nine general objectives reflecting the economic, environmental and social importance of the policy[4]:

- Support viable farm income and resilience across the EU territory to enhance food security;
- Enhance market orientation and increase competitiveness including greater focus on research, technology and digitalisation;
- Improve farmers' position in the value chain;
- Contribute to climate change mitigation and adaptation, as well as sustainable energy;

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[4] Fostering knowledge, innovation and digitalisation in agriculture and rural areas is a cross--cutting objective.

- Foster sustainable development and efficient management of natural resources such as water, soil and air;
- Contribute to the protection of biodiversity, enhance ecosystem services and preserve habitats and landscapes;
- Attract young farmers and facilitate business development in rural areas;
- Promote employment, growth, social inclusion and local development in rural areas, including bioeconomy and sustainable forestry;
- Improve the response of the EU agriculture to societal demands on food and health, including safe, nutritious and sustainable food, as well as animal welfare.

Figure 5. Challenges and future objectives of the CAP

GLOBALISTION

ECONOMIC
- food security
- price fluctuations
- increasing number of risks (changes of weather, animal illness, embargo, etc.)
- economic crisis
- pressures on farm income
- weaknesses in productivity and competitiveness
- imbalance in value chains

EU

ENVIRONMENT AND CLIMATE
- greenhouse gases
- worse soil conditions
- air and water quality
- habitats and biodiversity
- tight resources of water

TERRITORIAL COHESION (SOCIO-ECONOMIC)
- diversification of agriculture in the EU
- rural economies (businesses, infrastructures and services)
- ageing of European citizens, especially on rural areas
- social inclusion, reduction of poverty and territorial cohesion
- social capital, knowledge exchange and innovation
- migrants

Source: own elaboration.

On 1 June 2018, the EC presented legislative proposals on the CAP beyond 2020. Based on 9 objectives, the future CAP will continue to ensure access to high-quality food and strong support for the unique European farming model[5]. They have been illustrated below, broken down by challenges:

- economic,
- environmental and climate,
- socio-economic [Adamowicz, 2018] (Fig. 5).

The challenges arising from the dynamic process of globalization call for the need to strengthen the EU cohesion in the economic and social spheres, which also contributes to the evolution of the Community's agricultural policy [Adamowicz, 2018; Majewski and Malak-Rawlikowska, 2018; Mathews, 2018].

It seems necessary to refer the above-mentioned challenges to SWOT analysis regarding European agriculture. This analysis has been presented in comparison 1, whereby the greatest attention has been paid to economic challenges (see: box 1). The economic challenges identified by the SWOT analysis can be grouped into three main areas: (1) pressures on farm income[6], (2) weaknesses in productivity and competitiveness, (3) imbalance in value chains.

The analyses prepared for the EC order show that over the last 10 years (2005-2015), real income did not grow in the EU-28. The increase in real factor income per annual working unit (+3% per year) could only be realized due to a considerable outflow of labour force. In the next 10 years, the stagnation is expected to continue. Driven by stronger increases in costs compared to value of production, total agricultural income (in real terms) is expected to decline considerably (-14% by 2026) [*Modernising...*, 2017]. Strong pressures on income have an immediate negative impact on famers' standard of living. Part of farmers will go out of business. This could have negative impact on the local economy. Finally, low income makes farming less attractive to potential newcomers [Katchova and Dinterman, 2018]. While competitors in the sector adopt the newest technology, for a large group of the EU farmers take-up of new technologies is limited. Small and medium sized farms are particularly confronted with this technology gap. The investment gap remains significant. In the food supply chain, farmers are much more numerous than processors and retailers and their businesses are generally smaller. Price indices at a more disaggregated level are less available.

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[5] https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/future-cap_en (access: 17.09.2018); OECD, *Regulatory Policy Outlook*, 2015.
[6] http://www.welfare.ie/en/Pages/Farm-Assist.aspx (access 28.09.2018); Managing risk in agriculture policy assesment and design, OECD, OECD Publishing, Paris, 2011; S. Severini, A. Tantari, G. Di Tommaso, *Do CAP payment stabilise farm income? Empirical evidence from a constant sample of Italian farm*, Agricultural and Food Economics, No. 4(1), 2016.

Box 1. SWOT analysis of the European agriculture

ECONOMIC STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS FOR THE EU AGRICULTURE (economic challenges)[7]

Strengths:
- − better understanding of the various trends in consumer demand (better market research, data science and big data),
- − favourable production environment and environmental friendly production,
- − safe and high value foods,
- − innovative food chain,
- − positive agri-food trade balance.

Weaknesses:
- − differences in income level between different regions,
- − the EU population is ageing (farmers too),
- − the EU agricultural productivity growth is slowing down,
- − production costs are relatively high (especially owing to higher labour, land costs and environmental / sanitary standards),
- − the EU farmers experience some legal limitations towards some innovations in comparison to competitors (following health / environmental assessment of risks and/or societal choices),
- − significant gaps in economic performance (efficiency and productivity) between farmers,
- − price transmission is also not always perfect,
- − unfair trading practices (UTP) tend to persist,
- − concentration in the farming sector remains very low,
- − farmers are reluctant to cooperate (low level of vertical and horizontal integration).

Opportunities:
- − high consumer expectations (e.g. traceability, food safety / health, animal welfare, environment protection),
- − development of the bio-economy, the green economy and the circular economy,
- − local food and short supply chains,
- − demand growth due to population growth and increased purchasing power,
- − technologies improving information, logistics and organization in the food chain,
- − digitisation of agriculture and the further roll out of precision farming.

Threats:
- − increased competition for the EU producers,
- − increased dependency on other commodity markets (energy market),
- − increased pressure on natural resources,
- − more extreme climatic events,
- − potential outbreaks of animal and plant diseases,
- − geo-political instability,
- − bilateral and regional trade agreements,
- − emergence of major players on the global agricultural markets,
- − lack of consumer confidence (due to fraud, gaps in controls, traceability issues),
- − complexity of the supply networks,
- − high concentration levels in both the food processing and food distribution sectors,
- − lack of market transparency (Food Price Monitoring indices).

Source: own elaboration on the basis of Agricultural Outlook 2016-2025, OECD-FAO, OECD Publishing, Paris, 2016; Modernising and simplifying the CAP, European Commission, 2017.

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[7] Other challenges were analyzed in: *Environment and climate related challenges for agriculture and rural development*, European Commission, 11 December 2017; *Socio-economic challenges for agriculture and rural development*, European Commission, *11 December 2017.*

Price transmission along the supply chain is uneven. Market shocks are fully transmitted to farmers, while price declines / rises are much more limited for processors and consumers. Primary producers have a limited extent and a share in the supply chain and are, thus, under-using opportunities to increase their market power. A further meaningful step would be to extend market transparency all the way downstream to the retail stage. The market orientation of agriculture requires a better understanding of the demand for agricultural products. A better understanding of the various trends in consumer demand would help identify areas where further added value can be generated.

In response to these challenges the EC proposes a long-term budget of EUR 1.135 billion in commitments (expressed in 2018 prices) over the period from 2021 to 2027. The funding for the Common Agricultural Policy and Cohesion Policy will be moderately reduced (both by around 5%) [*Economic...*, 2017; *The MFF Proposal...*, 2018].

6.3. Summary and conclusions

The CAP has been and still is one of the most criticised EU policies. The literature critical of the policies was reviewed by, e.g. Ch. Henning [2000]. In Poland, it is criticised in, e.g. W. Kwaśnicki's publications [2010]. Perceiving the CAP functions is changing. Arguments justifying its further existence, but already in a new form, include: multifunctionality of the sector, market volatility, food safety, global threats, food security, but defined anew. From German perspective, the CAP needs to be better targeted and more efficient in spending taxpayers money, to achieve its stated policies regarding public services for lively rural areas and the protection of biodiversity. At the same time, farmers would like to avoid excessive bureaucracy.

On the other hand, agricultural policies are at the crossroads of several crucial aspects of European Union (viable food production, sustainable management of natural resources, rural vitality). More than 7.3 million farmers are CAP direct payment beneficiaries. They manage more than 170 million hectares of agricultural land.

For the CAP after 2020 is proposed to establish a more constraining framework on the Member States. This framework could, for example, include: (1) the obligation for Member States to design a national "intervention system" and (2) requiring Member States to conduct an impact assessment of the CAP.

This should allow for better and more efficient programming without adding complexity. The CAP measures should be more targeted. The next agricultural policy instruments will be the result of many forces (e.g. the interests of

Germany and France) and many factors. Future plans for agricultural policy-making must allow for the fact that European agriculture faces volatility of growing price. Farmers need stable incomes and economic visibility. In addition, the current form of agricultural policy is influenced by the earlier path of development (path dependence).

Member States need to address significant new challenges, especially with respect to migration, security, climate changes, public goods and growth. Brexit leaves a hole in the EU budget (EUR 10 billion per year). The adaptability of the policy ensures its continued relevance (climate change, price volatility, political and economic uncertainty, rural depopulation and the growing importance of global trade). The policy is leading a transition towards a more sustainable agriculture and support farmers' income. It seems that the most important priorities for the CAP post-2020 will be: investments in knowledge and technologies (for low-emission economy and environmental protection), use of IT capabilities (point / precise approach to agricultural production) and efficient logistics on the line: suppliers of production factors – agricultural producers – recipients of final products. The next financial perspective (concerning agricultural policy) will be to a greater extent to promote more intelligent, modern and sustainable agriculture (SMART agriculture).

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7. Problems and risks linked with investment supports in agrarian sector – the Czech experience

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Abstract

The grant system under the RDP has been long prevailing for investment supports in the Czech agriculture. The current evaluation system of investment projects is based on financial plans that use normative data to simplify the administration. This limits applicants for supports, especially when their holdings have better performance than the normative approach. To the contrary, when the farms have worse performance, they obtain supports even if it is not real to repay back sources, before the end of lifetime of the investment. In the case of supports in food processing investments, the heterogeneity of products is high and, therefore, the farmers prepare the whole simplified financial plan by themselves, applying their own data. The only control is by the comparison with the average profitability of the food products. The normative values are usually low, and many projects would not pass. Therefore, the applicants can justify their real profitability. However, it requires additional assessment and complicates the evaluation procedures. Considering the above-mentioned and other problems with the grant system, it is desirable in the next programming period and for the so-called productive investments to apply other forms of supports, based mainly on financial instruments[1].

Keywords: investment supports, evaluation, Rural Development Programme
JEL codes: H43, O22, B41

7.1. Introduction

The aim of the article is to discuss problems and shortcomings of the grant system in investment supports for the Czech agriculture, enlarged also by the current system of their assessment, and to give signals for needed changes in this field under the EU Common Agricultural Policy after 2020 (CAP 2020+).

First, there is a recapitulation of the current forms and their importance in investment supports for the Czech farms, or agrarian sector, respectively:

- Grants provided under the RDP 2014-2020, included in priority 4, up to 60% of eligible costs can be financed by non-repayable grants. Only efficient projects shall be supported. The assessment criterion is based on the payback period of the investment that is calculated by the IAEI model (see further). It must be shorter than the lifetime period set by the State Agricultural and Intervention Fund (SAIF). About 70% of all investment supports (about EUR 94 million in 2017) is provided by the grant system in the Czech agrarian sector.

- Supports provided as a state aid by the Support Guaranty Farm and Forestry Fund (SGFFF) in the form of interest subsidies, guaranties for bank credits, and returnable loans (with the application of *de minimis* principle – about EUR 15 million in 2017). The main criterion for support is financial health after investment, which is assessed by banks providing credits (or by the SGFFF in case of returnable loans, respectively).

- Particularly for non-productive investments following social priorities (e.g. land consolidation, ecological investments, etc.) there are national subsidies of the Ministry of Agriculture and partly of the Ministry of Environment, covering 100% of expenditures of projects.

So the largest part of the current investment supports for the Czech agrarian sector are supports from the EU funds in the form of non-repayable grants under the RDP for the period between 2014 and 2020. Subsidies shall be efficient and shall support only viable and efficient projects "The EU Commission highlights evaluations as important for improving common policies" [Anderson et al., 2017]. The evaluation shall be based on the criteria 3Es – efficiency, effectiveness and economy. Only economically viable and efficient projects shall be selected for support. "Evaluating the impact of rural development programmes is, however, complicated due to the widely varying policy targets of RDPs as well as their substantial heterogeneity across rural areas" [Smit et al., 2015].

Procedures under the grant system pose usually higher administrative burdens and costs for the Czech payment agency SAIF. It has to control those aspects of projects in application for support and take over political guaranty for supports. So, the whole system and processes are characterised by general and specific failures, inaccuracies and even mistakes that point out shortcomings of the grant system.

7.2. Material and methods

The objective of the article is the current grant system of investment supports in the Czech agrarian sector. The system is critically characterised using simple analytical / comparative methods.

General risks and failures of investment supports based mainly on sector approach, and which are more relevant in grant systems, are linked with opportunity costs to use public money in other sectors of the national economy, producing higher contributions to social benefits of a country. Failures in the allocation of subsidies, including investment supports, were examined, based on the theory of public choice, e.g. in Elliott and Heath [2000].

Other problems are on the sector level. They are very close to the moral hazard of the government, because they are linked with political preferences of investment supports on specific commodities (branches) or farm categories. By conditions for supports, the government increases the risk of an improper allocation of public sources among agricultural commodities and especially among farm categories. For example, the very large Czech farms – mega-farms / holdings are eligible to receive investment supports up to EUR 6 million per one application. Kravcakova Vozarova and Kotulic [2016] found out that in Slovak conditions the amounts of subsidies are correlated with the amount of gross agricultural production, which indicates that the subsides might be e.g. granted more to large farms or they increase by the size of the farms, respectively. Thus, the supports are detrimental to small- and medium-sized farms and, finally, to the rural development of the country[2].

There is also a general problem of a lower efficiency of investment supports as a kind of input supports due to a high potential or real outflow of supports from receivers – farms to suppliers of inputs. According to the previous OECD estimations, based on the Policy Evaluation Matrix model, the highest outflow of supports from farms (more than 80%) is linked with input subsidies. Real height of agricultural support in the Czech Republic is displayed at Figure 1.

There is more signal information on the Czech market that after the implementation of grant investment supports for selected inputs, the market prices of those inputs very quickly (sometimes steeply, even two times) increased.

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[2] The grant system in these aspects can be also analysed with the application of the contrafactual and dead weight losses methodology. The results in this field for the Czech investment supports in agriculture were presented in Doucha et al. [2017].

Figure 1. Agricultural support in the Czech Republic
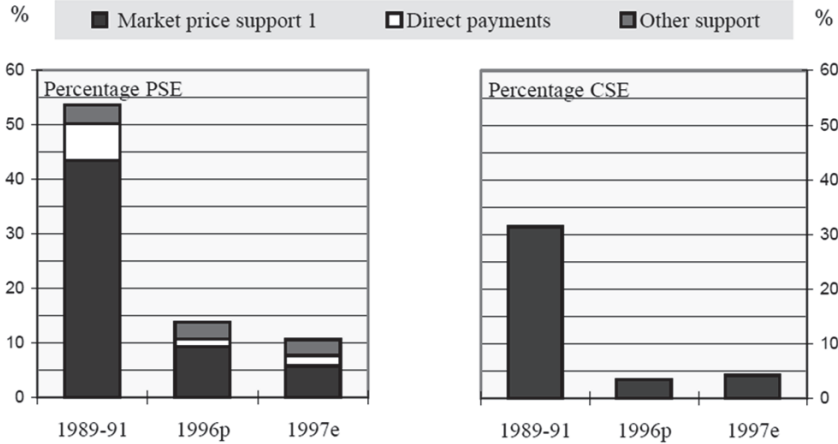
Figure 2. Outflow of supports through supported interest rates
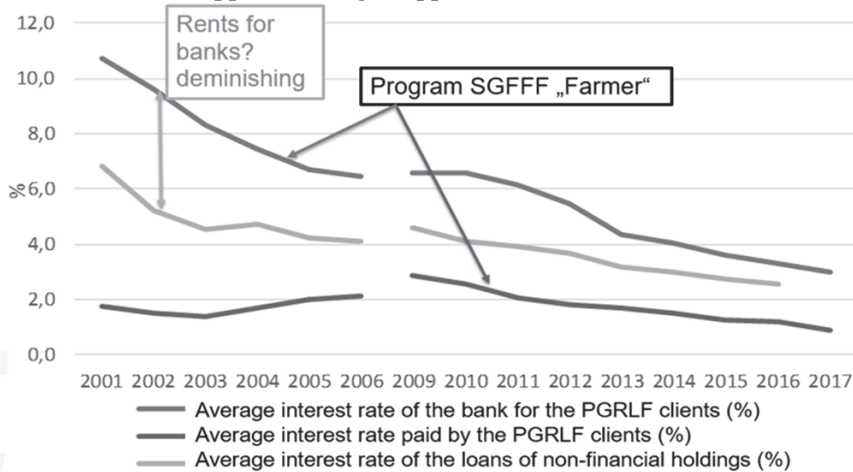
Besides, there is a problem of the leakage of supports through supported interest rates from the public finances via the receivers of the support to the banks. There are different interest rates for credits. As an example can serve the interest rate subsidies provided by the Czech Support Guarantee Farming and Forestry Fund (SGFFF) on the investments into tangible assets (common bank credits versus bank credits linked with SGFFF programmes for farms). From Figure 2 it can be seen that average interest rates provided by banks to the SGFFF customers (upper line) are the highest. The actual interest rates paid by

the SGFFF customers are lower (middle line) and the average interest rates of the loans of non-financial holdings is the lowest – only around 2% (lower line). When the loan is subsidised by the SGFFF, the banks tend to set higher interest rates.

7.3. The assessment model for application of farms for investment supports

Last but not least, problems with the grant system in the allocation of investment supports are embedded in procedures and methods of the assessment of applications for supports.

The Czech Institute of Agricultural Economics and Information (IAEI) has been functioning as an advisory body for the Czech Ministry of Agriculture, also in tasks for assessment of the allocation of investment supports to farms in the current period, and at the same time in analyses for the supports under the CAP 2020+.

The current IAEI model for the assessment of applications for investment grants in the RDP 2014-2020 and under administrative (SAIF) requirements has been applying a "normative" approach. The evaluation of investment projects is based on the assessment of financial plans of farms using normative data to simplify the administrative procedures. The IAEI – RDP calculator (model)[3] is used as a tool to assess efficiency of projects from economic point of view. The model follows the structure of the general financial plan, it means it calculates revenues (based on acreages, yields, number of animal units) and costs, and based on this cash flow and payback period.

Criterion for the selection of projects in the IAEI calculator – model is payback period that must be shorter than lifetime of the investment in application. The illustration of the model is presented on Figure 3.

Figure 3. RDP calculator of evaluation of the efficiency of the projects

Source: Chaloupka [2016a].

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[3] The model has the form of a software program system in the Microsoft Excel spreadsheet, version 2010. Its detail structure is presented in Chaloupka et al. [2016a; 2016b].

The applied normative approach[4] represents limitations to the applicants, especially when their efficiency is better than the average normative (lower costs, higher revenues and yields or better performance in livestock production). On the contrary, when the farms have worse efficiency, they obtain the subsidy even if it is not real to repay back sources before the end of the investment lifetime.

Normative approach also limits possibility to reflect an improvement or adaptation effect, e.g. higher efficiency or decrease of costs thanks to modernization, innovation and other changes.

In the case of investment supports for processing, the heterogeneity of the final food products is high and, therefore, the farmers have to prepare the whole simplified financial plan by themselves with their own data. It has to be controlled by comparisons with the average profitability of the given type of food products. The normative values are usually lower, and many projects would not pass. Therefore, the applicants can apply their own real profitability. However, it requires additional expert assessments and complicates the whole evaluation procedure.

Besides, the system is not able to jointly assess the processing of agricultural commodities directly on the farm because the assessments of supports for agricultural and food investments are strictly separated. Let us look on the example of wine production. Real operational costs plus other costs are CZK 64-69 per 1 litre of wine. In the calculator there is only wine grapes assessed at the normative price of 44 CZK/kg. But the minimum market prices for one litre of (late) harvested wine are CZK 85. Hence, the production of wine of higher quality (not only wine grapes) is in reality highly profitable which is not considered in the calculator.

The model and its utilisation are the examples of the typical conflict between normative (or flat rate) approach versus better targeted or even tailored measures (approaches) in the policy. In addition, grant system by its conditions predestines areas where farmers shall invest and kinds of eligible costs; however, a large part of subsidies reflects the needs to substitute unavailable labour on the Czech farms. So investments in agriculture are aimed at livestock production despite that it is usually less profitable, but "politically" preferred (pig meat, poultry).

Under the normative approach and related administrative procedures, and under the "policy" aim to spend public money as much as possible, if an original set of flat normative selects only few applicants, the original set of the normative is proportionately changed (e.g. yields increased). It represents a solution, which can be described as a "quasi-tailoring".

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[4] Similar problems are linked with regional approach. Kiryluk-Dryjska and Beba [2018] present a method for region-specific budgeting of rural development funds, based on objectively measured indexes of rural development that enables the allocation supporting weaker and underdeveloped regions.

7.4. Summary and conclusions

Considering the above-mentioned and other problems and shortcomings with the grant system in investment supports for agrarian sector, it is desirable in the next programming period and for the so-called productive investments to apply mainly other forms of supports, based on financial instruments. This shift can be stimulated by a significant and serious reduction of sources in the CAP 2020+ for grant investment supports, up to now prevailing.

It could and should transfer much higher responsibility for investments on private sector (farms, processors and banks), reducing risks related to moral hazards of the government and a proper allocation of public sources.

However, politicians have to resist pressures from the non-governmental organisations of (large) farmers, which could strongly protect the current grant system in investment supports with weaker conditions of their receiving (and leaving the realisation of financial instruments only for small farms).

The shift from the grant to a different system, represented by financial instruments, can be also slowed down by administrators of public money that is by budgetary risks to utilise fully public money, regardless of their efficiency.

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8. The adoption of agricultural insurance to manage farm risk: preliminary evidences from a field survey among Italian and Polish farmers[1]

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Abstract

Among EU Member States, Italian and Polish agriculture recorded the highest number of farms with income losses, due to adverse climatic events and market related risks. In line with its primary challenge of managing risk in agriculture, the Common Agricultural Policy encourages farmers' adoption of risk management tools as insurance, which covers against production losses due to many different risks. However, the success of this instrument seems to be very heterogeneous and the efforts to examine this are still limited in the literature. This paper provides some preliminary insights from a field survey among farmers in Poland and Italy. In particular, differences in behavioural aspects (e.g. perceptions, preferences) related to risk at farm level and insurance tool were investigated, showing some differences between producers in these two EU Member States.

Keywords: risk management, insurance scheme, Common Agricultural Policy, risk perception

JEL codes: G32, Q18

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8.1. Introduction

Risk is an inevitable element of any economic activity. In the case of agricultural production risk is particularly complex, not only due to the scale of threats and fragmentation of production entities, but also due to the inherent unpredictability of the underlying phenomena. Indeed, when planning the production process farmers are never able to predict its final results and may not guarantee the expected level of income. Indeed, producers may obtain lower income than they had anticipated or even no income at all. At the same time, crises caused by weather anomalies or animal diseases occur with considerable frequency. To stabilize their yields and revenues, farmers can adopt different strategies (both self-coping strategies and specific risk management tools).

The EU has historically addressed the problem of the protection of farmers' income through the organization of the agricultural market. Over the period from 2014 to 2020, the European Commission has emphasized the important role of subsidized risk management tools in the 2nd Pillar of the Common Agricultural Policy [Pawłowska-Tyszko, 2017; Trestini and Giampietri, 2018]. In accordance with the Articles 36-39, the EU Regulation No. 1305/2013 includes:

- Crop insurance subsidies, applicable in the case of losses caused by adverse weather phenomena, incidence of animal or plant disease, or pest infestation;
- Mutual funds providing financial compensation to farmers for losses caused by animal or plant disease or an environmental incident;
- THE Income Stabilisation Tool (IST), providing financial compensation to farmers experiencing a serious depletion of income;
- In particular, insurance schemes are used to transfer the risk to another entity. In addition to several countries worldwide as USA, Japan, Canada or Brazil, subsidized insurance programmes exist in many EU Member States such as Spain and Italy [Dubiel, 2014].

Since 2008, Polish farmers have the obligation to purchase subsidized insurance contracts for crops and animals, in order to be eligible to receive direct payments and state aid to remedy losses caused by natural disasters. In particular, farmers must insure at least 50% of their cropped area against damage caused by flood, drought, hail, adverse overwintering results and late frosts [Pawłowska-Tyszko and Soliwoda, 2017]. Moreover, insurance has to cover at least one risk indicated by the legislator as compulsory. Farmers who do not fulfil this obligation are required to pay a fee of EUR 2 per hectare for each calendar year. In reality, as a consequence of such a low fee for failure to purchase insurance along with relatively low effectiveness of the obligation execution, still a small percentage of farmers insure their crops [Wąs and Kobus, 2018]. Indeed, as it results from other studies [Sulewski and Drożdż, 2012; Śmiglak-

-Krajewska, 2014; Jerzak et al., 2015; Kurdys-Kujawska and Sompolska-
-Rzechula, 2018], Polish farmers take out insurance policies to a very limited
extent. As stated by Wąs and Kobus [2018], in 2013 only 10.8% of Polish farm-
ers stipulated insurance contracts, covering only a small amount of agricultural
land (23.88%). Conversely, over the last years there has been a high increase in
state budget subsidies to crop insurance in Poland: from PLN 125 million (EUR
29 million) in 2011 to PLN 900 million (EUR 208 million) in 2017 [Biernat-
-Jarka and Pawłowska-Tyszko, 2018]. In 2005-2012, the yearly rate of state-
-subsidized crop insurance contracts was around 141 thousand. Insurance com-
panies in Poland themselves are not very interested in participating in this
scheme, due to its low profitability: since the beginning of the crop insurance
subsidy system only three companies (i.e. PZU S.A., TUW and Concordia) have
had such insurance in their regular offer.

In Italy, the participation in insurance has been enhanced by national subsi-
dies dating back to 1970, with the creation of the National Solidarity Fund (re-
formed in 2004). Later, with the Health Check, European reserves have been added
to national funds to support insurance premiums. Although the higher level of sub-
sidies addressed to insurance compared to the other two instruments (i.e. mutual
funds and IST), currently farmers' participation remains not optimal, showing also
a remarkable North-South imbalance: in 2017, the 81% of the total insured value
and 86% of the total insured area was in the North, whereas 10% and 8%, respec-
tively, in central Italy and 9% and 6% in the South [ISMEA, 2018]. Moreover, over
the period from 2010 to 2015, the number of insurance contracts decreased by
20%, whereas the rate of insured agricultural areas remained almost equal.

This paper proposes a qualitative comparison between an Italian and
a Polish sample with regard to some major aspects related to farmers' decision
making concerning insurance adoption at farm level. To this purpose, this study
provides some descriptive information from a field survey in these two EU
Member States that, according to some recent EU policy statistics[2] and recent
literature (for Italy, see for instance Trestini et al., 2017), registered the highest
number of farms suffering severe income drops over the last years.

8.2. Data and methodology

Data were collected from a field survey started in December 2017 with di-
rect interviews among 140 farmers: 70 in Italy (Veneto region) and 70 in Poland
(Wielkopolska Voivodeship). The questionnaire was designed based on both the

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[2] European Commission (2017). Risk management schemes in EU agriculture Dealing with
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http://ec.europa.eu/agriculture/markets-and-prices/market-briefs/index_en.htm.

existing literature and a preliminary survey among 22 Polish farmers and 23 Italian farmers, and pre-tested on a small sample of respondents. All the variables were measured with a 5-point Likert scale statements. More in depth, the questionnaire investigated what follows: farmer's perceived income (3 items) and production (3 items) risks at farm level; subjective risk attitude (6 items); growers' perceived frequency, impact and control over some specific risks at farm level (i.e. frost, storm, hail, heavy rain, severe drought, animal disease, plant disease, pest infestation, severe drop of market prices); producers' preferred self-coping strategies among several options that originated from the literature; perceived knowledge and availability of the insurance tool, and the perceived trust (3 items) towards the intermediaries that are somehow responsible for the insurance uptake; farmers' subjective intention to adopt insurance in the near future at farm level; finally, the perceived barriers to insurance adoption. Mean values are described in the next paragraph and a T-test was carried out in order to show statistically significant differences between the samples.

Table 1 reports some descriptive statistics related to the Italian and Polish sample. Male and young farmers represent the majority in both samples, with average revenue per year lower than EUR 50,000. Conversely, farm utilised agricultural area is notably different between the two samples, with very small farms in Italy (14 hectares on average) compared to Poland (142 hectares). Moreover, the majority of Italian farms are specialized in permanent crops (50%), whereas the mixed type (livestock and crops) prevails in the Polish sample (69%).

Table 1. Descriptive statistics of the Italian (N=70) and Polish sample (N=70)

Categories	Description	ITALY				POLAND			
		N.Obs	%	Mean	SD	N.Obs	%	Mean	SD
Gender	(0) female	24	34.3			25	35.7		
	(1) male	46	65.7			45	64.3		
Age (years)	(1) less than 35	32	45.7			39	55.7		
	(2) 35-44	19	27.1			16	22.9		
	(3) 45-54	9	12.9			10	14.3		
	(4) 55-64	7	10.0			5	7.1		
	(5) more than 65	3	4.3			-	-		
Average farm revenue	(1) less than 50,000	40	57.1			44	62.9		
(gross income from	(2) 50,000 - 100,000	21	30.0			21	30.0		
farming/year)	(3) 100,000 - 250,000	7	10.0			4	5.7		
	(4) more than 250,000	2	2.9			1	1.4		
Utilised agricultural area	number of hectares			13.9	18.2			141.8	815.2
Farm type	Crop	19	27.1			22	31.4		
	Permanent crop	35	50.0			-	-		
	Livestock	9	12.9			-	-		
	Mixed	7	10.0			48	68.6		

Source: own elaboration [2018].

8.3. Results

Looking at the average values that our respondents assigned to the statements in the questionnaire, we find mean values that are above the scale mean, showing that farmers are risk averse. In particular, Italian farmers are significantly more risk averse than Polish ones (Table 2). Moreover, the Italian growers perceive a higher production risk than Polish, conversely to income risk (for which the difference was not statistically significant).

Table 2. Risk attitude, perceived income risk and perceived production risk

	ITALY		POLAND		Sig.[a]
	Mean	SD	Mean	SD	
Risk attitude	3.35	1.10	3.00	0.50	***
Perceived income risk	3.53	1.03	3.70	0.17	
Perceived production risk	3.52	1.04	2.80	0.50	***

Note: [a]T-test for comparison of mean values between the Italian and the Polish sample: significant difference between mean values at 1% level (***), 5% level (**) and 10% level (*).
Source: own elaboration [2018].

Table 3. Perceived risk frequency, risk impact and risk control at farm level

		Frost	Storm	Hail	Heavy rain	Severe drought	Animal disease	Plant disease	Pest Infestation	Severe drop of market prices
					RISK FREQUENCY					
ITALY	Mean	3.77	3.61	4.17	3.53	3.84	2.90	3.86	3.96	3.63
	SD	0.97	1.07	0.88	1.11	1.04	1.35	0.95	0.91	1.09
POLAND	Mean	4.57	3.61	4.03	3.93	4.21	3.29	3.63	3.06	3.60
	SD	0.50	0.98	0.87	0.95	0.68	1.25	1.11	1.02	1.13
Sig.[a]		***			**	**	*		***	
					RISK IMPACT					
ITALY	Mean	3.54	3.09	4.01	3.23	3.54	2.74	3.60	3.66	3.97
	SD	1.29	1.20	1.21	1.17	1.25	1.51	1.22	1.31	1.06
POLAND	Mean	4.53	3.59	4.13	3.97	4.40	3.10	3.36	3.33	3.71
	SD	0.50	1.00	0.87	0.76	0.52	1.41	1.27	1.25	1.36
Sig.[a]		***	***		***	***				
					RISK CONTROL					
ITALY	Mean	2.14	2.13	2.26	2.03	2.94	2.57	3.11	3.17	2.10
	SD	1.25	1.25	1.42	1.19	1.30	1.35	1.22	1.18	1.16
POLAND	Mean	1.36	1.27	1.36	1.70	1.70	3.17	3.66	3.01	2.21
	SD	0.78	0.59	0.53	0.81	0.91	1.08	0.78	1.06	1.20
Sig.[a]		***	***	***	***	***	***	***		

Note: [a]T-test for comparison of mean values between the Italian and the Polish sample: significant difference between mean values at 1% level (***), 5% level (**) and 10% level (*).
Source: own elaboration [2018].

Table 3 shows that for the Italian sample hail risk is perceived as the most frequent at farm level, followed by pest infestation and plant disease, whereas for Polish farmers frost is the most frequent risk, followed by severe drought and hail; in addition, we find very similar values between Italy and Poland for storm and severe drop of market price risks. With regard to the impact at farm level, generally

speaking the most important risks for the Italian sample are hail and drops in market prices, whereas for Polish sample it is frost followed by severe drought. Moreover, Italian farmers state to have the highest risk control for pest infestations and plant diseases, while Polish farmers for plant and animal diseases. Interestingly, we notice an interesting and statistically significant (at 1% level) difference in farmers' perception of severe drought control between the two samples, with Italian managing this risk better than Polish farmers.

Among the available self-coping strategies to manage risk at farm level, Table 4 shows the highest preference of the Italian sample for the modernization through investments (that aim at making the farm more competitive). Conversely, on average Polish farmers mainly prefer the use of fertilizer. More in depth, among the strategies linked to the market both samples prefer the improvement of production quality, followed by organic production and direct selling in Italy and by direct selling in Poland. With regard to technical strategies, Italian farmers prefer modernization followed by irrigation, whereas Polish farmers prefer the use of fertilizer followed by farm modernization. Crop diversification is the most preferred management strategy both in the Polish and the Italian sample. Finally, among the financial strategies to manage risk at farm level, the Italian sample seems to prefer to avoid loans, whereas the Polish sample prefers the strategy of money saving; in both samples, receiving the EU payments represents the second best financial option for self-coping risks.

Table 4. Preferred self-coping strategies at farm level

Category	Self-coping strategy	ITALY		POLAND		Sig.[a]
		Mean	SD	Mean	SD	
Market	Production contracts	3.09	1.11	3.96	0.67	***
	Organic production	3.60	1.16	2.90	0.97	***
	Improving the quality of production	4.01	1.01	4.07	0.69	
	Direct selling	3.60	1.13	3.97	0.78	**
Technical	Irrigation	3.90	0.90	3.94	0.68	
	Use of pesticides	2.80	1.15	3.93	0.86	***
	Use of fertilizer	3.20	1.07	4.20	0.63	***
	Investments (i.e. structural/technological modernization)	4.10	0.85	4.19	0.67	
Management	Crop diversification	3.79	0.96	4.06	0.70	
	Diversification of farm activities	3.53	1.13	3.93	0.69	**
	Increasing off-farm incomes	3.56	0.94	3.79	0.95	
	Increasing the level of production	3.60	1.07	3.63	1.02	
Financial	Financial hedging (e.g. future contract)	3.59	1.03	3.57	0.86	
	Money savings for times of financial hardship	3.77	0.92	4.04	0.79	*
	Avoiding loans	3.96	1.08	3.21	1.05	***
	The EU direct payment	3.79	1.01	3.94	0.81	

Note: [a]T-test for comparison of mean values between the Italian and the Polish sample: significant difference between mean values at 1% level (***), 5% level (**) and 10% level (*).
Source: own elaboration [2018].

As shown in Table 5, Polish farmers demonstrate a higher knowledge of the insurance tool mechanisms and perceive this as an available tool on the market to manage risk more than the Italian farmers of our sample; coherently, also the intention to adopt insurance at farm level is higher for Polish farmers. Furthermore, the two samples show similar values of positive trust towards the intermediaries on average.

Table 5. Perceived knowledge and availability of insurance tool, perceived trust towards the intermediaries, and intention to adopt insurance tool

	ITALY		POLAND		Sig.[a]
	Mean	SD	Mean	SD	
Perceived knowledge	2.71	1.16	3.81	1.09	***
Perceived availability	3.06	0.98	3.94	0.98	***
Trust	3.01	0.89	3.07	0.18	
Intention to adopt	3.64	1.04	3.87	0.99	

Note: [a]T-test for comparison of mean values between the Italian and the Polish sample: significant difference between mean values at 1% level (***), 5% level (**) and 10% level (*).
Source: own elaboration [2018].

The high costs of insurance, followed by the absence of adequate information and the scarce transparency about the functioning mechanisms represent the major barriers to insurance adoption among farmers in both samples (table 6), showing higher values for the Italian sample. Finally, the excess of bureaucracy also represents a perceived barrier to insurance adoption, especially for Italian farmers.

Table 6. Perceived barriers to insurance adoption

Barrier type	ITALY		POLAND		Sig.[a]
	Mean	SD	Mean	SD	
Excess of bureaucracy	3.36	0.98	2.64	1.27	***
No adequate information	3.69	1.03	3.26	1.06	***
Scarce perception of benefits	3.30	1.13	3.04	0.84	
Low transparency	3.49	0.96	3.09	0.86	***
Difficult management	2.93	1.05	2.66	0.78	*
High costs	3.81	0.92	3.54	0.93	*

Note: [a]T-test for comparison of mean values between the Italian and the Polish sample: significant difference between mean values at 1% level (***), 5% level (**) and 10% level (*).
Source: own elaboration [2018].

8.4. Summary and conclusions

As insurance uptake is still scarce in Italy and Poland (compared to the levels desired by policy makers), the understanding of the antecedents of the decision to adopt such tool represents a core research issue and the objective of a wider research in which this study takes part [Trestini et al., 2018]. In line with this, this paper highlights some interesting descriptive information regarding some main differences between behavioural aspects in the two considered countries. Albeit the results are not representative of the two populations, they repre-

sent an important source of preliminary evidence that derive directly from a filed investigation. First of all, the results demonstrate a higher perceived risk for hail in Italy and for frost in Poland. Interestingly, we notice a higher control for drought risk for the former, compared to Poland where such risk registers a high impact, and this is probably due to the traditional water management in the Italian agricultural sector. Looking at the possible self-coping strategies available for farmers to manage risk at a farm level, we notice a higher preference for organic production for Italian producers compared to Polish farmers, thus denoting an acceptable value added recognition (in terms of farm revenues) by the market. Conversely, the Polish sample prefers the use of technical inputs. Generally speaking, the Italian sample shows a higher perception of barriers to insurance adoption, whereas the Polish sample shows a higher knowledge and availability of the insurance tool in the market and a higher intention to adopt it in the future. It follows that probably more information campaigns should be targeted to increase the number of insurance adopters, especially in Italy.

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9. The Common Agricultural Policy and the farm households' off-farm labour supply

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Abstract

The economic sustainability of farm households is frequently dependent on the availability of off-farm employment. This paper uses farm-level data to examine the impact of the Common Agricultural Policy (CAP) direct payment scheme, farm household characteristics and agricultural market conditions on farm households' labour allocation decisions in Ireland. Among other things, the hypothesis that decoupled direct payments induce farm household members to allocate more time to off-farm employment is tested. The analysis presented here suggests that decoupled direct payments are significantly and negatively associated with both the probability and amount of time allocated to off-farm work in the case of the farm operator. For married couples, the analysis finds a negative relationship between decoupled payments and the probability of both the farm operator and the spouse working in off-farm employment. Interestingly, decoupled payments have no significant relationship with the probability of the spouse only working in off-farm employment. This result corresponds to the finding of El-Osta et al. [2008] and suggests that decoupled payments tend to play a very limited role in explaining the off-farm employment decisions of the spouse. This analysis contributes to our understanding about the importance of off-farm labour in supporting farm household income. Furthermore, the analysis contributes to our understanding about the role of the farm spouse in contributing towards farm household income, the farm viability and the relationship between off-farm labour decisions and agricultural policy.

Keywords: off-farm labour supply, direct payments, probit model, multinomial logit model

JEL codes: J22, J43, Q12

9.1. Introduction

Off-farm employment by farmer operators and their spouses is a common feature of agriculture and farmers constitute a sizeable proportion of the rural labour force in many Member States of the EU. The growing phenomenon of off-farm employment has arisen out of a number of push and pull factors. For example, small farm size and poor and volatile farm incomes have contributed as push factors [Loughrey and Hennessy, 2016]. Growing rural labour markets with higher and more stable wage rates are among the main pull factors. Many of the factors affecting off-farm employment trends are explored in this paper. The determinants of off-farm employment strategies among married couples is given particular attention given that the off-farm employment decisions of the farm operator and the spouse may differ for a number of reasons.

This paper examines the impact of the Common Agricultural Policy's (CAP) direct payment scheme and agricultural market conditions on farm households' labour allocation decisions in Ireland. The case of Ireland provides an interesting setting for this analysis given the recessionary period from 2007 to 2012. Giannakis et al. [2018] explain that "understanding the factors affecting farmers" off-farm labour decisions during recessionary periods has significant implications for agricultural and rural development policy'. Along with Spain and Greece, Ireland experienced the largest declines in the employment rate among the OECD countries during the course of the economic recession from 2007 to 2012 and this manifested itself in declining opportunities for off-farm employment. The decoupling of direct payments occurred in 2005 and, therefore, prior to the onset of the economic recession. We first hypothesize that the decoupling of direct payments led to an increase in off-farm labour activity among farm operators. Second, we examine the impact of direct payments on off-farm employment strategies among the subset of farm households, which are led by married couples. The hypothesis is that the value of direct payments is negatively associated with the probability of a strategy whereby both the farm operator and the spouse are engaged in off-farm employment. These hypotheses are tested empirically and the results are discussed in the context of the impact of the CAP on farm employment and on the off-farm employment decisions of farmers.

9.2. Theoretical framework

A neoclassical household model based on utility maximisation is used to model farm households' labour allocation decisions. This model is the most common approach in the literature and stems from the seminal paper by Becker (1965). The model rests on the neo-classical assumption that households behave

to maximise their utility function defined over consumption commodities. Lee [1965] was among the first to extend this labour-leisure model for the special case of farm operator households. Tokle and Huffman [1991] extended this model to deal with the labour supply decisions of couples.

In this paper, we deal with the labour allocation decisions of the farm operator (OP) and the spouse (SP) in the farm household. The utility function (U) is assumed to be a function of consumption (C) and leisure time (L) of both the operator and the spouse and is expressed by equation 1.

$$Maximise \ U = f\big(C, L_h^{OP}, L_h^{SP}, \tau\big) \tag{1}$$

The term τ refers to other household characteristics. Total hours of leisure equates to the sum of leisure of the operator and spouse in the following:

$$T_h^i = \ L_h^{OP} + L_h^{SP} \tag{2}$$

subject to the constraints:

$$\bar{T} = \ T_f^i + T_o^i + \ T_h^i \,, T_o^i \geq 0 \,, i = OP, SP \tag{3}$$

Equation 3 shows that the utility function is maximised subject to time constraints as the farmer's total time endowment $\bar{T}$ is finite and is allocated between leisure time of the operator and spouse T_h^i, off-farm work T_o^i and farm work T_f^i. In the case of agriculture, it can be assumed that time allocated to leisure and farm work is positive but for many farmers the time allocated to non--farm work is zero, hence the inequality in equation 3.

$$P_c C = \Sigma_i W_o^i \ T_o^i + \big(P_f \ Y_f - I_f \ X_f\big) + V \tag{4}$$

$$Y = f\big(T_f^{OP}, T_f^{SP}, X, \Phi\big) \tag{5}$$

$$W_o^i = W_o^i(\zeta^i, \psi) \tag{6}$$

Equation 4 shows that the utility function is maximised subject to budget constraints. The total household Consumption (C) is constrained by equating total consumption with total income, i.e. consumption cannot exceed income and savings do not exist. Income can be derived from the off-farm work income (W_o^i) the farm profit and the exogenous household wealth V, that is wealth that is not derived from farm or off-farm labour. The off farm income is due to the wage rate W_o^i multiplied by the off-farm hours T_o^i while the farm profit amounts to the price of farm goods produced P_f by the volume of production Y_f less the cost of production, i.e. the cost of farm inputs I_f by the volume of input X_f.

Equation 5 shows the production function where farm output Y is determined by the labour time of the farm operator T_f^{OP} and that of the spouse T_f^{SP}

along with capital and land inputs X and local or regional factors Φ, which may include climate or soil conditions. The farm operator and spouse face an off-farm wage rates W_o^i which are a function of ζ^i the farmer's human capital and ψ the local labour market conditions. The trade-off between time spent farming and time spent off the farm is conceptualised diagrammatically by Sumner [1982].

The decision to participate in off-farm employment is binary. Rational individuals are expected to participate when the off-farm wage offered exceeds their reservation wage. It is assumed that the farmer or spouse engages in off-farm employment where the offered wage exceeds the so-called reservation wage, i.e. where the offered wage exceeds the reservation wage $w_o^{i*} > rw_o^{i*}$. Conversely, the farmer does not engage in off-farm employment, if the reservation wage rw_o^{i*} exceeds the offered wage w_o^{i*}.

The probability of participating in off-farm work is estimated using a vector of exogenous variables X that are hypothesised to influence the latent reservation wage and off-farm wage rates and therefore the participation decision. Variables that increase the off-farm wage rate relative to the reservation wage increase the probability of off-farm work and the opposite is true for variables that decrease the off-farm wage rate. There are four alternative off-farm work strategies emerging from this model; only the farm operator works off-farm, only the spouse works off-farm, both work off-farm and neither spouse works off-farm.

In addition to these four strategies, we model the intensive margin of off-farm labour supply for the farm operator, i.e. the number of hours committed to off-farm work. The supply function for off-farm work is determined by the optimal level of leisure hours and off-farm work hours, as described in equation 7.

$$T_o^{OP} = \overline{T}^{OP} - T_f^{OP} - L_h^{OP} = F = f(w_o^{OP*}, P_f, I_f, V, \zeta^i, \psi) \tag{7}$$

The number of hours supplied by the farm operator towards off-farm work T_o^{OP} is a function of the off-farm wage w_o^{OP*}, farm profit, i.e. output less costs (Pf - If), exogenous household income V, the farm operator's human capital ζ^{OP} and local employment market conditions Z.

9.3. Methodology

In this section, we describe the econometric methodology used to model the off-farm labour supply of farm operators in Ireland. We follow this with a description of the methodology applied to model the choice of off-farm work strategy among married couples.

We first seek to identify the extent to which different factors contribute towards the hours of off-farm labour supply for farm operators in the Irish case. We wish to estimate the hours equation in the following:

$$OHRS^*_{it} = \beta_0 + \beta'_1 X^*_{1it} + \varepsilon_{1it} \qquad (8)$$

where: $OHRS^*_{it}$ represents the hours of off-farm labour and ε_{1it} is the regression error term. The term X^*_{1it} represents the independent variables and β'_1 represents the coefficient parameter for these variables. Our chosen model is a fixed effects estimator. We, therefore, decompose the error term ε_{1it} into an unknown constant v_{1it} which differs only across individuals and the random error term u_{1it} which is assumed to be independently and identically distributed over time and individuals

$$\varepsilon_{1it} = v_{1it} + u_{1it} \qquad (9)$$

As this is a fixed effects model, we allow for correlation between the constant v_{1it} and the explanatory variables X^*_{1it} but we do not capture the effect of stable covariates.

Studies of off-farm employment typically involve situations whereby a large proportion of the population have zero reported off-farm labour hours and wages due to non-participation in off-farm employment. Our conceptual framework claims that these instances of non-participation are due to reservation wages being above offered wages, i.e. where $w^{r*}_{it} > w^{i*}_{it}$. The reservation wage w^{r*}_{it} is a latent variable where the latent model can be described as:

$$w^{r*}_{it} = \beta_0 + \beta' X^*_{it} + \varepsilon_{it} \qquad (10)$$

where the observed binary participation in off-farm employment O_{it} can be summarised as:

$$O_{it} \begin{cases} 1 \; if \; (w^i_o > w^{r*}_{it}) \\ 0 \; if \; (w^i_o < w^{r*}_{it}) \end{cases} \qquad (11)$$

Equation 8 includes only those observations where the hours of off-farm labour supply $OHRS_{it}$ are available, i.e. where the farm operators are employed off-farm. This may suggest the problem of sample selection bias. We can attempt to overcome this problem by first modelling the participation decision.

We use a random effects probit model for the off-farm participation decision O^*_{it}, whereby:

$$O^*_{it} = \exp(\beta_0 + \beta'_2 X^*_{2i}) + \varepsilon_{2it} \qquad (12)$$

where: O^*_{it} measures the probability of participation and ε_{2it} is the regression error term for this equation. The term X^*_{2i} represents the independent variables and β'_2 represents the coefficient parameter for these variables. The error term ε_{2it} is decomposed into a time invariant individual effect v_{2it} and the random error term u_{2it} which is assumed to be independently and identically distributed over time and individuals.

$$\varepsilon_{2it} = v_{2it} + u_{2it} \tag{13}$$

Given that this is a random effects model, we therefore assume that there is no correlation between the individual effect v_{2it} and the explicit explanatory variables X_{2i}^*.

We can test whether or not sample selection bias is a problem in the first instance by using the error terms from both the participation and labour supply models. Both error terms may be correlated as they both contain information about the reservation wage. If the correlation coefficient suggests that the error terms, ε_{1it} and ε_{2it} are uncorrelated, then the hours equation can be estimated consistently by ordinary least squares. If, however, this correlation is significant, then the inference is that some unobserved variable influences both decisions. The existence of the sample selection bias is, therefore, established and the estimates of the labour supply have to be corrected.

Heckman [1979] provided a two-step method that can potentially correct for sample selection bias. This requires the estimation of the so-called inverse mills ratio. The Inverse Mills Ratio ($\overset{\jmath}{\lambda_i}$) can be estimated from the parameters of the participation model (equation 11). This involves dividing the probability density function by the cumulative density function:

$$\overset{\jmath}{\lambda_i} = \frac{\phi(x_{i2}\beta')}{\Phi(x_{i2}\beta')} \tag{14}$$

This ratio $\overset{\jmath}{\lambda_i}$ is used as an additional regressor in the second stage labour supply model. If a simple t-test suggests that the $\overset{\jmath}{\lambda_i}$ coefficient is not significantly different from zero, then sample selection bias is not a problem and the OLS model can be regarded as consistent. If the simple t-test suggests that the $\overset{\jmath}{\lambda_i}$ coefficient is significantly different from zero, we can then imply that sample selection bias is present, i.e. the farm operators engaging in off-farm employment have certain unobserved characteristics which differ on average in value from those farm operators not engaging in off-farm employment. In the neo-classical model, these differences are absorbed through the reservation wage variable *Wr*. In the next stage of the analysis, we apply the Multinomial Logit Model to analyse the determinants of off-farm work strategies among married couples. In the Multinomial Logit Model, the dependent variable is defined according to the four alternative off-farm work strategies (S) emerging from this model; only the farm operator works off-farm, only the spouse works off-farm, both work off-farm and neither spouse works off-farm.

The Multinomial Logit Model is described as follows:

$$\hat{P}_{jq} = \text{Prob}(Y_i = q) = \frac{\exp(\beta_q' x_j)}{\sum_{k=1}^{4} \exp(\beta_k' x_j)}, \quad q = (1,2,3,4) \quad (15)$$

where: β_q' refers to a vector of coefficients corresponding to each strategy q.

A set of probabilities are established for a farm household j with a vector of characteristics $x_j = (x_{1j}, x_{2j}, x_{3j,})$. Only S-1 of the probabilities can be determined independently. This issue arises because the probabilities sum to one and only S parameter vectors are needed to determine the $S+1$ probablities. This problem is solved by normalizing β_q' to equal zero.

The probabilities can be described as follows:

$$\hat{P}_{jq} = \text{Prob}(Y_i = q|x_j) = \frac{\exp(\beta_q' x_j)}{1 + \sum_{k=1}^{S} \exp(\beta_k' x_j)}, \quad q = (2,3,4), \beta_0 = 0 \quad (16)$$

In our model results, we express the coefficients relative to the strategy where neither the farm operator or the spouse engage in off-farm employment.

9.4. Data

In this section, we describe the data sources used for the analysis. The analysis is based on the Teagasc National Farm Survey, which is essentially the Irish FADN database but containing richer data on off-farm labour supply. O'Brien and Hennessy [2006] described the objectives of the Teagasc National Farm Survey (NFS) as being to:

- Determine the financial situation on Irish farms by measuring the level of gross output, costs, income, investment and indebtedness across the spectrum of farming systems and sizes;
- Provide data on Irish farm incomes to the EU Commission in Brussels (FADN);
- Measure the current levels of, and variation in, farm performance for use as standards for farm management purposes; and
- Provide a database for economic and rural development research and policy analysis.

To achieve these objectives, a farm accounts book is recorded for each year on a random sample of farms, selected by the CSO, throughout the country. The Teagasc NFS is designed to collect and analyse information relating to farming activities as its primary objective. The Teagasc NFS represents panel data of the form x_{it}, where x_{it} is a vector of observations for farmer i in year t. As pointed out by O'Brien and Hennessy [2006], the panel is unbalanced in the sense that there is some attrition from year to year as farmers leave the sample and are replaced by other farms. The attrition rate is relatively low, however, and a sizeable propor-

tion of the farms are contained in the dataset for all of the years concerned. New farmers are introduced during the period to maintain a representative sample and the sample size is usually kept to between 1000 and 1100 farms.

Table 1. Mean value statistics for panel data 2005-2014

Variables	Farm operator model	Married couples model
Dependent Variables		
Off-farm job farm operator (0,1)	0.35	0.37
Off-farm hours per annum	515.13	565.88
Both off-farm job	N/A	0.22
Operator only with off-farm job	N/A	0.15
Spouse only with off-farm job	N/A	0.26
Neither with off-farm job	N/A	0.37
Independent variables		
Operator AGE	55.57	55.56
Operator age squared	3238.76	3211.41
Sex (male = 0, female = 1)	0.04	0.02
Specialist dairy (0,1)	0.16	0.19
UAA (ha)	39.90	42.03
Married (0,1)	0.69	1.00
Number of young in HH	0.55	0.76
Household SIZE	3.09	3.65
Hired workers (0,1)	0.19	0.21
Number of livestock units per UAA	1.33	1.36
Decoupled payment (10,000s)	1.43	1.53
Coupled Income (10,000s)	0.62	0.79
Regional variables		
Mid-East region (0,1)	0.10	0.11
Border region (0,1)	0.20	0.18
Midlands region (0,1)	0.11	0.10
Mid-West region (0,1)	0.09	0.09
South-East region (0,1)	0.15	0.15
South-West region (0,1)	0.18	0.18
West region (0,1)	0.18	0.19
Border Midlands West region (0,1)	0.48	0.47

In Table 1, we include summary statistics showing the mean value for the independent variables, which we included in our models. These summary statistics are provided for the whole sample, i.e. for the model of off-farm labour supply among all farm operators. The summary statistics are also provided for the subset of farm households, which are headed by a married couple. The statistics show that 35% of farm operators are engaged in off-farm employment. This rises to 37% among the subset of farms headed by a married couple. The average age of the farm operator is approximately 55 years old. The proportion of farms classified as specialist dairy is approximately 16% for the sample as a whole, but rises to 19% among the farms, which are headed by a married couple. For most variables, the summary statistics for the group of farms headed by a married couple differ little from that for the overall sample. Couple income is, however, noticeably higher for the farms headed by a married couple relative to that for the sample as a whole. This coupled income represents farm income from market activities plus coupled income supports.

9.5. Results – farm operator

In this section, we present results for the off-farm labour supply models of the farm operator. In Table 2A, we provide the results for the participation decision. These results include the coupled farm income variable. The results show that specialist dairy farms and large farms have a reduced probability of engaging in off-farm employment. As expected, we find that coupled farm income is negatively associated with off-farm employment participation. The number of livestock units per hectare is negatively associated with participation. Farm operators with intensive non-dairy herds are, therefore, less likely to participate in off-farm employment relative to their less intensive counterparts. In terms of the household variables, it appears that the number of children is negatively associated with off-farm employment. This suggests that childcare reduces the amount of time available for off-farm work.

In Table 2B, we provide results for the participation model with a variable representing the value of the decoupled payments. Focusing on the decoupled payment variable, it is clear that the decoupled payments are negatively associated with off-farm employment participation. This implies that the wealth effect of decoupled payments has dominated the relative wage effect. Farms with relatively high payments are, therefore, likely to participate less in off-farm employment. The relative strength of the wealth effect appears stronger in this research relative to the findings of previous research, which compared the determinants of off-farm employment in Ireland and Italy around the time of the introduction of decoupled payments [Loughrey et al., 2013].

Table 2A. Results for off-farm employment of the operator probit analysis

Variables			
Age	0.118*** (0.03)	0.110*** (0.03)	0.110*** (0.03)
Age squared	-0.00222*** (0.00)	-0.00204*** (0.00)	-0.00198*** (0.00)
Sex (male = 0, female = 1)	0.210 (0.29)	0.148 (0.29)	0.150 (0.28)
Specialist dairy (0,1)	-1.592*** (0.20)	-1.919*** (0.20)	-1.696*** (0.18)
UAA (ha)	-0.0233*** (0.00)	-0.0182*** (0.00)	
Spouse working off-farm (0,1)	-0.233** (0.11)	-0.235** (0.11)	-0.224** (0.11)
Coupled farm income (10,000s)	-0.0627*** (0.02)	-0.0864*** (0.02)	-0.108*** (0.02)
Married (0,1)	0.443** (0.18)	0.386** (0.17)	0.275 (0.17)
Number of young in HH	-0.166** (0.07)	-0.163** (0.07)	-0.188*** (0.07)
Household size	0.178*** (0.05)	0.170*** (0.05)	0.165*** (0.05)
Hired workers (0,1)	-0.178 (0.11)	-0.241** (0.11)	-0.272** (0.11)
Number of livestock units per UAA	-1.109*** (0.14)		
Mid-East region (0,1)	Excl.	Excl.	Excl.
Border region (0,1)	0.466 (0.34)	0.702** (0.34)	0.918*** (0.33)
Midlands region (0,1)	1.024** (0.40)	0.987** (0.40)	1.009*** (0.39)
Mid-West region (0,1)	0.480 (0.40)	0.730* (0.39)	1.000** (0.39)
South-East region (0,1)	0.0218 (0.34)	-0.0273 (0.33)	0.135 (0.33)
South-West region (0,1)	0.113 (0.33)	0.250 (0.32)	0.446 (0.32)
West region (0,1)	1.613*** (0.47)	1.779*** (0.44)	2.362*** (0.36)
2005	Excl.	Excl.	Excl.
2006	0.0449 (0.13)	0.0681 (0.13)	0.0258 (0.13)
2007	0.104 (0.13)	0.179 (0.13)	0.135 (0.13)
2008	0.325** (0.13)	0.393*** (0.13)	0.324** (0.13)
2009	-0.0955 (0.14)	-0.00466 (0.14)	-0.0827 (0.14)
2010	-0.351** (0.14)	-0.217 (0.14)	-0.287** (0.14)
2011	-0.274* (0.14)	-0.101 (0.14)	-0.170 (0.14)
2012	-0.230 (0.16)	-0.161 (0.16)	-0.268* (0.16)
2013	-0.0350 (0.17)	0.000594 (0.16)	-0.112 (0.16)
2014	0.0468 (0.17)	0.0805 (0.17)	-0.0508 (0.16)
Constant	-0.653 (0.84)	-2.641*** (0.79)	-4.310*** (0.76)
N	10581	10581	10581

Table 2B. Results for off-farm employment probit analysis

Variables			
Age	0.118*** (0.03)	0.113*** (0.03)	0.116*** (0.03)
Age squared	-0.00224*** (0.00)	-0.00211*** (0.00)	-0.00213*** (0.00)
Sex (male = 0, female = 1)	0.191 (0.29)	0.123 (0.29)	0.129 (0.28)
Specialist dairy (0,1)	-1.743*** (0.19)	-2.154*** (0.19)	-2.143*** (0.19)
UAA (ha)	-0.0172*** (0.00)	-0.0106*** (0.00)	
Spouse working off-farm (0,1)	-0.226** (0.11)	-0.222** (0.11)	-0.210* (0.11)
Decoupled payment (10,000s)	-0.349*** (0.08)	-0.485*** (0.08)	-0.673*** (0.07)
Married (0,1)	0.431** (0.17)	0.391** (0.17)	0.360** (0.17)
Number of young in HH	-0.177*** (0.07)	-0.175*** (0.07)	-0.187*** (0.07)
Household size	0.185*** (0.05)	0.180*** (0.05)	0.181*** (0.05)
Hired workers (0,1)	-0.132 (0.11)	-0.184* (0.11)	-0.188* (0.11)
Number of livestock units per UAA	-1.047*** (0.13)		
Border region (0,1)	0.424 (0.33)	0.623* (0.33)	0.660** (0.33)
Midlands region (0,1)	1.063*** (0.38)	1.087*** (0.39)	1.139*** (0.38)
Mid-West region (0,1)	0.371 (0.38)	0.549 (0.38)	0.581 (0.38)
South-East region (0,1)	0.0471 (0.33)	0.0200 (0.33)	0.103 (0.33)
South-West region (0,1)	0.0124 (0.32)	0.0950 (0.32)	0.108 (0.32)
West region (0,1)	1.439*** (0.38)	1.583*** (0.39)	1.678*** (0.37)
2006	0.137 (0.13)	0.197 (0.13)	0.211* (0.13)
2007	0.170 (0.13)	0.269** (0.13)	0.277** (0.13)
2008	0.433*** (0.13)	0.542*** (0.13)	0.549*** (0.13)
2009	0.0553 (0.14)	0.204 (0.14)	0.213 (0.13)
2010	-0.276* (0.14)	-0.111 (0.14)	-0.110 (0.14)
2011	-0.246* (0.14)	-0.0634 (0.14)	-0.0708 (0.14)
2012	-0.182 (0.16)	-0.0785 (0.16)	-0.0917 (0.16)
2013	0.00219 (0.16)	0.0674 (0.16)	0.0448 (0.16)
2014	0.0494 (0.17)	0.103 (0.16)	0.0647 (0.16)
Constant	-0.541 (0.81)	-2.114*** (0.78)	-2.449*** (0.76)
N	10581	10581	10581

In Table 3, we present the results for the intensive margin, i.e. the hours of off-farm employment model. As in the case of the participation model, we find that age has a non-linear relationship with off-farm employment. Many of the independent variables have the same direction of relationship with off-farm employment in both the participation and hours of off-farm employment models. In contrast with the participation model, we find that the off-farm employment status of the spouse is highly significant and negative in its relationship with the extent of the farm operator's off-farm employment. Farm operators with a spouse in off-farm employment may, all other things being equal, be under less pressure to engage in a particularly high number of hours of off-farm labour.

Being married is positively associated with the extent of off-farm employment, while the number of children is negatively associated with the extent of off-farm employment. Focusing finally on the decoupled payments, it appears that the payments are negatively associated with the number of hours in off-farm labour. As in the case of the participation model, this again implies that the wealth effect is dominating the relative wage effect and the decoupled payments relax the commitment to off-farm employment. One may argue that this is not an undesirable effect of the payments given the average number of hours committed to off-farm employment as reported in Table 1.

Table 3. Results for hours of off-farm employment analysis

Variables	
Age	0.116*** (0.03)
Age squared	-0.00222*** (0.00)
Sex (male = 0, female = 1)	0.162 (0.29)
Specialist dairy (0,1)	-1.907*** (0.20)
UAA (ha)	-0.0182*** (0.00)
Spouse working off-farm (0,1)	-0.225** (0.11)
Married (0,1)	0.460*** (0.18)
Number of young in HH	-0.169** (0.07)
Household Size	0.182*** (0.05)
Hired workers (0,1)	-0.133 (0.11)
Number of livestock units Per UAA	-1.075*** (0.13)
Decoupled payment (10,000s)	-0.370*** (0.09)
Time dummies	
2006	0.139 (0.13)
2007	0.171 (0.13)
2008	0.430*** (0.13)
2009	0.0556 (0.14)
2010	-0.277** (0.14)
2011	-0.249* (0.14)
2012	-0.181 (0.16)
2013	0.00660 (0.16)
2014	0.0604 (0.17)
Constant	0.217 (0.79)

9.6. Results – farm operator and spouse

In this section, we provide the results for the choice of off-farm work strategy among those farm households, which are headed by married couples. These results are presented below in Table 4.

Table 4. Results for off-farm employment multinomial logit analysis

Variables	Strategy = operator only works off-farm	Strategy = spouse only works off-farm	Strategy = both operator and spouse works off-farm
Age	0.212*** (0.03)	0.209*** (0.03)	0.218*** (0.03)
Age squared	-0.00293*** (0.00)	-0.00284*** (0.00)	-0.00352*** (0.00)
Specialist dairy (0,1)	-1.343*** (0.13)	0.0131 (0.07)	-1.634*** (0.12)
UAA (ha)	-0.0227*** (0.00)	-0.00399*** (0.00)	-0.0138*** (0.00)
Number of livestock units per UAA	-0.647*** (0.08)	-0.0626 (0.06)	-0.715*** (0.08)
Number of young in HH	-0.0346 (0.05)	-0.00781 (0.04)	-0.259*** (0.05)
Household size	0.0379 (0.04)	-0.0630** (0.03)	0.113*** (0.04)
BMW NUTS 2 region (0,1)	0.508*** (0.09)	-0.0700 (0.06)	0.378*** (0.08)
Decoupled PAYMENT (10,000s)	-0.142** (0.06)	-0.0252 (0.03)	-0.348*** (0.05)
2005	Excl.	Excl.	Excl.
2006	0.0529 (0.17)	0.147 (0.13)	0.294* (0.17)
2007	0.123 (0.17)	0.300** (0.13)	0.392** (0.17)
2008	0.131 (0.17)	0.233* (0.13)	0.717*** (0.17)
2009	-0.101 (0.18)	0.182 (0.13)	0.399** (0.17)
2010	-0.266 (0.18)	0.129 (0.13)	0.0525 (0.17)
2011	-0.344* (0.18)	0.0278 (0.13)	-0.0530 (0.17)
2012	-0.0553 (0.19)	0.272** (0.13)	0.269 (0.18)
2013	0.126 (0.19)	0.470*** (0.14)	0.572*** (0.18)
2014	0.135 (0.20)	0.505*** (0.14)	0.618*** (0.19)
cons	-1.366 (0.91)	-2.256*** (0.68)	-0.0393 (0.70)

**Results are relative to strategy of neither operator or spouse in off-farm employment.

For the main variable of interest, we find that decoupled payments are significantly negatively associated with the likelihood of both the farm operator and the spouse engaging in off-farm employment. This corresponds to our initial hypothesis. The results show, however, that the decoupled payments have no significant relationship with the likelihood of a strategy whereby only the spouse works off-farm. We also find that the presence of a specialist dairy farm and the degree of livestock intensity (livestock units per hectare) have no significant relationship with the choice of this strategy. The result for decoupled payments

suggests that these payments have a very limited impact on the decision-making of the farm spouses with regard to off-farm employment and this corresponds with previous findings by El-Osta et al. [2008] for the United States. This result may be related to the high education levels of many farm spouses and their ability to gain employment off-farm. As in the case of Nordin et al. [2018], we may not presume that farm income or the overall household income is shared equally between the farm operator and the spouse and an unequal sharing of income may also be a contributory factor. We find that living in the NUTS 2 Border, Midlands and West region is positively associated with the strategy whereby both the operator and the spouse engage in off-farm employment. This reflects the disadvantaged economic conditions of farming in much of this region.

9.7.   Summary and conclusions

We investigate the determinants of off-farm labour participation among farm household members in Ireland with the primary aim of understanding the role played by decoupled payments. To this end, a neoclassical household model is used to model farm households' labour allocation decisions. Under this framework, the effect of decoupling on off-farm participation is the result of two contrasting effects namely a wage effect, that should increase the off-farm labour participation, and a wealth effect, that should reduce it. Thus, which of the two effects will prevail is an empirical question. Overall, many of the considered determinants of off-farm labour participation and off-farm labour supply have the expected significant effect. Among farm operators, the results suggest that decoupled payments have a negative effect on the off-farm participation decision and on number of off-farm employment hours. This implies that the wealth effect of decoupled payments is the dominant factor in influencing off-farm employment decisions.

For married couples, the analysis finds a negative relationship between decoupled payments and the probability of both the farm operator and the spouse working in off-farm employment. Interestingly, decoupled payments have no significant relationship with the probability of the spouse only working in off-farm employment. This result corresponds to the finding of El-Osta et al. [2008] and suggests that decoupled payments tend to play a very limited role in explaining the off-farm employment decisions of the spouse. Future research should seek to develop a better understanding about the off-farm employment opportunities for both farm operators and their spouses and the degree to which farm household members contribute in terms of both farm and off-farm employment.

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10. Comparison of potential effects on the profitability of the US MPP application on dairy farms in Veneto (Italy) and Wielkopolska (Poland)

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Abstract

The American agricultural policy has introduced a form of insurance to guarantee the specific income for dairy producers called the Dairy Margin Protection Program. The program aims to protect farmers from the volatility of prices of both milk and production, without having distorting effects on the market. Joining the DMPP program is voluntary, but with the obligation to remain in the insurance system until the end of the program. The program ensures a share of the perceived income, chosen annually by the producer, of a quantity of reference milk assigned to the individual producer on a historical basis. The insurable theoretical income is defined monthly by the difference between the average milk price and the feed cost index calculated on the basis of a standard ratio. Farmers, who are members of the DMPP program, are entitled to compensation when the theoretical milk income is below the level of income coverage chosen by the producer for a two-month period. This work describes the operating mechanism of the US Dairy MPP with simulation in Veneto (Italy) and in Wielkolpolska (Poland) regions of costs that would have been incurred in the in the period from 2007 to 2017 and the effects on profitability of dairy farms. Finally, a comparison was made between the costs actually incurred by the Community agricultural policy in support of the milk sector and what would have cost a potential application of the MPP.

Keywords: dairy economy, agricultural insurance, dairy farm management, risk assessment, CAP

JEL codes: D24, E52, H54, H72, Q14, Q18

10.1. Introduction

In the 1970s and early the 1980s the effects of the first European CAP based on the guaranteed price levels produced a milk oversupply. To face the increasing public expenditure, the milk quota regime was introduced in 1984 in order to address the growing stocks of butter and milk powder and to subsidise the export. In 2003, after the Luxembourg agreement, it was decided to remove the quota system in 2015 to allow the EU dairy producers to benefit from an estimated rising global demand for dairy products in those years.

In response to a worldwide macroeconomic and dairy recession in 2009, both the EU and the United States introduced new dairy policy instruments. In the EU, the measures focused on increasing producer bargaining powers and public support for private storage of dairy commodities. In the US the new Farm Bill introduced the Margin Protection Program for Dairy Producers (MPP-Dairy) in 2014.

The American agricultural policy has introduced this form of insurance to guarantee a specific income for dairy producers. The program aims to protect farmers from the volatility of prices of both milk and production, without having distorting effects on the market.

Unlike previous price support programs, the Dairy Margin Protection Program (MPP-Dairy) is the first of its kind to recognize that both the price of milk and the cost of feed inputs are important to protect producer profitability. Therefore, protecting a margin between these two would ensure that an adequate return to cover non-feed costs is available.

The DMPP program started in August 2014 and will end on 31 December 2018. Membership is voluntary but with the obligation to remain in the insurance system until the end of the program.

Dairy producers have the option to purchase MPP-Dairy at coverage levels from USD 4.00 per cwt to USD 8.00 per cwt, depending on their risk preference and financial position. They may also choose to insure from 25% to 90% of their milk production history as determined by the highest of 2011, 2012, 2013 annual milk marketing.

The insurable theoretical income is defined monthly by the difference between the average milk price and the feed cost index calculated on the basis of a standard ratio.

Previous Farm Bill programs provided limited support for larger dairies, whereas the MPP program provides a two-tier cost structure but eliminates caps based on farm size or adjusted gross income.

Farmers who are members of the DMP program are entitled to compensation when the theoretical milk income is below the level of income coverage chosen by the producer for a two-month period.

10.2. Materials and methods

The prices considered are those of the foods that most affect the cost of the feed ration. In order to work on standard data, the values are all calculated on a monthly average basis and converted into EUR 100 kg.

The period that we analysed is eleven years long and the methodology is based on monthly average price (from 2007 to 2017) of: milk, corn, soybean meal and alfalfa hay (in Veneto), and milk, corn, soybean meal and meadow hay in Wiekopolska. The calculation of the IOFC (Income over Feed Cost) assessment of the margin (EUR/kg of milk) is settled, for small, medium and large farms (no MPP, 0.07 protection level and 90% of historical production, 0.15 protection level and 25% of historical production, 0.15 protection level and 90% of historical production). Assessment of the risk reduction by coverage level was included as well.

The Italian milk data was collected by the Chamber of Commerce of Lodi and, for what concerns the raw materials, the Chamber of Commerce of Bologna. The Polish data are based on databases of Wielkopolski Farm Advisory Centre in Poznań.

The research is then compared on the basis of a sample of Italian and Polish farms. We settled the average production of those two regions and we calculated the value of insurable milk quantity per year.

In the end, the IOFC (Index of Feed Costs) is calculated and it is in relation to the FADN samples to have a simulation of the application of this tool on the profitability of the farms.

During this study we discovered that, although the two regions have comparable "working factors", there are so many differences in terms of climate, market and also currency that they influence the results of the program.

Farms in the eastern part of Europe tend to be smaller (under 150 cows), and most often grow forages needed for their herds. In contrast, farms in the west and southwest of Europe are larger, and purchase most of their feed.

The dynamics of milk production and the number of milk producers in the two regions (Wielkopolska and Veneto) are very different.

The data show us how the production of Wielkopolska has grown a lot while that of Veneto has remained stable.

The number of farms in Veneto is in sharp decline, while in Poland there is a slight increase. Especially in Veneto, the number of large farms with a strong managerial capacity is much higher than in Poland, where the average size of a herd is around 80 cows.

Figure 1. Comparison between Wielkopolska and Veneto annual milk production (in 100 kg)
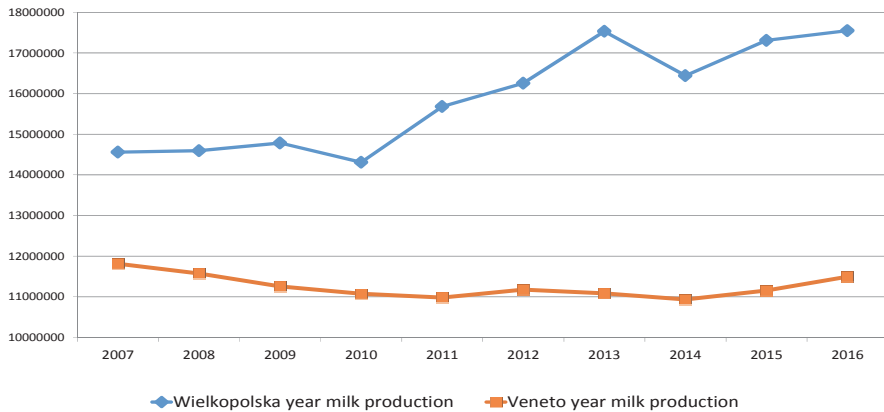
10.3. The situation in Veneto

The comparison between the milk price and the feed costs in Veneto is presented over an average time. The graphic shows two different critical situations, first one between August and September 2009, where there is a huge increment in price that cause the IOFC value decreasing, and the second one during March 2016, when there was a fall in milk price after the abolition of milk quotas.

The two lines describe the maximum and the minimum level of coverage in the MPP program. The higher one is set on the euro 0.15 level and the lower is euro 0.7.

Figure 2. IOFC Veneto 2007-2017
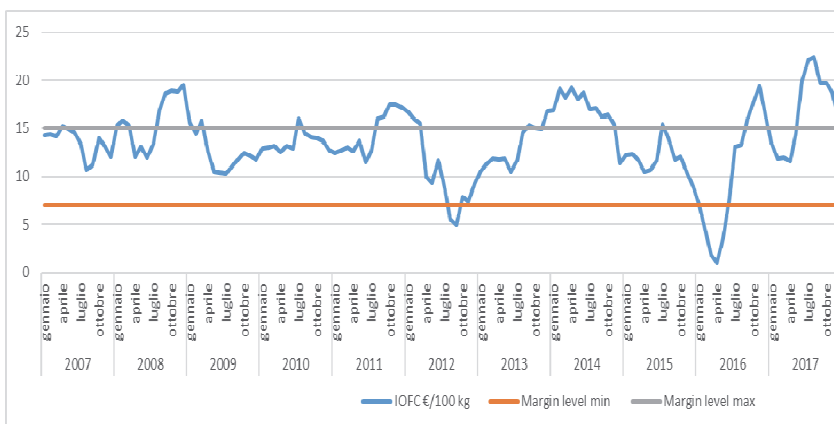
The graph shows the value of the ratio between the sum of the money received and the amount paid to enrol in the insurance program throughout the entire period. The three series of columns represent the farms analysed divided by categories: small (from 1 to 50 cows), medium (from 51 to 150) and large (more than 150 cows).

Figure 3. Average MPP payment per farm size (EUR/year) – Veneto

	Small	Medium	Large
0,07Margin@90%	-28,49	-34,84	596,04
0,15Margin@25%	-64,02	2.271,06	2.433,42
0,15Margin@90%	970,78	9.384,17	10.033,43
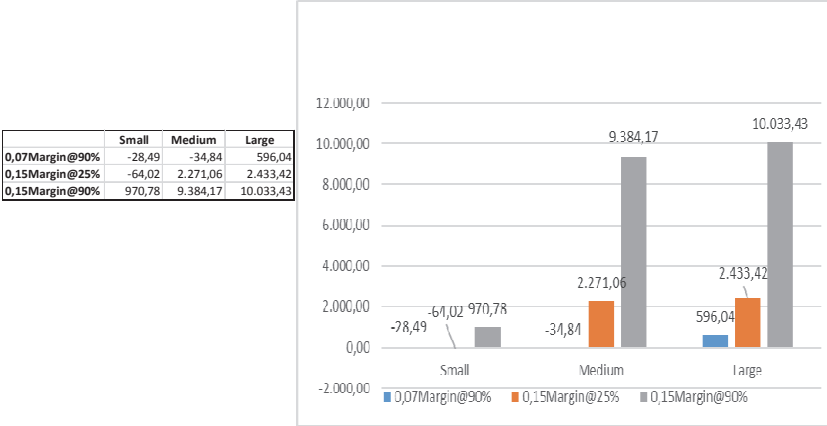
The three values show the revenue received for three different selected coverage examples. The first column indicates the minimum level of coverage, the central one the maximum coverage level, but insured on 15% of the total milk and the last one – the highest level of coverage.

We can see that for small and medium-sized farms insuring at lowest level is not convenient, in fact the cost of insurance is higher than the premium received. On the other hand, if we consider the highest level, we notice how small and medium-sized farms receive much more in relation to the larger one that have to pay much more to ensure a greater quantity of milk. This leads the smaller producers to choose higher levels of coverage, while large farms have the convenience to choose the lowest level.

10.4. The situation in Wielkopolska

In Wielkopolska the situation is more complicated, because the price of milk has a more volatile trend. This changes a lot from year to year and varies over a much longer period. The cost of raw materials, on the other hand, changes much more quickly and with increases and falls in prices. For this reason, the value of the IOCF does not have a linear trend and falls many times below the minimum level of coverage.

Figure 4. IOFC Wielkopolska 2007-2017
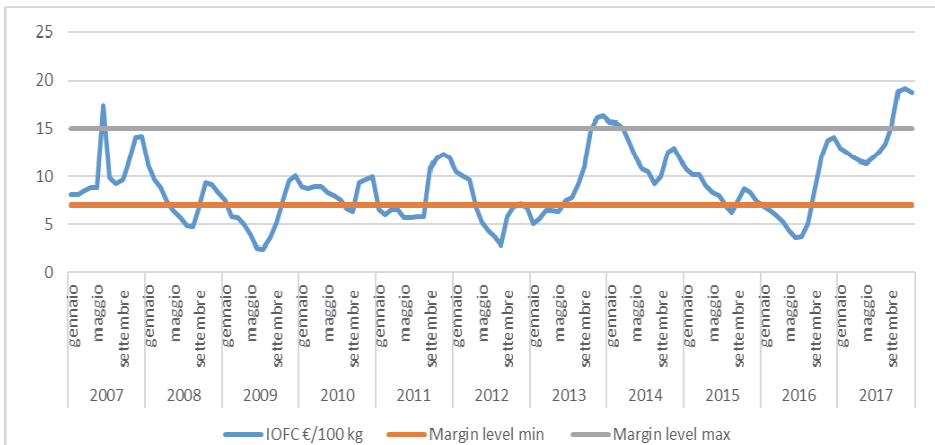
This means that comparing the above data with those collected in Italy and maintaining the same parameters, Polish farmers collect much more money than the Italian ones. Thus, in the graphic that shows the amount of income of the breeders, the situation is not comparable to the situation in Italy. In fact, all three classes of farms always get a lot of money.

Figure 5. Average MPP payment per farm size (EUR/year) – Wielkopolska

	Small	Medium	Large
0,07Margin@90%	384,54	2278,95	15835,07
0,15Margin@25%	1343,56	6908,82	34726,07
0,15Margin@90%	5099,06	25130,78	118205,67
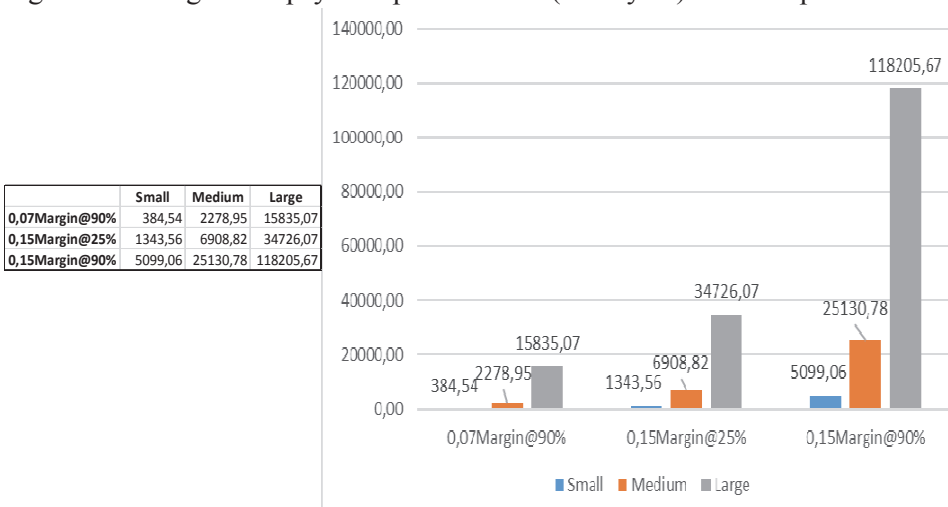
In such a situation expires the system that favours small and medium-sized companies and the prize received becomes closely linked to the quantity of milk. In short, the more it produces, the more it earns.

10.5. Summary and conclusions

It was concluded that application of the US levels of coverage the risk reduction of margin is higher in Wiekopolska than Veneto because the Wielkopolska's IOFC is lower. A comparison was made between the costs actually incurred by the Common Agricultural Policy (CAP) in support of the milk sector and what would have cost a potential application of the MPP. The comparison shows that the potential compensation generated by MPP in Veneto, is aligned for the large farms and higher for medium and small farms.

Figure 6. Comparison risk reduction (%) Veneto, Wiekopolska, California
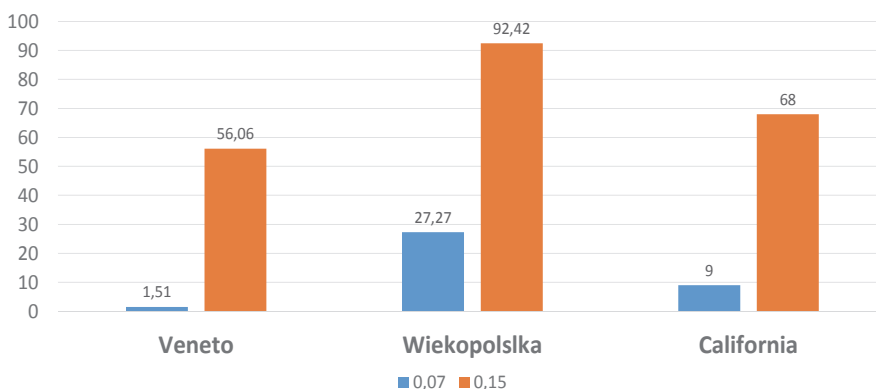
To reach the same level of risk as in California, the minimun level of coverage has to be:
- 0,10 €/100 kg in Veneto   **(+0,03 €/kg)**
- 0,04 €/100 kg in Wielkopolska   **(-0,02 €/kg)**

Compared with the American MPP, the American researchers find a similar situation in different US states because the basis tends to be more positive in the Upper Midwest, and negative and large in California and Idaho. This has caused some concerns about using a single national MPP-Dairy margin formula [Bozic et al., 2016].

To reach the same payment level with the MPP program we have to change the minimal level of coverage for the two regions. We set the Veneto level from 0.07 euro/l up to 0.9 euro/l, and we moved down the Wielkopolska level down from 0.7 euro/l to 0.04 euro/l.

A larger point to be made here is that insurance policies like MPP-Dairy can only address short-term inadequacies of profit margins. MPP-Dairy cannot solve long-term structural disadvantages.

Recently introduced MPP-Dairy program, has yet to demonstrate its effectiveness in the US. Only a very small fraction of the US milk production is protected at a coverage level comprehensive enough to offer meaningful support in very low margin environments such as experienced in 2009 and 2012.

In general an average stable market framework makes MPP effective, intended as an instrument capable of remedying a momentary crisis situation and not as a long-term payment method.

By itself, farm-level heterogeneity in milk prices and feed costs do not present an insurmountable obstacle for implementing a program similar to MPP-Dairy in the EU. Other than a few countries (Malta, Cyprus, Greece, and Finland) most of the EU countries have very similar dynamics of farm-level milk prices.

However, expectations regarding the forthcoming consolidation and spatial restructuring of the EU dairy sector necessitate complementing short-term risk management program like MPP-Dairy with supports for gradual transition towards more market-friendly environment.

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11. The risk management and the insurance of agricultural production

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Abstract

The plant production, as the primary production in agriculture is at risk of natural disasters and other harmful incidences. Thus, the agricultural production which mostly takes place "under the open sky" is always exposed to the influence of many natural factors that cannot be often predicted. Natural forces because material damages in plant production, which are often catastrophic and lead to interruption of the production continuity and disturbance of the production process.

The subject of this paper is the analysis of the dangers faced by plant production, their recognition by the degree of action and damage they cause in a specific area. Research was conducted based on collecting data and analysis of the business results and implementation of the insurance on a farm, where the agricultural production was the most important activity. The primary goal of this paper was to point out to significance of the risk management process in a particular branch, in a specific area and possibility to protect manufacturers from natural disasters. Protection of the primary agricultural production is significant, as regards production protection and business of an economic entity, as well as stability, growth and development of state's economy.

Keywords: risk, insurance, agricultural production, technical result, natural disasters

JEL codes: G22, G32, Q13

11.1. Introduction

The plant production, as the primary production in agriculture, is more liable to natural disasters and other harmful incidences than production in other branches of the economy. Since the agricultural production is mostly run "under the open sky, it is often exposed to the influence of natural factors that are rather unpredictable [Marković, 2010].

Goal: The goal of this paper is to show the way how the insurance in agriculture is carried out, and the extent of insurance coverage in Serbia, with an emphasis on the business results of insurance companies, i.e. individual efficiency of plant production insurance.

Research subject: The subject of research is the insurance in agriculture, in part relating to production, how they work, what are the insurance functions, how to manage risks that threaten to destroy agricultural plantations, crops and yields. The technical result in the plant production insurance was also analysed.

Research problem: The basic problem is that the risks agriculture and its production are exposed to, cannot be completely controlled or eliminated, but they can only react preventively. Therefore, there are preventive measures that are being taken to reduce or prevent damages, which can appear as a result of the risk that the agricultural production is exposed to. The problem is also present regarding the undeveloped awareness of the importance of insurance in a sector of agriculture.

The insurance in agriculture is a type of protection in case of risk realisation by way of compensation of damages. This is exactly the basic and the most important function of insurance in this field, as well as its contribution to business and its stability and provision of certain protection and a sense of security to subjects, and provision of income in a form of insurance benefit to an insurance company, which can be invested further.

11.2. Theoretical basis

From the reviewed available literature, it is noticeable that the agricultural insurance is present in various forms and develops under different institutional framework in different countries. In some countries (developing countries), it appears as a recent phenomenon, while elsewhere it has a tradition of over a century. Insurance coverage ranges from the protection against only one risk to joint coverage of numerous hazards. Methods of determining the insurance premium and compensations also differ from country to country [Miletić, Milivojević and Terzić, 2016].

The most widespread method of insurance [Marković and Jovanović, 2008] is called the single risk insurance and is present in most of the European countries. However, in few European countries, farmers can only insure themselves from hail (Belgium, Denmark, Finland, Ireland, and Great Britain).

There are two systems in the multi-risk crop insurance. The first system is characterized by the compensation that depends on an estimated damage, which occurred under the influence of weather disturbances [Marković, 2008]. This system is being applied in several European countries (Portugal, Austria, Greece, Cyprus, France and Italy).

On the other hand, in Spain [Marković and Jovanović, 2008], the US and Canada, the multiple peril crop insurance eliminates the estimation of damage and implies determining the difference between a guaranteed and a realized yield, so possible decrease in yield is compensated to farmers. The European system requires higher costs of compensating losses, but it avoids the existence of a moral hazard, as one of the biggest problems of the insurance system in the US. The all--risk crop insurance provides farmers to insure themselves from all perils that can harm their crops and fruit. This insurance system is live in the US and Spain.

Risk reduction and risk placement can be implemented only after a well--functioning, internal risk-detecting and monitoring system is in place [Vojinović et al., 2016]. Individuals or organized groups of individuals, who independently make decisions on the use of available resources and bear risks of previously made decisions, are the agri-business entities. Households, as a basic form thereof, enterprises and the state are included in the category. In agriculture, manufacturers can be family agricultural holdings, but also bigger agrobusiness corporations [Matić, 2004].

The agricultural production is consisted of labour and means of production. The means of production are consisted of instruments of labour and materials, which together with manpower mean "*condition sine qua non*" for every material production. The instruments of labour are those means used in several production cycles, whereby they are consumed progressively, i.e. transfer a part of their value to the product. According to Jovanović [2001], the instruments of labour in agriculture are: land and buildings, which are considered as the objective condition of production and the agricultural machines, tractors, tools, perennial plantations (orchards, vineyards, hop plantation) and livestock units, as means used directly as working tools.

As regards the existence of variability in the need for manpower, in the human resource management, the emphasis is put on the selection of an optimal number of employees, favourable employee structure and the effective management from the aspect of the appropriate organization and motivation of employees [Birovljev and Tomić, 2009].

Agricultural activity is characterized by numerous production, organizational and technical specificities, which impose the need for special treatment of agriculture [Vasiljević, 2008]. These specificities are related to:

• Influence of natural factors on the production results;
• Possibility of self-reproduction in natural form;
• Biologically determined period of production and performance of some production activities;

- Phase character of production, i.e. incompatibility of work time and period of production;
- Seasonal character of production;
- Slow turnover of capital;
- Expressed horizontal and vertical connections among varied production lines.

Functioning of the agri-business organisation is considerably determined [Birovljev and Tomić, 2009] by natural factors (fertility of soil, plant and animal characteristics and climate) and environmental factors (the level of agricultural development, agrarian and economic policy, global market, scientific and technological processes in agriculture). It is much harder to have an effect on the natural than the environmental factors, which have been pre-set and cannot be controlled. However, it is possible also to improve the natural factors, to a lesser extent.

On the occasion of making high-quality strategic, tactical and operational decisions, it is necessary to consider soil specificities. Only this approach enables the harmonization between an economic decision and the business goal of agricultural holdings. Some natural characteristics of soil should be taken into account to assess the role and significance of soil [Zakić and Stojanović, 2012].

The amount of yield has been largely determined by the natural fertility of soil. Regarding to different fertility of the observed arable land, there is necessary a different investment volume to realize the same yield. This fact represents a base for differential rent, i.e. for making a higher profit in regard to competitors. The next important consequence of different soil fertility is that it reflects the existence of diversity in production, i.e. a degree of specialization. Thirdly, different fertility defines the role and significance of crop rotation. Respecting the peculiarities of the observed land and taking into consideration its different fertility, the managers in agricultural holdings make selection, through an operational plan – what to produce, on which land, by which mechanization and how many working capital is needed for production [Jovanović, 2001].

Prostran [2016] considered that the plant production insurance had a significant role in protection of farmers, since the insurance costs have been extremely low in regard to their share in total costs (1.5-2%).

11.3. Characteristics of the plant production insurance in Serbia

Insurance of agriculture can be divided into two types of insurance [Vojinović and Žarković, 2016]:
- Insurance of plant production, i.e. crops and yields;
- Insurance of domestic and other animals.

Every agricultural product is exposed to the risk posed by nature, at every phase of their development, i.e. during sowing, growth and ripening, and therefore it is especially important to protect them. The increasing popularity of protection of agricultural production means the inclusion of insurance; the insurance indemnity covers everything that is destroyed by the realization of insured occurrence and thus the function of agricultural production, i.e. economic protection, is fulfilled.

Although the state offers incentives, only 10% of the entire area of arable land in Serbia is insured. The payment of a premium in agricultural insurance is alleviated by incentives offered by the Ministry of Agriculture, Forestry and Water Management. There is expected no less than RSD 50 million of incentives for premiums. Every holder of an agricultural holding is entitled to use an incentive for insurance in the amount of 40% of an insurance premium amount without taxes on premium of non-life insurance. Every holder of a holding can be entitled thereto by submitting a claim with all the documentation to the National Treasury Administration.

The insured object in insurance of agriculture are crops, yields (fruit), medicinal herbs, meadow grasses, orchards and vineyards, ornamental plants, young forest crops up to 6 years and others. Likewise, the insured object can be sheep, hoofed animals, cattle, pigs, bees, dogs, fowls such as hen, guinea fowls, turkeys, peacocks, geese, ducks and pheasants, exotic animals in zoos and outside zoos.

Crops and yields that are damaged from the insurance risk cannot be covered by the plant production insurance. If the insurer determines that after a contract is concluded, that insured crop or fruit was damaged from the risk that was covered by insurance before the insurance contract was signed, an insurer can demand the cancellation of the concluded contract [Miloradić, 2004].

Total gross value of agricultural production in 2016 in Serbia was USD 5.3 billion or 11.8% above the realized value in 2015. At the same time, a net realized value of agricultural production amounting to USD 4.4 billion is higher by 8.5% compared to 2015. By regions, Central Serbia has a gross value of agricultural production in the amount of USD 2.9 billion, with the share of 54.3% in total value realized by Serbia, which is above the realized gross value in Vojvodina (USD 2.4 billion, i.e. 45.7%).

However, as the production of basic crops in 2015 (dominant by the production capacity and the production volume) was below average, the base in the evaluation of production was significantly decreased in 2016. It refers primarily to maize (the share of maize in gross value of agriculture in 2016 was 23%), soy 3.9%, sunflower 3.1%, and sugar beet 1.7%. Insignificant variations in livestock production were realized in 2016. There was increased production of all kinds of meat, while the production of sheep milk, honey and table eggs was decreased.

In the structure of realized gross value of agricultural production in Serbia for 2016, the share of plant production was USD 3.5 billion or 66.2%, with the share in Central Serbia of USD 1.6 billion or 45.9%, while the plant production in Vojvodina was USD 1.9 billion, with the share of 54.1%.

In 2016, a total value of the realized plant production in Serbia was assessed at USD 3.5 billion, or it was increased by 20.28% compared to 2015, with the share of 66.2% in the realized value of total agricultural production.

Table 1. Plant production in Serbia by cultures, with the share by regions in 2016

	Serbia		Central Serbia		Vojvodina	
Crop	Value (in euro)	Share in %	Value	Share in %	Value	Share in %
Maize	1,257,643.540	100.0	431,279,443	34.3	826,364,097	65.7
Wheat	472,439.103	100.0	181,630,487	38.4	290,808,616	61.6
Sunflower	165,420.168	100.0	11,759,209	7.1	153,660,959	92.9
Soy	207,263.613	100.0	15,019,660	7.2	192,243,953	92.8
Sugar beet	93,400.681	100.0	0	0	93,400,681	100.0
Lucerne	69,082.155	100.0	48,611,380	70.4	20,470,775	29.6
Sour cherry	40,170.642	100.0	34,571,391	86.1	5,599,251	13.9
Peach	33,386.321	100.0	25,881,893	77.5	7,504,428	22.5
Raspberry	101,525.033	100.0	101,135,711	99.6	389,322	0.4
Strawberry	15,406.257	100.0	13,727,138	89.1	1,679,119	10.9
Apple	88,540.856	100.0	47,734,336	53.9	40,806,520	46.1
Pear	27,677.352	100.0	22,010,785	79.5	5,666,567	20.5

Source: Statistical Yearbook of the Republic of Serbia Agriculture.

The agricultural production in the Republic of Serbia is based on the structure of property in which prevail semi-sustainable agricultural holdings. The agricultural holdings, which use up to 2 ha of agricultural land, are represented with 47% in the property structure. In comparison with the average size of an agricultural holding in the EU, it is around 20 ha. This fact has a direct effect on the competitiveness of agricultural production, incomes and payment ability of an agricultural holding, and thereby on demand on the agricultural insurance market in the Republic of Serbia. Poor association of farmers has an effect on inefficient demand on the market of crop and yield insurance, which disables the favourable insurance conditions [Žarković, 2016].

Figure 1. Structure of plant protection of Serbia in 2016

Struktura biljne proizvodnje Srbije u 2016. godini

Legend:
- Žita 51%
- Industrijsko bilje 14%
- Povrće 15,1%
- Krmno bilje 5,6%
- Voćarstvo 13,1%
- Vinogradarstvo 1,1%
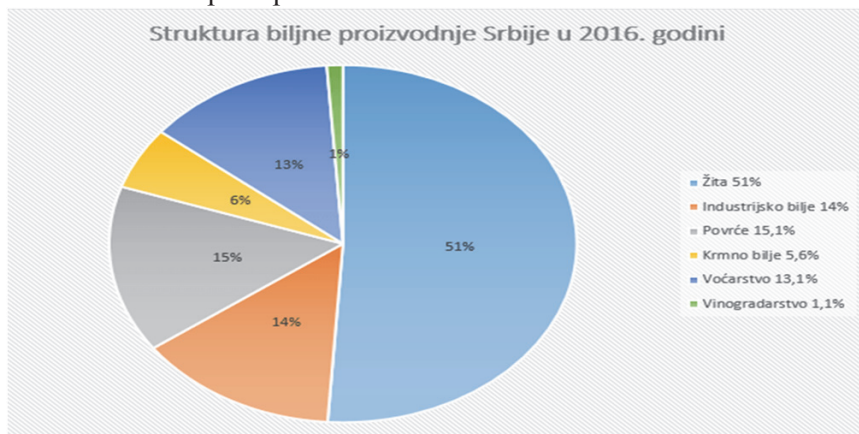
Structure of plant protection of Serbia in 2016:
- Cereals 51%,
- Industrial crops 14%,
- Vegetables 15.1%,
- Fodder 5.6%,
- Fruit growing 13.1%,
- Viticulture 1.1%.

The percentage share of insured areas in the period from 2006 to 2014 in the total agricultural area of the Republic of Serbia was 6.32% in average, while it was 9.32% in the total arable land of the Republic of Serbia. A significant increase in the percentage of insured area has occurred after catastrophic floods in some areas of the Republic of Serbia in the previous period, and in 2016 it was estimated that around 10-12% of areas were insured.

The average share of plant production insurance premium in the total premium of agricultural insurance of the Republic of Serbia for the observed period was 70%, and the insured animal premiums were 30%.

In accordance with the presented data, we can conclude that possibilities for the development of insurance against agricultural risks are significant, as due to the insufficient level of this insurance segment development in the Republic of Serbia, as well as due to the insufficient implementation and competence for the business of state institutions and the understatement of legislation.

Around 10% of arable land and less than 5% of registered holdings in Serbia is insured. The insurance premiums of crops and yields of RSD 1.85 billion make less than 3% of the total insurance market, and around 40% of premiums are subsidized by the state, which was around RSD 450 million in 2016 for the insurance in agriculture for which subsidies were used.

11.4. The position of farmers in the system

According to results of the Census of Agriculture in 2012, there were 1.44 million members and full-time employees of agricultural holdings in the Republic of Serbia. Of this number, around 98% are owners of holdings and members of their families, and only 1.9% persons are regularly employed in agriculture.

If expressed in number of annual work units (AWU), the number of employees in agriculture is 646,283 persons. Of this number, approximately 40% of AWU by persons who are 100% engaged in agriculture, while around 28% of AWU are persons who are occasionally hired in agriculture (less than 50% of working hours). Of the total AWU, 91% is work of a holding's holder, i.e. members of their holdings (44:47%), 4% – work of full-time employees, and 5% is seasonal workforce. Preliminary results of Census show that the level of qualification of a holding's manager for being engaged in agriculture is not particularly high. In other words, data shows that 60% of managers of holdings have only the experience gained in agricultural production, 2.5% have secondary agricultural education, and 1.4% of managers have the Faculty of Agriculture diploma. Only 3% of holding managers had combined some form of education and training in the census year.

Table 2. Subsidiary table for the classification of settlements and municipalities into the classes of peril in the hail emergence

Long-standing technical result of a regional unit	Classes of peril
Up to 10%	I
From 10% to 30%	II
From 30% to 50%	III
From 50% to 90%	IV
From 90% to 150%	V
From 150% to 220%	VI
From 220% to 300%	VII
From 300% to 400%	VIII
From 400% to 500%	IX
Over 500%	X

Source: prepared by authors.

As for our insurers, there is mostly the manifestation of their premium rates that imply the conditional franchise of 5%. In other words, if damage occurs, which is less than 5% of the insurance amount, the insured person bears the entire damage; however, if it is higher than 5% – the damage will be completely covered by the insurer. Thus, the insurers make selection, i.e. exclude small damages, whose costs exceed compensation, as well as those damages with low values in which case it is hard to decide whether they are generally the consequence of the insured risks or not [Miloradić, 2004].

According to the Table, if in the last ten years the average technical result of 47% in some place was recorded in the hail insurance, this insurance will be classified as third class peril. If this result becomes more unfavourable in the next year, for example 52%, this same place will be classified into the fourth – higher class, and thus the premium is higher.

In the research of damage and success in business trends, every insurer follows necessarily the so-called damage rate or technical result. In most general terms, this indicator represents the ratio between damages and the insurance premiums. It is expressed proportionally or by the coefficient. As it is lower than 100%, the technical result is more favourable or better. Instead of the total premium, there can be taken into consideration only a part intended for payment of damages – the technical premium [Miletić, Milivojević and Terzić, 2016].

11.5. Research results

If the obtained amount of technical result is lower than 100%, it means that the technical result is favourable, i.e. high-grade. However, if this amount is higher than 100%, it means that the technical result is unfavourable, i.e. low--grade, and in the observed period the amount of damages was higher than the premium. It is possible to follow in the current period or at the relevant level of disbursed amount of damages and incoming premiums in an absolute amount.

Farmers mostly insure their crops only against the basic risks (hail, fire and thunder strike), and it makes from 95% to 98% of all concluded insurances, while they are insured mostly against spring frost and storm, as it comes to the additional risks.

The annual insurance premium for field crops, depending on the crop and the average amount per hectare, ranges from RSD 4,020 for 1 ha of maize to RSD 3,050 for 1 ha of wheat.

Table 3. Number of the effected insurance contracts and a total insurance premium of crops and yields in the Republic of Serbia between 2012 and 2016

Year	Number of concluded insurance contracts	Total insurance premium of crops and yields (RSD)
2012	14,871	1,126,363.000
2013	18,658	1,503,919.000
2014	19,768	1,603,900.000
2015	27,652	1,672,794.000
2016	28,749	1,847,144.000

Source: National Bank of Serbia – Insurance sector in Serbia (Annual reports 2012-2016).

When it comes to the insurance of fruit cultures, what should be mentioned is the offer for the insurance of plums with the premium of RSD 29,937 per ha, and the insurance of raspberry, RSD 120,582 per ha, as well as the insurance of blackberry with the premium of RSD 90,436 per ha.

In the Tables, we can see a reliable and constant growth of premium and the concluded contracts in the period from 2012 to 2016.

Table 4. Number and amount of the accepted crop and yield damages insurance in the Republic of Serbia in the period from 2012 to 2016

Year	Number of accepted damages	Amount of accepted damages
2012	2,519	416,273.000
2013	6,019	1,506,422.000
2014	6,278	1,062,003.000
2015	3,151	710,060.000
2016	7,755	1,584,411.000

Source: National Bank of Serbia – Insurance sector in Serbia (Annual reports 2012-2016).

We have a sudden decrease in the following two years, and in 2016 it was the same as in 2013, as it is described in the Table that shows the amounts of accepted damages after the big growth in 2013 in regard to the previous year. There is also a growth in the accepted damages, except in 2015.

The research refers to the largest insurance company in the field of agricultural production insurance in Serbia, which is located in predominantly agrarian region of Vojvodina. We observed the centres of plant production in towns of Novi Sad, Sremska Mitrovica and Zrenjanin in long-lasting period from 2010 to 2017.

Table 5. Technical result of the plant production insurance by branch offices for the observed period from 2010 to2017

Branch office	Closed technical premium (RSD)	Liquidated damages (RSD)	Technical result (%)
Zrenjanin	85,367,039.91	62,032,255,00	72.66
Novi Sad	103,295,126.86	100,590,906.08	97.38
Sremska Mitrovica	39,590,086.79	44,806,035.00	113.17
Total	228,252,253.56	207,429,196.08	90.88

Source: prepared by authors.

If we consider business success, the most relevant are data on the financial result, considering that agriculture is the field we observe, the most important is to precisely take account of the relation between the premium and damage from the insurance-technical point of view. Data were expressed in domestic currency, dinar (RSD). Bearing in mind that it is the most important

for an insurance company, and more precisely its business efficiency, to regularly monitor the result (damage and premium ratio), the following tables show data by branch offices.

If we observe the obtained data, we can see that the results for branch offices in Zrenjanin are 72.66% and Novi Sad – 97.38%, the positive, i.e. technical result, is high grade, and it points to the fact that insurers, in respect of crop insurance, were careful while insuring and rating. The technical result in Sremska Mitrovica is 113.17% and as such it is not favourable or high grade.

The number of insured crops in the observed period was in Novi Sad, as we can see from the Table, where the effected technical premium was RSD 103,295,126.86 and thereby the amount of damages was higher in regard to Zrenjanin and Sremska Mitrovica (RSD 100,590,906.08), and accordingly the technical result was 97.38%. The lowest number of insured crops was on the territory of Sremska Mitrovica with the technical premiums of RSD 39,590,086.79, and thereby the least liquidated damages in amount of RSD 44,806,035.00, which led also to unfavourable technical result for this territory (113.17%). While Zrenjanin is in the middle between these two towns with RSD 85,367,039.91 of technical premiums and RSD 62,032,255.00 of liquidated damages and accordingly has the most favourable technical result of 72.66%. Besides the data processed for the period from 2010 to 2017 on the basis of the total for these three areas, the results were processed separately by years.

Figure 2. The effected technical premiums and liquidated damages in crop insurance for the period from 2010 to 2017 (branch offices)
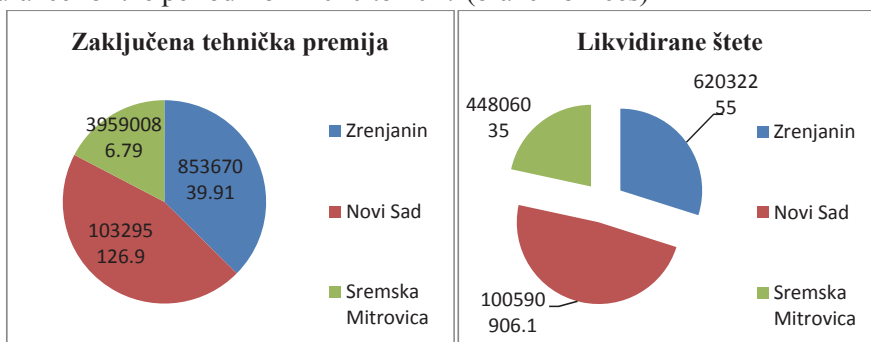
Source: prepared by authors.

According to this Figure, we can notice that the highest technical premiums occur on the territory of Novi Sad, and the lowest on the territory of Sremska Mitrovica. The analytical review by years, shows that the premium increases and the increase in premium from plant production is significant. Only the branch office in Sremska Mitrovica has achieved a significant decrease in premium in the

observed period, which is the consequence of the insurer's supply decrease and the risk analysis. Negative technical result defines the policy of supply decrease and failure to take into account in the insurance the plant production risk.

Table 6. Analytics of the effected crop insurance technical premium in the observed period, in RSD

Year	Zrenjanin	Novi Sad	Sremska Mitrovica
2010	6,720,584.90	6,243,477.10	6,094,251.71
2011	5,968,855.92	9,369,405.19	997,519.53
2012	7,848,859.85	8,666,554.54	848,933.23
2013	12,889,967.03	12,680,792.39	7,789,405.46
2014	12,925,929.86	16,680,700.12	11,901,011.98
2015	11,096,585.99	16,276,473.50	3,691,241.54
2016	11,425,122.11	17,354,360.52	3,204,675.37
2017	16,491,134.25	16,023,363.50	5,063,047.97
Total	85,367,039.91	103,295,126.86	39,590,086.79

Source: documentation "DDOR Novi Sad" 2017.

Figure 3. The effected technical premiums of crops by branch offices (RSD)
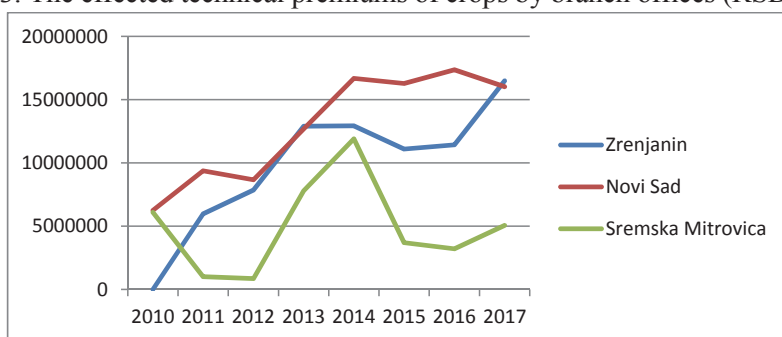
Source: prepared by authors.

Table 7. Liquidated damages in the period from 2010 to 2017 by branch offices (RSD)

Year	Zrenjanin	Novi Sad	Sremska Mitrovica
2010	6,506,142.00	9,301,566.00	1,678,959.00
2011	5,118,808.00	1,781,575.00	651,516.00
2012	14,692,205.00	61,790.00	106,424.00
2013	3,535,908.00	52,795,697.04	33,262,481.00
2014	5,483,450.00	343,217.00	4,025,936.00
2015	1,897,278.00	2,596,758.04	138,294.00
2016	22,463,057,00	11,955,484.00	546,269.00
2017	2,335,407.00	21,754,819.00	4,396,156.00
Total	62,032,255.00	100,590,906.08	44,806,035.00

Source: documentation "DDOR Novi Sad" 2017.

If we observe the damage analysis in the specific period, we can conclude that there is a negative result in 2013, when the technical result was 4.3 index points. Dynamics of premiums and damages in this area points to a strange be-haviour and the occurrence of unusual risks, floods and drought with cata-strophic consequences in this year.

Figure 4. Liquidated damages in crop insurance in 2010-2017 (RSD)
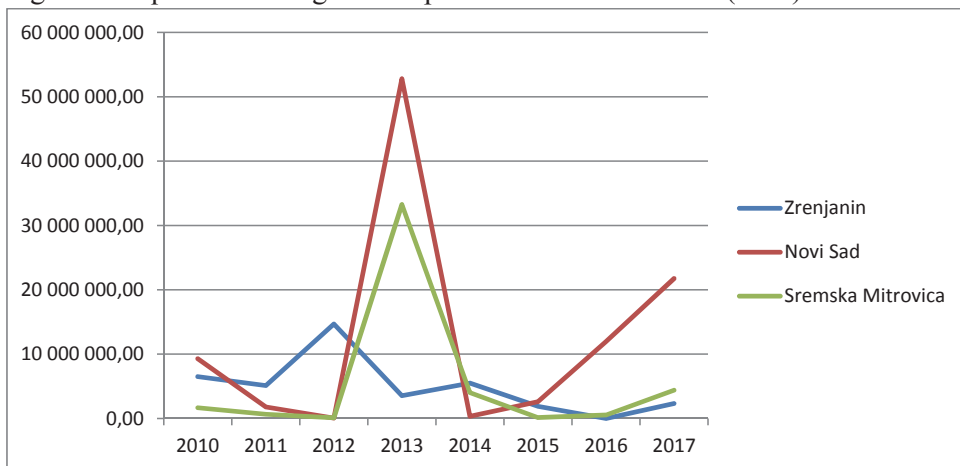
Source: prepared by authors.

In the following review, we provide an analytical review of the achieved result of a technical premium by years.

Table 8. Technical results by branch offices for the period 2010-2017 (%)

Year	Zrenjanin (%)	Novi Sad (%)	Sremska Mitrovica (%)
2010	96.81	148.98	27.55
2011	85.76	19.01	65.31
2012	187.19	0.71	12.54
2013	27.43	416.34	427.02
2014	42.42	2.06	33.83
2015	17.09	15.95	3.75
2016	196.61	68.89	17.05
2017	14.61	135.77	86.83
Total	72.66	97.38	113.17

Source: prepared by authors.

Figure 5. Technical result by branch offices for 2010-2017 (%)
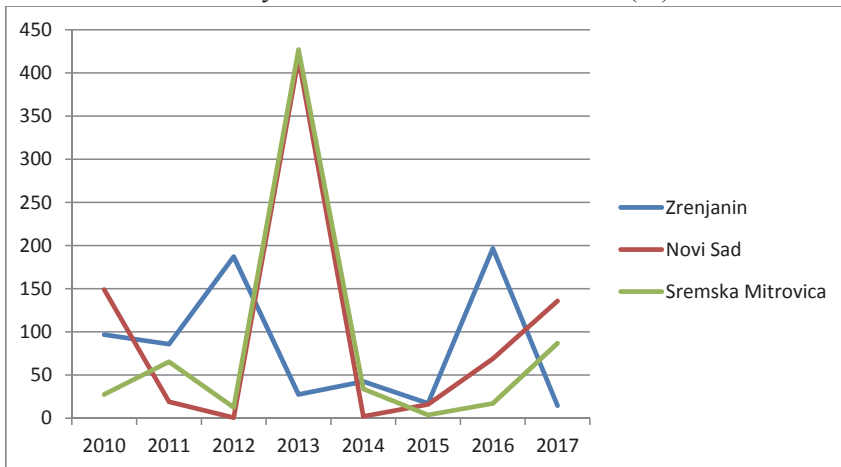
Source: prepared by authors.

We can notice from the enclosed data that the technical result was the most unfavourable in Sremska Mitrovica in 2013, with 427.02% and this was caused by the fact that production was realized in the conditions of major and fast meteorological changes, which have affected the growth and development of plants. Very unfavourable technical result occurred in Novi Sad in the same year and it amounted to 416.34%, while in Zrenjanin the most unfavourable technical result was in 2016 (196.61%).

The increased damages in 2013 caused by to overdraught, which hit Serbia and thereby had an effect on the unfavourable technical result (Figure 5). Climate changes and anomalies have a negative effect on development and growth, as well as on the condition of most of the agricultural crops. Yields were halved and it resulted in big damages.

11.6. Summary and conclusions

Agriculture, as the sector of the economy, is vital for the Republic of Serbia and its total social and economic development. The position of agrarian sector is specific, because besides the economic, it also has special social and ecological importance, whereby it is instantaneously the carrier of rural development. Agriculture contributes to the national wealth that is important in creating GDP (assessed at 10%) and the total employment of population (around 20%).

Serbia has very favourable natural conditions (soil and climate) for diverse agricultural production (both plant and livestock production), experienced farmers, top experts and scientists, and the selection of various plant products recognized worldwide.

Plant production should be developed in direction of total areas under crop reduction, increase in areas under orchards, vineyards and meadows, the increase in yield per unit of capacity with the reduction of their variability, wider range of products and higher product quality, stronger market and export orientation.

The crop production should be developed in the direction of reduction in areas under cereals, and increase in areas under industrial crops, fodder and vegetables. According to optimal, projected structure of sown areas, the share of cereals should reduce from 51.4% in 2016 to 50% in 2020. At the same time, the share of industrial crops should be increased from 13.3% to 15%; the share of vegetables should be increased from 8.3% to 15%, and the share of fodder should be increased from 14% to 18%.

In fruit production and wine growing, it is necessary to prevent the reduction in the number of continental fruit trees, grapevine vines and total areas under vineyards. The share of these branches in the structure of total agricultural production value can be increased by more significant increase in yield per capacity unit. Development of fruit production from big plantation orchards in monoculture, predominantly in the plain area, should be directed to new plantations located in the appropriate agro-ecological regions, in hilly areas, respecting the local pomo-ecological potentials. The increase in the number and varieties requires improvement in domestic selection of certain varieties of continental fruit, but also import of an adequate assortment of high production and market value of raspberry, blackberry, walnut and hazelnut.

Serbia belongs to the group of countries with low yields, and it is noticeable that insurance does not cover arable land sufficiently. This is because of the manufacturers' trust, their habits and the insurance awareness, as well as the economic policy carried out by the state, and also maybe the poor access of insurance brokers or lack of adequate supply of insurance companies [Birovljev, Vojinović and Balaban, 2015].

Eight big insurance companies in Serbia offer agricultural insurance services in the form of crop/yield/animal insurance. Crops and yields can be insured against hail risk, risk of fire and thunder as the basic risks, and storm, spring and autumn frost, draught, flood, loss of quality and quantity, as additional risks. The amount of premium in this type of insurance depends on many factors, including: plant variety, area in which crops and fruit are located, a contracted insured amount, risks covered by insurance, etc. The insured amount is determined according to the expected yield in kg per ha and the market price of a product.

Underdeveloped agriculture disables higher amounts of investments, due to which yields are low as well.

Without the specific financial products and services that provide insurance against production and market risks and motivate enterprises to make new investments, SMEs and farmers have no other option, but to borrow under market conditions [Sedlak et al., 2016]. Consequently, small manufacturers often assess that paying the insurance premium is uneconomical, although the premium costs are in average only 1.5-2% of the production value. Relatively more opportunities to afford the insurance have big socially-owned farms, which remained in minority due to the privatization process and fragmentation of properties, as well as farmers jointed in cooperation and associated under agricultural cooperatives, while individual farmers, whose existence depends on yield, insure rarely [Petrevska, Toskano and Milošev, 2010]. Likewise, in the conditions of relatively low level of development the insurers themselves do not dispose with sufficient financial capacities in order to offer the insurance against natural hazards at affordable prices, and this is why the supply is scarce. For example, the risk of drought can be insured at just one insurance company for a limited number of crops [Kočović, Rakonjac Antić and Jovović, 2016].

Reasons for the underdevelopment of plant production insurance are low life standard of rural population, ignorance of manufacturers on the insurance advantages, low insurance culture, limited capacities of insurers and the opinion that has taken root with us that the state should compensate. In such conditions of natural hazards, the state compensates damages in the largest part. Ultimately, their effects flow over to population as taxpayers and the users of agricultural products.

From the above, it can be clearly concluded that a new platform, which would better encourage farmers to insure their production, is inevitable for the development of crop and yield insurance in Serbia. It is necessary to create long--term solutions:

- Stable portfolio (along with the risk diversification),
- Adequate system of subsidies (acceptable for all parties),
- Development of the preventive funds (as a measure to reduce risk),
- Products adjusted to the needs of insured persons (with the necessary levels of covered risks), and
- Programmes to raise the awareness on risks in agriculture and improve the availability of such insurance.

One of the suitable solutions, by which the market could accelerate, is a model in which a pre-contractual obligation of adequate insurance cover would be introduced, as the condition for obtaining subsidies in agriculture by the state.

This would realize multiple effects; on the one hand, farmers would have predictable incomes, while on the other, the state would protect investments in the form of subsidies in agriculture and hereto it would protect the state budget

from further unplanned expenses. Neither the positive effect on the insurance industry generally, nor the return effects in the sense of preventive measures development and the education on the agrarian production risks and measures to overcome them should be neglected [Žarković, 2000].

Žarković points out that the plant production insurance in the Republic of Serbia has been carried out in almost unmodified way for decades. Starting from the frequency and severity of consequences, the hail hazard, as a basic risk, takes the first place. Fire and thunderstruck also belong to the basic hazards. The additional hazards are storm, spring and autumn frost and flood. The insurance companies offer also other possibilities to protect plant production: protection from seed quality loss, the crop and fruit protection in glasshouses and green-houses, protection of crops and fruit after harvest, protection of quality loss, but these additional insurances are not of great concern. Experts think that possibilities of the plant production insurance market in the Republic of Serbia are better than the current level of development.

Researchers can get the approximate data according to a number of registered farms (agricultural holdings), which are entitled to the insurance premium recourse. It is calculated directly that only 3.14% of registered farms is insured. Adoption of Positive Practices of the countries in the region could be a good example (e.g. the Republic of Croatia), which implies designing the "map of agricultural risks".

The maps are the technical means by which determine the probability of hazard emergence and zones of specific risk areas. The maps represent a base for determining a risk coefficient of some areas. The so-called partly compulsory insurance of agriculture would be statutory, as a compulsory insurance model for users of the government subsidy in the insurance of agricultural production. Prostran promotes the model of legal mandatory insurance in agriculture, "primarily for farmers who use the state subsidies, because in that way there would be avoided confusion what, when and how to insure. In that way, the risk would be avoided, and manufacturers would be protected from bankruptcy". In accordance with the proclaimed state strategy, the insurance companies would be under an obligation to organize trainings in the field of insurance for manufacturers. A certificate would be an integral part of documentation necessary for getting the state subsidy.

Some experts speak in favour of raising a percentage of the regressive insurance premiums from the current 40% to 50%, in accordance with the good European practice, which aims to increase the economic protection of manufacturers. The suggested measures avoid the moral risk as a condition to insure against the loss of income, which implies the obligation of agricultural entities to sow the declared seed, use mineral fertilizers in the required amount, as well

as the chemical protective agents, whereby insurance gets full meaning. The mentioned measures should have long-term positive effects on the development of insurance and ensuring a stable source of financing for agriculture.

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12. Distribution of interventions of the Rural Development Programme and Regional Operational Programmes in 2007-2013 in the context of territorial development

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Abstract

Making up for differences in the regional development is one of the main challenges facing the European Union in the context of the integration of European countries. Against this background, particularly visible are the relations among the EU sectoral policies, in this case (regional) cohesion policy instruments and CAP second pillar instruments (rural policy). The article analyses the types of interventions of the CAP second pillar instruments and regional operational programmes in the implementation period from 2007 to 2013. The paper analyses the relations between inputs for the individual axes and subjects of the rural and regional policy subjects and the selected characteristics of the socio-economic development at the local level (districts). Information on the amount of support under 16 Regional Operational Programmes (ROPs) comes from the SIMIK database, while the data on the Rural Development Programme (RDP) and regional characteristics – from the Local Data Bank of the Central Statistical Office (GUS). The study showed that, at the local level, the effects of implementing the RDP and ROP are complementary while the measures within the individual axes of intervention of both sectoral policies are related to different regional development characteristics.

12.1. Introduction

The process of integrating the European Union countries depends largely on improving the quality of life and the conditions for the emergence of new development initiatives in the regions. Against this background, particularly visible are the relations among the EU sectoral policies, in this case (regional) cohe-

sion policy instruments and CAP second pillar instruments (rural policy). As rural areas are also the largest part of the regions, many measures under both policies are addressed to the same areas [Bivand and Brunstad, 2003; Barca et al., 2012; Böhme et al., 2015]. Therefore, on the occasion of subsequent EU policy reforms there are opinions indicating a need to reduce the sectoral approach to its implementation, to the benefit of regional planning [Buckwell, 2015; Chmieliński et al., 2017].

The objective of the article is to determine how the instruments of the rural policy (second pillar of the CAP) and of the cohesion policy (or rather of its regional part) effectively determine changes in the socio-economic characteristics at the regional level. The joint analysis of inputs of the CAP second pillar instruments and regional development programmes during the implementation period from 2007 to 2013 will allow to determine whether the positive effects of implementing both policies contribute particularly to improving socio-economic cohesion in the regions and whether the measures of two sectoral programmes are complementary to each other.

12.2. Types of intervention of the RDP and 16 ROPs

The approach to the policy implementation in this programming period was based on strengthening the European territorial cooperation, as a guarantee of sustainable development of the Community territory. Strategic EU guidelines on shaping the spatial policy (in 2007-2013) promoted an integrated approach to the development strategy, combining the measures at the national, regional and local level. It was stressed that account should be taken of investment needs both on urban and rural areas, paying attention to their role in the regional development and aiming at the sustainable development, sustainable communities as well as social inclusion [Bureau and Mahé, 2008; CAP, 2008; Esposti, 2008]. In particular, the regional component of the cohesion policy allows to include the above assumptions in the process of planning and implementing individual measures. Also, in the case of the Common Agricultural Policy (CAP) instruments, targeting support on improving the competitiveness of the agricultural sector and the subsidy system – even more and more linked to environmental practices of agricultural producers – is a reason why the measures for the rural system development, i.e. in the field of enterprise, development of modern services, infrastructure base and human resources in rural areas are mainly implemented under regional programmes [Hansen and Teuber, 2010].

In the case of the CAP, its first pillar is focused on direct payments and market expenses, only the second pillar instruments (RDP) in Poland are instruments focused on the rural systems development, more broadly than the development of the agricultural sector.

The RDP budget 2007-2013 was more than EUR 17.4 billion, of which the EU funds from the European Agricultural Fund for Rural Development (EUR 13.4 billion) were supplemented by co-financing from the national budget (around EUR 4 billion).

The RDP was focused on 4 subjects under 4 axes:

Axis 1: Improving the competitiveness of the agricultural and forestry sector,
Axis 2: Improving the environment and the countryside,
Axis 3: The quality of life in rural areas and diversification of the rural economy,
Axis 4: LEADER.

The implementation of the cohesion policy in Poland has been defined in the document entitled the National Cohesion Strategy (NCS), for which a total of about EUR 85.6 billion was allocated. More than EUR 9 billion was spent on an annual average (until 2015) for the implementation of the NCS, which corresponds to around 5% of gross domestic product. This amount comprised the following:

- EUR 67.3 billion from the EU budget,
- EUR 11.9 billion from the national public funds (including about EUR 5.93 billion from the state budget),
- About EUR 6.4 billion from private entities.

Cohesion policy expenses will be coordinated with expenses allocated for structural instruments of the Common Agricultural Policy and the Common Fisheries Policy, as well as with the European programmes for strengthening competitiveness.

Types of implementing the European Union cohesion policy in the years between 2007 and 2013 were designated by the document Community Strategic Guidelines on Cohesion for 2007-2013 (CSG). It identified the areas where the cohesion policy can most effectively contribute to implementing the Community priorities oriented towards achieving the objectives of the renewed Lisbon Strategy.

The decision on the Community Strategic Guidelines was adopted by the EU Council on 6 October 2006 and published in the Official Journal of the European Union on 21 October 2006. The adoption of the document paved the way for the official launch of the talks with the Commission on the National Strategic Reference Framework and the resulting programming documents.

An informal discussion on the content of the document between the Member States and the European Commission began after publishing by the EC, in January 2005, the working document entitled "Working Document of the services of the Commission on the Community Strategic Guidelines 2007-2013". Then, on 5 July 2005 the Commission published the Communication "Cohesion policy in support of growth and jobs. Community Strategic Guidelines, 2007-2013" which has become the subject of a technical discussion within the EU Council Working Party on structural funds and broad public consultations carried out by the Commission. The conclusions of the consultation were included by the EC in a special report published in October 2005[1].

In accordance with the provisions of the Regulation No. 1083/2006 laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund, the Member States have been obliged to submit the following national documents to the Commission: NSRF and draft operational programmes prepared in accordance with the requirements of that Regulation, within 5 months from the date of adopting the CSG. The preparation of regional programmes was the responsibility of voivodeship local governments, but they used the guidelines which included, *inter alia*, a list of leading topics as a matrix for designers of individual axes and priorities.

The suggested areas of intervention as part of the programming of 16 Regional Operational Programmes involved 11 subjects (and a technical-administrative task called technical assistance):

- Research and Technological Development (RTD), innovation and enterprise,
- Information society,
- Local employment and development initiatives and support for structures providing local services in creating new jobs,
- Environment,
- Prevention and combating of natural and technological risks,
- Tourism,
- Investments in culture,
- Investments in transport,
- Energy investments,
- Investment in learning (education),
- Investments in healthcare infrastructure and social infrastructure.

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[1] European funds, https://www.funduszeeuropejskie.2007-2013.gov.pl/OrganizacjaFunduszy Europejskich.

The regional government units, based on a diagnosis of the socio-economic situation and public consultations, have developed the programme by selecting relevant subjects. As a result, in each voivodeship, the programme was targeted according to preferences, while such an approach did not give room for including specific needs, as well as for a flexible response to a time-changing basis for development, resulting e.g. from macroeconomic changes, shocks and financial crises.

Figure 1 presents the distribution of the axes of the Regional Operational Programmes for 2007-2013 by regional policy intervention subjects. Regional authorities preferred focusing the axes on implementing the infrastructural measures – 19 of 128 of all priorities of 16 ROPs had such objective, it should be stressed that in some voivodeships it was decided to create 2 axes geared towards various aspects of infrastructure development, with a particular focus on transport infrastructure. In prioritising the types of support under the ROP, a comparable emphasis has been put on issues related to the environmental protection and support for research, development, innovation and enterprise (17 axes in each of the two subjects in total), as well as to the measures related to the development of tourism.

Figure 1. Distribution of the axes of the Regional Operational Programmes for 2007-2013 by regional policy intervention subjects
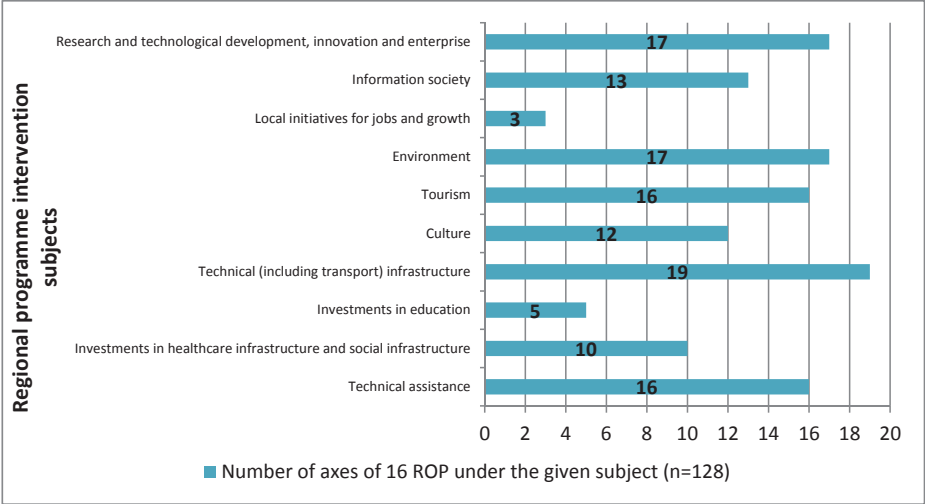
Source: own study based on the documents of 16 ROP.

The distribution of expenses for the individual subjects and axes of the ROPs and RDP points to a significant role of regional programmes, which in the period from 2007 to 2015 spent, on average, PLN 3.4 thousand *per capita*,

against PLN 1.9 thousand of expenses under the RDP (Table 1 and Table 2). It should be remembered, however, that the RDP in Poland is complementary to the CAP first pillar instruments. This results from, e.g. the distribution of funds between them. Consequently, many areas of development of technical, social infrastructure and enterprise in rural areas are supported from the ROPs.

Table 1. Distribution of funds for the individual subjects and axes of the ROPs

Priority axis	Expenses *per capita*
Axis 1: Improving the competitiveness of the agricultural and forestry sector	865.10
Axis 2: Improving the environment and the countryside	572.60
Axis 3: The quality of life in rural areas and diversification of the rural economy	376.30
Axis 4: LEADER	87.80
RDP in total	1 901.80

Given the intensity of support *per capita* in the given region, it can be concluded that in the RDP a large part of support has been allocated for modernising the agricultural sector and for the agri-environment programmes, while less than one-third of the overall budget was allocated for the measures aimed at improving the functioning of local economies. Support for the local development, where rural areas are in large majority of the territory, was enabled by the regional operational programmes. By analysing the distribution of expenses under all 16 ROPs *per capita* and under the priority subjects, it is easy to conclude that the amount of funds allocated by regional authorities for research, development, innovation and enterprise was not lower than that for infrastructure investments.

Table 2. Distribution of funds for the individual subjects of the Regional Operational Programmes

Priority subject	Expenses *per capita*
Subject 1. Research and development, innovation and enterprise	972.10
Subject 2-3. Information society	169.80
Subject 4. Environment	357.80
Subject 5-6. Tourism, culture, interregional cooperation	287.80
Subject 7. Urban development, revitalisation	335.80
Subject 8. Technical (including transport) infrastructure	986.00
Subject 9-10. Investments in education	94.70
Subject 11. Investments in healthcare infrastructure and social infrastructure	162.80
16 ROPs in total	3 428.70

At the same time, by analysing the spatial distribution of the funds spent under both policies in the years between 2007 and 2013, it can be concluded that, while the RDP expenses have been concentrated in the eastern regions and decreased as the level of urbanisation increased, the funds of the regional programmes were allocated more evenly and again, were concentrated rather outside large agglomerations, which is related to, for instance, the size of infrastructure investments in the regions.

Map 1. Distribution of the RDP 2007-2013 expenses *per capita*, in districts
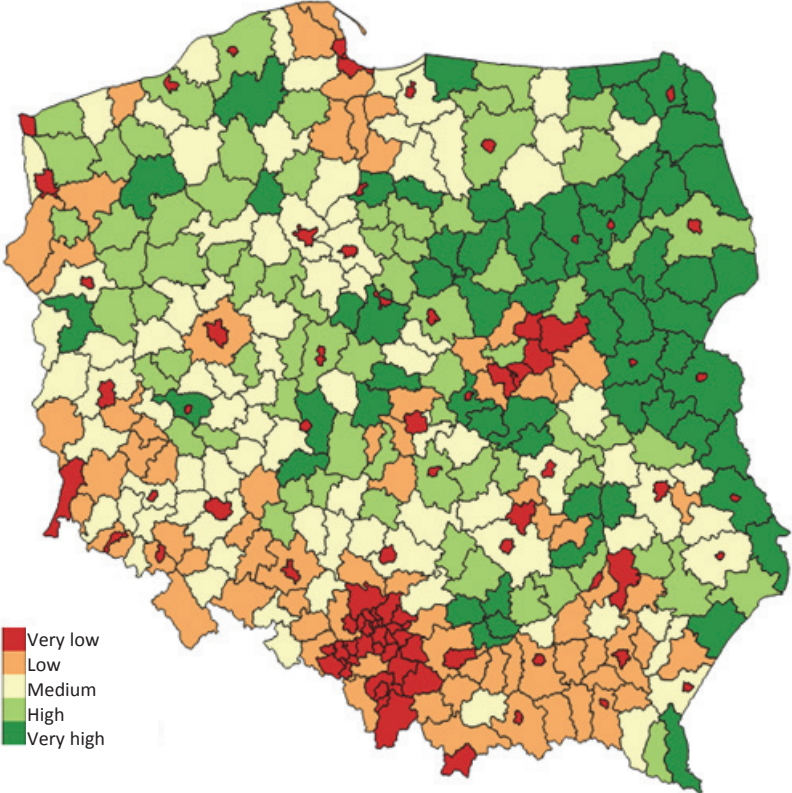
By analysing the level of expenses in the individual districts, it can be observed that in some cases there are some relations as regards the intensity of support under both instruments in the individual areas. Locally, at the district level, we can see the areas which use the rural programmes to a lesser extent, but are clearly characterised by higher intensity as part of the regional programmes. Consequently, the question arises to what extent these two instruments are complementary to each other, but, above all, to what characteristics of socio-economic development this complementarity can be demonstrated.

Map 2. Distribution of expenses of 16 Regional Operational Programmes in 2007-2013 *per capita*, in districts

Very low
Low
Medium
High
Very high
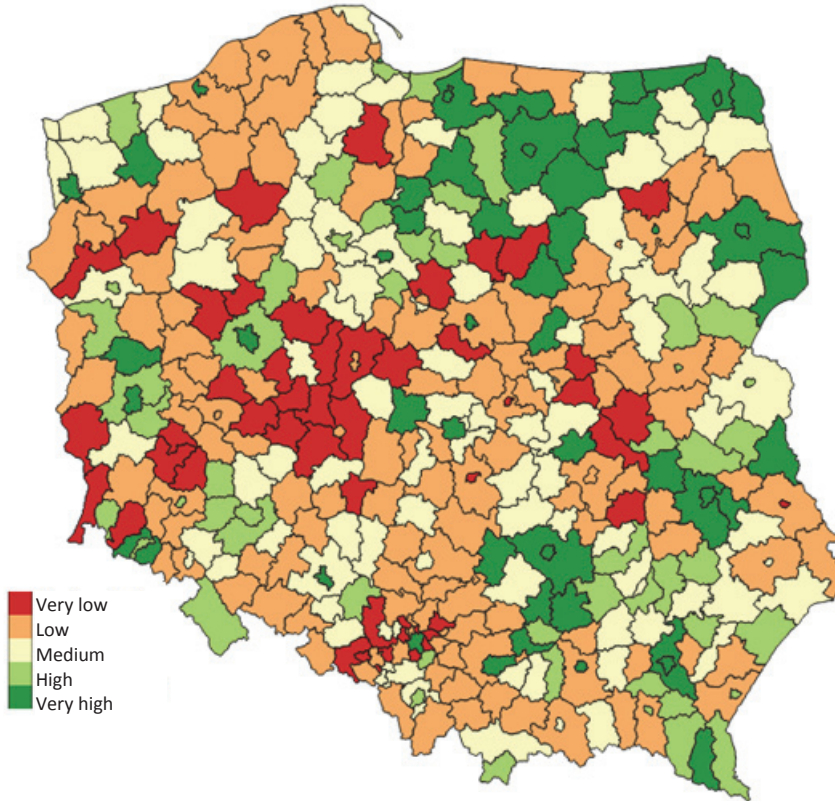
12.3. Support for local development in the rural and regional policy between 2007 and 2013

Shucksmith, Thomson and Roberts [2005] analysed the impact of the CAP instruments on the regional development by implementing a research project financed by the EU Framework Programme, as part of which they selected a set of socio-economic characteristics at the regional level and checked relations between the individual directions of the CAP intervention and the changes in these indices. Pelucha, Kveton and Jilkov [2013], analysing the impact of agri-environmental payments on the local development, used this approach, while in adapting this methodology they introduced a number of amendments, e.g. indicating a need for analysis at the national (and preferably regional) level since the relative importance of the individual rural development instruments is very diverse in the individual EU Member States, which is primarily determined by different priorities and budgetary constraints in each Member State. Pelucha et al. [2013] suggested that statistical

analyses contained data on actual payments, and not on budgetary allocations (such an approach was applied by Shucksmith, Thomson and Roberts [2005] in their work), which may to a greater extent translate into the identification of the areas of effective impact of public support in the regions. Using the approach of both analyses, this study examined the actual expenses of funds for each priority axis in the programmes of both policies during the 2007-2015 programming period (according to the N+2 rule), as well as a change in socio-economic characteristics at the local level (district, NUTS4) during this period. The Pearson correlation coefficient was used to assess the relation between the level of expenses for the RDP and ROPs *per capita* and the selected indices describing the level of economic, social and demographic development in individual districts. The choice of this level of delimitation was dictated by the availability of data at the lowest possible level of territorial division so as to obtain the possibly complete picture of local development characteristics (Table 3).

Table 3. Selected characteristics of the socio-economic development of the regions

Variable	min	max	median	SD
Population (av. 2008-2016)	20,767.13	1,730,863.63	101,390.33	117,271.27
Area in km^2	13.00	2,975.00	822.84	520.80
Share of agricultural land in total area (2005)	0.0%	87.0%	57.8%	25.9%
Area of agricultural land in ha (2005)	0.0	181,522.0	47,916.9	31,584.0
Newly registered economic entities (av. number 2008-2016)	131.3	35,417.0	939.3	2,112.8
Newly registered economic entities (average change 2008-2016)	38.4	204.6	78.8	23.4
Newly registered economic entities (per 10k population, average 2008-2016)	-0.1	0.3	0.0	0.0
Natural persons conducting economic activity (per 10k pop., av.2008-2016)	946.0	223,905.0	7,821.4	14,153.6
Natural persons conducting economic activity (av. no. 2008-2016)	358.9	1,293.6	686.1	180.6
Total revenues *per capita* (average amount in PLN 2008-2016)	499.2	7,515.7	1,518.3	1,381.4
Own revenues *per capita* (average amount in PLN 2008-2016)	143.2	5,499.7	666.3	890.2
Total expenditures *per capita* (average amount in PLN 2008-2016)	503.8	8,023.9	1,568.4	1,430.3
Total expenditures on education and culture per capita (av. PLN 2008-2016)	5.9	2,407.7	512.9	539.7
Share of people with at least secondary education (2011)	42.8%	92%	72.9%	12.6%
Share of people with higher education (2011)	2.6%	23.9%	6.3%	3.3%

Source: own study.

Figure 2. Pearson correlation coefficients of selected socio-economic indices and RDP/ROP expenditures *per capita* in districts (NUTS4)
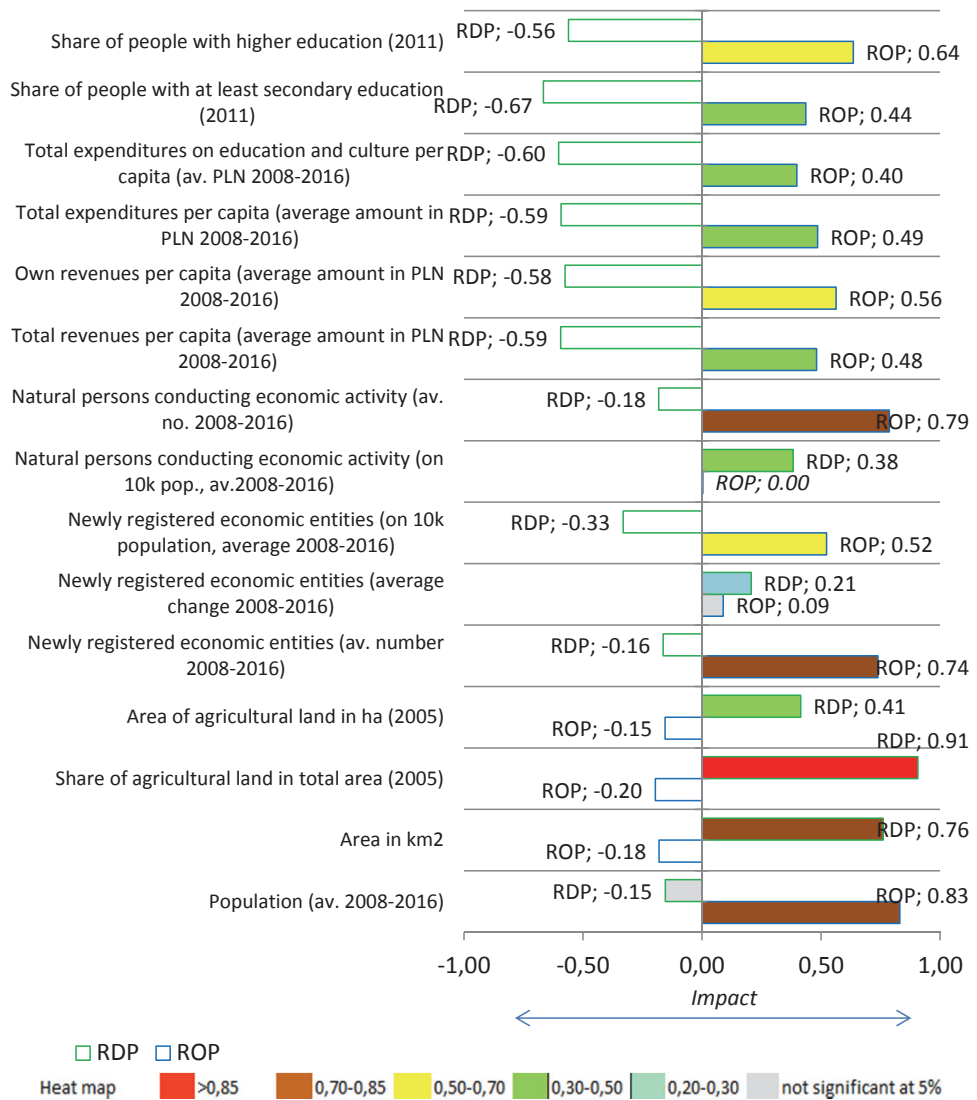
Figure 2 shows the Pearson correlation coefficients of the selected socio-economic indices and RDP/16 ROPs expenses *per capita* in the districts (NUTS4). At the beginning, it should be stressed that the targeting of support under both programmes has been strongly linked to spatial development characteristics, in relation to total amounts spent in terms of districts a certain principle can be observed. In the case of the RDP funds, they were allocated mainly in

rural areas as it results from the programme's objectives, while in the case of the ROP funds such principle could not be observed, which means that the funds of regional programmes had a fairly even impact in both rural and urban areas.

The ROP funds in each measure were positively correlated with the variables describing the size of the population living in the area concerned, whereas the rural policy funds were related more to the characteristics of the physical size of the area concerned. As the RDP largely supported farms and its agri--environmental dimension was highly dependent on the physical size of a farm, the entire stream of support was strongly related to the size of utilised agricultural area in the area concerned.

It should also be stressed that the ROP demonstrated strong relations to the characteristics of economic development, such as the increase in the number of economic entities, changes in the development of technical infrastructure or investments in education and human capital.

What was also demonstrated clearly was the relation between the value of the ROP inputs with the level of unemployment in the area concerned (negative correlation), which means that the effects of regional programmes are positively translated into the labour market situation. It should also be stressed that ROP support was also related to total revenues and expenses of local government units as well as to the level of technical infrastructure development.

In the field of economic development of the area concerned, some complementary actions of both programmes may be indicated. Focusing support with the RDP funds in the individual axes was positively correlated with the growth rate of the number of natural persons pursuing economic activity, thus, in both instruments support addressed to the territory concerned was positively related to the economic activity of the population.

The study carried out showed that the correlation of allocation of the ROP and RDP funds was close to zero, indicating that these instruments were addressed to other areas, while it was the regional programme which largely translated into the development of non-agricultural functions of rural areas. The RDP supported mostly areas where agriculture plays a major role, at least in physical terms, as the share of utilised agricultural area in the district's area.

Summing up, the results of the study suggest that it is difficult to talk about synergies in the case of both development policy instruments. The correlations of the measures with the socio-economic characteristics at the local level, as illustrated in Figure 2, clearly point to the complementarity of the programmes, but above all to their positive impact in the regions.

12.4. Discussion and summary

At the level of the institutional system, the cohesion policy actions implemented under the Common Agricultural Policy and relating to the non--agricultural functions of rural areas could be implemented at the regional level and the Polish experiences in implementing the ROPs confirm the validity of a need to transfer development programming and implementation of financial instruments to the NUTS 2 level. This is linked to further strengthening the system of planning and implementing the programmes at marshal's offices, while making the decision-making processes more flexible as regards types of support. It can only be assumed that some flexibility related to adapting the instruments to specific regional needs and a possibility of responding to the ever-changing reality (in this context, the planning in the perspective of 7 years is a huge challenge) is not possible in the case of RDP, determined in Poland at the national level.

On the EU scale, 118 rural development programmes are implemented in 28 countries, of which 20 are individual national programmes, while 8 Member States selected to implement RDP at the regional level.

This analysis shows that the possibility of introducing regional RDP, supported by the same institutions as the regional programmes, should be taken into account. At the same time, it would be required to work on strengthening the governance process, by building horizontal networks (cooperation at the level of administration and public services) and vertical cooperation (with local residents and organisations). Paradoxically, in Poland it is LEADER, the RDP measure, which is a tool for creating local governance – it fostered dialogue between local governments (administrations) and representatives of residents, social organisations and economic operators, and also for expressing local needs. Many of them, which have been responded within the framework of local development strategies, have been permanently incorporated into the public policy [Zypries, 2017].

Taking into account the territorial dimension will help create sustainable communities and will not let the uneven regional development limit the overall growth potential. This approach requires also taking account of specific problems and opportunities of urban and rural areas, as well as the areas with special features e.g. cross-border and transnational areas in the wider sense and regions facing other difficulties due to isolation, remoteness (e.g. outermost or arctic regions), low population density or mountainous nature. Environmental and geographical constraints in coastal areas may also require attention. The effective implementation of the measures to promote territorial cohesion requires the implementation of mechanisms allowing to guarantee the fair treatment of all territories based on their individual capacity as a competitive factor. Therefore, good governance is important for effective taking of the territorial dimension into account.

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13. The role of organic farming in the CAP, the rural development programme, with particular regard to subsidies

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Abstract

Sustainability is a central target of rural development and common agriculture policy. For ages organic farming has seemed to be the main answer to the question. The article wants to introduce organic farming's characteristics and development in the last decades and the role of CAP in this question. The lack of capital, wrong working and the lack of market knowledge are the main problems and transferring to organic cultivation and waiting for the subsidies do not solve the base problems. Despite this questions CAP can pay huge attention to the support of organic farmers but this only is help for them if they can work successfully in the traditional method.

Keywords: CAP, organic farming, subsidies, regional development

JEL codes: Q13, P48, R11

13.1. Introduction

Organic farming builds on the natural systems, and manages to work in harmony with natural systems. Organic farming is a farming, food production and production system that aims at prohibiting at least the different chemicals, fertilizers, artificial yield enhancers beyond the protection of wildlife, in some directions to the healing of nature. It originally stems from the fact that biodynamic farming, production farms, unity as a whole, in which a dynamic balance between the life and the interaction of living beings can be observed. It tries to make this unit the best possible way through its preparations, while crop yields allow the production unit to survive in the economic life. Biodynamic farming has evolved from different trends and from different alliances and organizations. One of the many features of organic farming is that it attaches great importance to the keeping of animals, including the circumstances.

13.2. Organic farming's characteristics

The concept of so sophisticated and fashionable sustainability is closely linked to organic agriculture. This includes the fact that the living area and the area of the farm are used in such a way that their condition does not deteriorate or even improve circumstances. The well-being of the animals is an important aspect for the farmer, because they are able to rely on higher yields on the one hand, and on the other hand it is compatible with the principles of organic farming. In order to demonstrate compliance with the principles of organic farming, they are subject to compliance. Of course, the question arises as to how rigorous, consistent and playable is this? According to the basic condition system, everyone who wants to produce and sell organic food, feed, and seed for organic farming is obliged to comply with the organic legislation that applies to it and to conduct its activity in a control system. Those who do this as verified partners of any official inspection body are compelled to comply with the Fund Criterion and those who want mass-making and organic-cosmetics. So they have to comply with all the requirements of the basic condition system. Let us see what these are.

The products produced must be GMOs free and use the list of authorized substances on the list during production. Organic propagating material must be produced in the same way, with the difference that cultivation can take place from conventional raw materials. There is a well-established organic and conventional unit within a farm but it cannot be the same in livestock farming (apart from fish), and crops should be easy to differentiate. It is prohibited to store materials or devices in the organic-farming or unit. It is important to authenticate all procedures, materials and movements. From the specifications, it already appears that documenting plays an important role. The audit is also documentation-based, based on this. Obviously, the specifications detail the specific requirements and rules of each production branch, living organisms. If the product is produced in accordance with the organic specifications, it shall be labelled with a logo indicating that this product is organic. This logo allows distinctive distinction to be applied to the logo for the product. The logo is a unique identifier that is issued when the conditions of a particular specification are met. The logo already recognized by consumers helps to see the quality, message and image of the product as a result of the already established trust. This is definitely a strong marketing advantage and getting such a logo is based on conditionals.

When manufacturing the product, it is necessary to separate it from other products either in space or time. That is, either in space or in another plant, the organic product should appear or there may be, but at any other production time it is necessary to run the production or the packaging. It is a basic requirement that the components of the product must be fully biologically, but if it is not pos-

sible to obtain all ingredients from organic sources and the ingredient is included in the positive list of the EU Regulation, up to 5% non-organic ingredients are possible. The range of substances that may be used in the law, even in the case of baby food. Ionizing radiation, genetically modified materials, preservatives, flavour enhancers, stock enhancers, are not permitted, i.e. prohibited (Rules from References).

In addition, the specification defines the terms that can be used on the label of the product. For example, a transition product is the product where the conversion of the production area into organic has begun, for a product of plant origin for a year. As we have said before, the proportion of organic ingredients must be at least 95%, and that should not be on the positive list. These standards shall apply to seeds and propagating material. And in addition, many requirements regulate the necessary conditions. They prefer species that are resistant to GMOs, which means that efforts should be made to use the old varieties that have once had a good bearing on the trials and are now well placed to fight the pathogens. In addition, there is a separate section on animal husbandry. As a statute, an animal of organic origin is needed in the stocking, but in some cases a non-organic animal is involved in the breeding. During retention, efforts must be made to maintain conditions in which animals are presumed or proven to be kept in good conditions. Ventilation, lighting, and space should be such as to satisfy the needs of a particular species and individual. Efforts should be made to live on natural pastures, and if this cannot be guaranteed, at least the maximum possible time should be sought. Other interference can only be used if justified. The feed must also be organic and the greater the proportion of its own pastures. Fodder from conversion areas can also be coated after a certain period of time. In the field of healing, the focus is on prevention. Thus, by providing conditions, resistant and powerful individuals are raised that are more tolerant of the difficulties. Under certain conditions, the animals can be cured by medical and pharmacological methods, but then, once certain conditions are met, the subject can be changed again. That is, it can be downgraded when too many veterinary interventions exist [biokontroll, 2018; ökogarancia, 2018].

It is clear from the tables that, as in Hungary, Poland, but also in most European countries, the size of the areas under organic farming is constantly growing, both in absolute terms and in proportion. As the total area of cultivated land in Europe is largely constant in most countries, it can be said that the share of organic cultivated areas is growing steadily. While in Hungary in 1995, it was approx. 8000 hectares of organic farming, in 2009 it has reached 140,000 hectares and in 2017 it is 129,000 hectares.

Table 1-2. The share of organic cultivation per country 2000-2007

geo\time	2000	2001	2002	2003	2004	2005	2006	2007
EU (28 countries)	:	:	:	:	:	:	:	:
EU (27 countries)	:	:	:	:	:	3.6	3.7	4
Belgium	1.5	1.6	2.1	1.7	1.7	1.7	2.1	2.4
Bulgaria	:	:	:	:	:	0.2	0.1	0.3
Czech Republic	:	:	:	7	7.2	7.1	7.2	8.2
Denmark	5.9	6.3	6.5	6.3	5.8	4.9	5.1	5
Germany	3.2	3.7	4.1	4.3	4.5	4.7	4.9	5.1
Estonia	:	:	:	:	7.2	7.2	9.6	8.7
Ireland	0.6	0.7	0.7	0.7	0.7	0.8	0.9	1
Greece	0.7	0.7	2	6.4	6.5	7.6	7.6	7
Spain	1.5	1.9	2.6	2.9	2.9	3.1	3.7	4
France	1.2	1.4	1.7	1.9	1.8	1.9	1.7	1.9
Croatia	:	:	:	:	:	:	:	:
Italy	6.7	8	7.6	7	6.4	7.3	7.9	7.9
Cyprus	:	:	:	:	0.6	1	1.2	1.5
Latvia	:	:	:	:	1.6	6.8	9.4	8.1
Lithuania	:	:	:	:	1.4	2.3	3.5	4.5
Luxembourg	0.8	1.6	2.2	2.3	2.5	2.4	2.4	2.6
Hungary	:	:	1.6	2	2.3	2.2	2.1	1.8
Malta	:	:	:	:	0	0.1	0.2	0.3
Netherlands	1.6	1.9	2.2	2.2	2.5	2.5	2.5	2.5
Austria	13.8	14	14.5	15.4	16	16.7	16.7	17
Poland	:	:	:	0.2	0.5	1	1	1.8
Portugal	1.2	2	2.1	3.2	5.6	6.2	7.2	6.3
Romania	:	:	:	:	:	0.7	0.8	1
Slovenia	:	:	:	:	4.6	4.6	5.5	5.9
Slovakia	:	:	:	2.2	2.6	4.6	6.2	6.1
Finland	6.7	6.7	7.6	7.1	7.2	6.5	6.3	6.6
Sweden	5.9	6.6	6.8	7.2	7	7	7.2	9.9
United Kingdom	3.3	3.8	4.2	3.9	3.9	3.5	3.4	3.7
Iceland	:	:	:	:	:	:	:	:
Norway	2	2.6	3.1	3.7	3.9	4.2	4.3	4.7
Switzerland	:	:	:	:	:	11	:	:

Source: Eurostat.

Table 1-2. The share of organic cultivation per country 2008-2016

geo\time	2008	2009	2010	2011	2012	2013	2014	2015	2016
EU (28 countries)	:	:	:	:	5.64	5.65	5.78	6.2	6.67
EU (27 countries)	4.4	4.7	5.2	5.5	:	:	:	:	:
Belgium	2.6	3	3.6	4.1	4.48	4.67	5	5.17	5.8
Bulgaria	0.3	0.2	0.5	0.5	0.76	1.13	0.96	2.37	3.2
Czech Republic	9	10.6	12.4	13.1	13.29	13.47	13.44	13.68	14
Denmark	5.6	5.9	6.1	6.1	7.31	6.44	6.25	6.33	7.67
Germany	5.4	5.6	5.9	6.1	5.76	6.04	6.18	6.34	6.82
Estonia	9.6	11	12.8	14.1	14.86	15.65	15.96	15.68	18.02
Ireland	1	1.1	1.1	1.1	1.16	1.2	1.16	1.65	1.72
Greece	7.8	8.5	8.4	5.2	9.01	7.36	6.72	7.7	6.5
Spain	5.3	6.6	6.7	7.5	7.49	6.85	7.26	8.24	8.48
France	2	1.9	2.9	3.4	3.55	3.66	3.87	4.54	5.29
Croatia	:	:	:	:	2.4	3.13	4.03	4.94	6.05
Italy	7.5	8.1	8.6	8.4	9.3	10.6	10.91	11.79	13.99
Cyprus	1.6	2.6	2.8	2.9	3.38	4.03	3.63	3.72	4.94
Latvia	8.9	8.7	9.2	10.1	10.63	9.89	10.86	12.29	13.42
Lithuania	4.6	4.8	5.2	5.4	5.51	5.74	5.57	7.11	7.5
Luxembourg	2.7	2.7	2.8	2.8	3.14	3.39	3.43	3.21	3.47
Hungary	2.1	2.4	2.4	2.3	2.45	2.45	2.34	2.43	3.48
Malta	0.4	0.5	0.2	0.2	0.32	0.06	0.29	0.25	0.21
Netherlands	2.6	2.6	2.5	2.5	2.61	2.65	2.67	2.67	2.91
Austria	17.4	18.5	19.5	19.6	18.62	18.4	19.35	20.3	21.25
Poland	2	2.3	3.3	4.1	4.51	4.65	4.56	4.03	3.72
Portugal	5.7	4.3	5.8	6.1	5.48	5.31	5.74	6.52	6.75
Romania	1	1.2	1.3	1.6	2.1	2.06	2.09	1.77	1.67
Slovenia	6.1	6.3	6.4	7	7.32	8.07	8.55	8.85	9.12
Slovakia	7.3	7.5	9.1	8.6	8.53	8.18	9.37	9.47	9.75
Finland	6.5	7.2	7.4	8.2	8.65	9.07	9.29	9.91	10.47
Sweden	10.9	12.8	14.3	15.7	15.76	16.5	16.53	17.14	18.3
United Kingdom	4.1	4.2	4.1	3.7	3.41	3.24	3.02	2.89	2.82
Iceland	:	:	:	:	:	0.49	:	1.41	:
Norway	5.1	5.5	:	:	:	:	5.05	4.83	4.85
Switzerland	:	:	:	:	11.56	12.17	12.7	13.04	13.53
Former Yugoslav states	:	:	:	:	:	0.82	0.79	0.17	0.26
Serbia	:	:	:	:	:	0.23	0.27	0.44	0.41
Turkey	:	:	:	:	:	:	1.34	1.34	1.39

Source: Eurostat.

Table 3. Biokontroll controlled farms 2006-2015

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Territory (ha)	116 197	111 873	111 800	133 720	121 071	113 070	118 990	119 275	112 285	107 605
firms	1 249	1 203	1 171	1 541	1 493	1 345	1 282	1 339	1 327	1 411

Source: Biokontroll.

Figure 1. Change of Biokontroll controlled areas 2006-2015
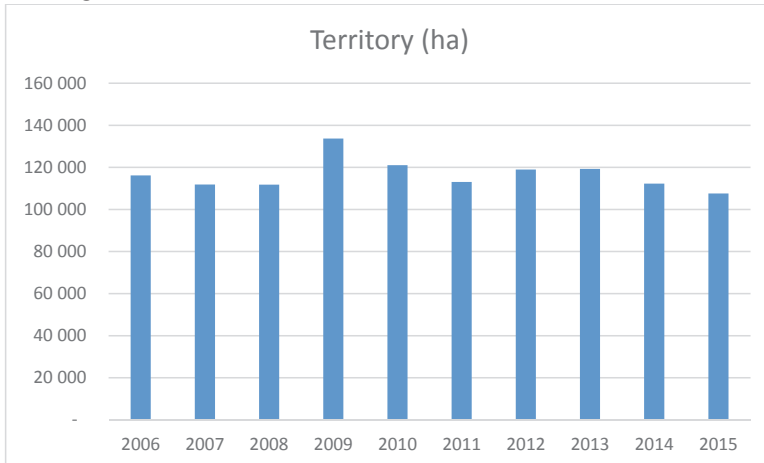
At present, there are no data on the areas controlled by Hungária Ökogarancia, but according to the experience of the former period, 10% of entrepreneurs and areas are controlled, so if this is correct, then the data on Biokontroll will concern approx. 10% higher values showing the total Hungarian reality.

In terms of the composition of the cultivation, pastures make up the largest area. Then this is followed by arable crops and vegetables. So it is characteristic of animal husbandry, plant cultivation, and horticultural cultivation.

Figure 2. Land Use in 2015
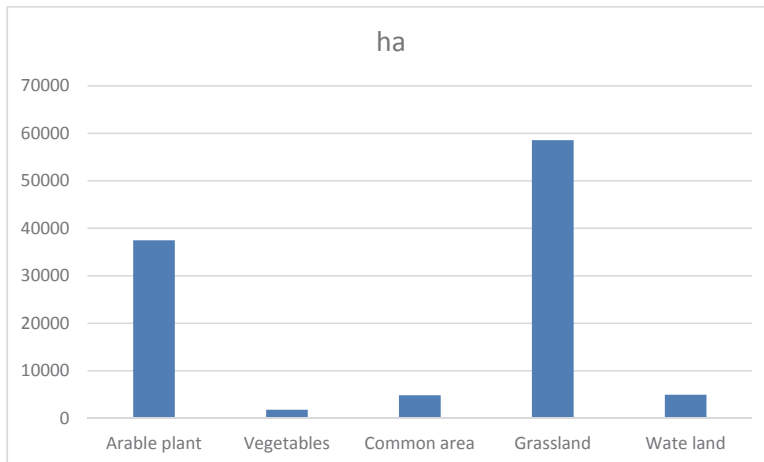
This is similar to that of conventional farming. Poland has a fairly large share of European organic farming. Polish territories account for 5% of all 12.7 million European cultivation areas. That is, more than 580 thousand hectares are cultivated. This represents 3.8% of all agricultural land. Contrary to Hungary, where it measures 2.4%.

Figure 3. Countries with the highest European organic status
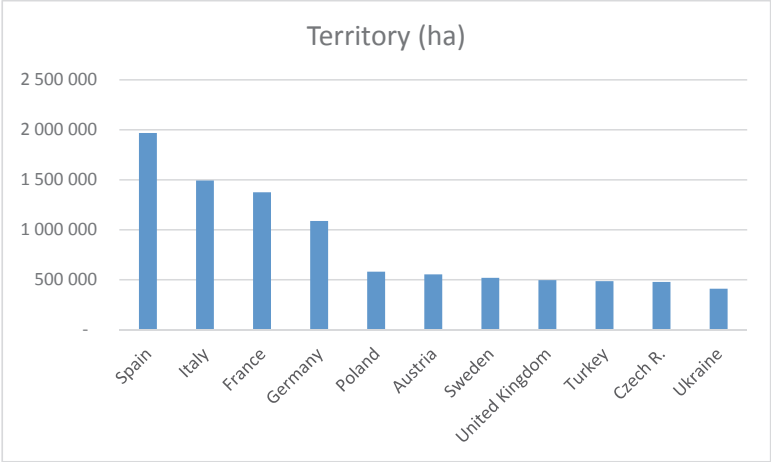
Source: FibL.

Yet the organic proportions of these countries are far below the European average.

Figure 4. The share of organic cultivation in the countries with the largest share in 2015
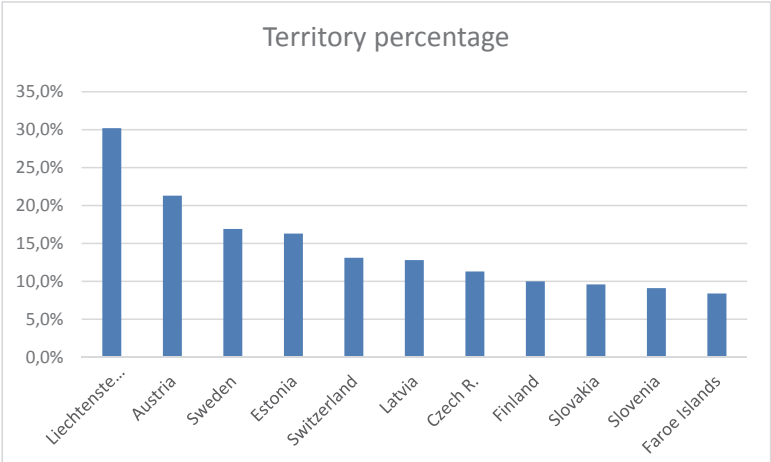
Source: FibL.

The development of organic production started in the 1920s by Rudolf Steiner. In agriculture, after World War I, motives and signs of industrialization appeared in Europe (earlier in the USA). Because of increased food demand, due to increased production, fertilizers were increasingly being used to protect the growing amount of crops (which are the causes of this, as well as the pests, insects and mushrooms imported from agricultural products from the Americas), chemicals were used by the chemical industry and mechanization (for example: mechanization of harvesting, threshing and ploughing), the work of a large number of animals and people doing work became redundant. (For example, in 1938 fertilizers used per 1 hectare in the Netherlands were 310 kg, 100 kg in Germany and 2 kg in Hungary.) This caused changes to the purpose of production. In the first instance, the self-supply, and only the secondary production of the market during which the surplus was sold, has begun to come to a standstill. In this agricultural model, the producer relied mainly on his internal resources, forming a closed agricultural system. This location was replaced by the new model, which was increasingly relying on external, industrial-based resources, a product-producing agricultural model. In this change, the work of a large number of people in agriculture has become redundant. And because of the fact that the former communities had this (close working relationship), they started to break up. The closed relationship between the village, the individual and the earth has ceased. As the number of producers declined, land became less and less the village and individual's subsistence base. At the start of organic farming, this would have wanted to bring this disintegrated role, that is, the implementation of a close-to-nature closed system relying on internal resources, which would preserve the rural form of existence and community. Thereafter several organic trends evolved, mostly in the German language, but the role of organic production was negligible. The change occurred when the adverse effects of excessive chemization became known in the 1960s and 1970s, and at the same time, with the burst of energy prices, the basic costs of industrial production increased considerably. At the same time, the other change was that agricultural commodity prices dropped considerably due to market oversupply. There were very big problems, uncontrolled use of chemicals and improper treatment of environmental damage, manure, animal carcasses, impoverishment of the wildlife, food shortages or high food prices. At this point, two trends emerged. One of the already mentioned organic agriculture, which completely excludes chemical use, and the other is the integrated production that allows the use of chemicals based on moderate scientific calculations. One of the trends was the organic production which completely rejected the use of organic chemical compounds that caused loss of confidence in agricultural products and the other was

their scientifically based, rational use of integrated production. As organic production has solved many of the problems that have arisen in the 1970s with persistent overproduction of food, the West, which has been plagued by environmental degradation, has begun to support this trend [Buday-Sántha, 2007].

Why is it necessary to support agricultural production? Support may be required for two reasons. In the first case, it helps to move to organic farming. For yields, we can expect lower returns during and after conversion. Organic production renounces the use of the most powerful yield enhancers known today. By doing this, you take a greater risk of compensating for prices [Buday--Sántha, 2002]. The yields of this mode of production are uncertain states Solti [1999] and Loch and Nosticzius [1992]. Kürthy [1997] also notes that organic agriculture with lower yields does not solve the problem of hunger in the world. Reduction in yield is shown by several other authors [Radics, 2002; Illés, 1995; Kim, 2003]. There were also experiments where higher yields were achieved in organic production [Liebhardt, 2003]. Countrywide and local studies conducted by Gyarmati in 2007 also show that yields on organic production are behind traditional cultivation.

Table 4. National yields, traditional vs. organic production

Traditional	1999	2000	2001	2002	2003	Average 1999-2003	Traditional/ organic
Barley	3 120	2 770	3 530	2 820	2 380	2 932	1.70
Potato	18 390	15 290	21 280	18 280	15 660	17 740	3.32
Wheat	3 590	3 600	4 310	3 510	2 640	3 538	1.01
Corn	6 380	4 150	6 220	5 050	3 950	5 155	1.52
Sunflower	1 520	1 620	1 960	1 860	1 900	1 766	1.03
Rye	2 030	2 000	2 370	1 960	1 460	1 971	1.14
Oat	2 540	1 670	2 450	2 160	1 490	2 068	1.72
Barley	1 080	1 841	3 055	1 329	3 177	1 729	0.59
Potato	12 403	9 808	8 581	3 459	2 701	5 337	0.30
Wheat	3 980	3 816	4 244	3 757	2 247	3 518	0.99
Corn	5 228	3 650	3 454	2 607	2 906	3 387	0.66
Sunflower	1 084	1 977	3 562	1 332	1 386	1 710	0.97
Rye	4 262	1 205	590	2 057	1 904	1 734	0.88
Oat	650	1 923	2 370	1 065	414	1 200	0.58

Source: Gyarmati 2007.

While 15 years ago it was true that organic consumption in organic production was over, this is no longer true today. Organic cultivation takes place at 4-5% of the world's production areas, while 5% of the world's food consumption is now sold by this product range. At the same time, we can see that there are countries that are more productive and exporter (Argentina, Australia, China, etc.) and are both producing and consuming (Germany, USA, Austria, etc.) and there are those that they prefer to import, they cannot produce to meet their needs (Switzerland, Japan).

Despite the rapid development of domestic organic production, it was not able to achieve a share of more than 2-3% in both production and exports, but the consumption of domestic organic-products is somewhere below the world average and far behind the Western European countries. The latter is linked to the fact that at least 90% of the produced organic products are directly or indirectly sold to foreign markets in the form of raw plants (about 80%) and animal products and processed products. The analysis of domestic production points out that more than 50% of Hungarian organic-farms are grasslands, which – taking into account their neglect – were easy to convert to organic production. However, the utilization of grasslands is low in terms of the number of livestock, and the number of cattle and sheep kept in organic farming is little more than 2% of the number of livestock, and the ratio is even worse for other animal species. The situation of domestic organic-farming is determined by market opportunities. The domestic market is extremely narrow. This is related to the fact that the domestic purchasing power is low and the prices are far above the quality. Unfortunately, rapid change is not expected in this area. At present, however, they cannot afford the greater consumption of organic products for which it would be justified. The large-scale production plants of domestic organic-products are mainly destined for fattening cereals and oilseeds with low labour costs, as well as extensive beef cattle (Hungarian grey) and sheep and mangalica fattening. Thus, there is inadequate supply of organic produced fruit and vegetables that consumers are primarily looking for. These small producers are producing, the country is about 10 or directly via traders on a very high Western level (or even exceeding) price level, often at 100 to 200% higher than normal products. Of course, this affects the circle of consumers, especially since the guarantee behind the products is often incomplete. In Hungary, most of the retail distribution of organic products is dealt with by large chains of goods, which mainly sell, to a greater extent, dry goods and to some extent processed dry goods.

Due to limited supply and demand, the conditions for the marketing of organic vegetables and fruits do not deserve them, so their price control role does not apply to fresh products most important for consumption. Thus, in fact, there

is nowhere to be found a wide range of affordable, guaranteed quality products. Hungarian organic production is specifically export-oriented. Organic farming, in accordance with its domestic conditions, has planted cereal and oil plants (sunflower, soybean, rape, oil) and feed (which occupy 98% of the arable land), from vegetables to mushrooms, frozen and potato pummel, sweet corn, and meat products and eggs from animal products played a greater role. Observing the ten-year development of exports, it can be concluded that the export base is made up of simply produced, stored and transported unprocessed mass products exposed to very sharp competition. They did not play a decisive role on a single market, but their role in meeting the raw material needs of the Western European food industry was to improve partial supply, supply and demand. In processed form (flour, pasta, tares, canned, frozen vegetables, salami), therefore, a very small part of organic products will be exported. However, the export prospects of feed maize (e.g. maize, barley, etc.) and other fodder are improved by the fact that Western countries are unable to produce the necessary quantities of feed for the livestock, and the importer's German-speaking countries are located next door, so transport costs are also high. Since Hungarian organic-products are not decisive in the markets, their import demand depends essentially on the annual yield of the importing country. Their market stability is also undermined by the fact that Hungarian products are mainly processed and re-exported together with domestic products and can therefore be relatively easily replaced by cheaper, but cheaper Asian (e.g. Chinese honey) and Eastern European products (e.g. oil plants, cereals). Because of this, Hungarian products are sold at relatively low prices and are gradually excluded from Western European (English, Danish, Dutch, French) markets as a result of rising transport costs and simultaneously increasing market competition and the export trend is the traditional Hungarian Central European agricultural products countries, especially to Austria, Germany and Switzerland. The French and Dutch markets still represent a smaller share.

In unprocessed form, bulk merchandise is still not to be delivered to demand markets (for example, USA). Hungarian organic production – like the Hungarian agriculture – did not succeed in achieving a market share with specific products. Which is no wonder, because they are only lasting for processed and market-adjusted products. New seed sprouts or maize seed production was only significant until importers could meet the demand with domestic products. The situation of domestic organic-production is hampered by the spontaneous nature of both production and sales. There are no stable market relationships that regulate production, there is a lack of logistical background that can adapt to market needs, so depending on weather influenced yields there is over-supply of certain

products and where we cannot meet demand. We do not export because of the inorganic nature of the trade and its underdevelopment, but at the time of harvest, foreign merchants will select the required quantity of imports from Hungarian produce. Hungarian organic products can only stay on the market if the efficiency of production improves and the quality of the products and the organic guarantee level exceeds our new market competitors who are cheap mass production. This quality surplus is demanded and appreciated by German-speaking countries, and if it does not appear in higher commodities, but in the more stable markets [Buday-Sántha, 2007].

Organic farming is supported within the framework of the Rural Development Program. Separate regulation of the areas already underway and in transition. However, the organic regulations must also be observed in areas undergoing conversion.

During the transition period, additional costs are generated or yields drop, resulting in a loss of revenue. Producers receive additional support for this. Total with the switchover time is 5 years of commitment period. There was a change compared to the old support period because only support was granted in compliance with the rules that go beyond the requirements of the certification, while in the new period sufficient compliance with the basic EC Regulations is sufficient. The inspection body issues a certificate every year.

By 2020, an amount equivalent to EUR 207.5 million will be available. From 2016, 80% of this can be used. The aid intensity is in each case 100%. Degression is not used. The amount of the grant may be claimed for a five-year annual payment request within the framework of the single application. A sponsorship document issued after the successful submission of a successful application does not automatically entitle the grant to the grant, only entitles it to participate in the grant. You may submit a payment claim with a supporting document, but you do not yet have the final grant decision. The aid is in the form of area-based, non-refundable subsidies. The aid serves the additional costs associated with the fulfilment of the quality system requirements and the remuneration of lost revenue. To qualify for the subsidy, the requirements of the certification system must be respected, paid only after the receipt of the webGN containing the particulars of the checks and the management log. The fee for participating in the certification system for the calculation of the subsidy amounts has been offset and no specific support is available. The status of the area affected by the aid will be established as of 1 January each year during the commitment period and the amount of aid will be determined on that basis. If the requesting subsidy is requested for a shortening period for the area affected by the commitment, the amendment will take place the year following the change of status. The level of

the euro exchange rate is determined on the basis of the central rate of the European Central Bank on 1 January of the year of the payment request.

Table 5. Aid amounts by cultivation branches 2014-2020

	Status in process (euro/ha/year)	Status organic (euro/ha/year)
Field	242	172
Vegetables	516	366
Apple	1 040	802
Vine	873	674
Other Fruit	734	568
Reaping	84	84
Pasture	147	147

Source: *Ökológiai gazdálkodás 2018.*

It is important to know that, during the commitment period, the applicant has the opportunity to apply for arable crops for one year in the case of a given table and the amount of aid for growing vegetables in the other year, taking into account the cultivated crop. The same is true for lawn areas where mushrooming or grazing can be added. For plantations, support may be required for installation after grubbing, but only with the lower amount.

The areas under organic farming are automatically eligible for greening. Its goal is to achieve sustainable farming. The two systems aim to achieve the two goals by different means. Since the common goal of the EU is to rule out the two areas, it is not possible to allocate both grants to the same area [Ökológiai gazdálkodás, 2018].

Table 6. Changes in the subsidy procedure

	Old one	New one
The base of process	The law governing administrative procedure	Government regulation
Support	Title	Competition
Declaring of support	Item in the decree	Call for proposal
Submission of claim	Electronic surface	Electronic surface
Notification of the support decision	Resolution	Supporting document
Application of support	Payment request	Payment claim

Source: *Ökológiai gazdálkodás 2018.*

In summary, it can be stated that the promotion of organic production is implemented in both a separate support package and a basic support. The extent to which ecological producers can use it depends on how well they are able to meet the basic management conditions, to improve them and to acquire and market them.

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14. Agricultural policy in the servitizated economy

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Abstract

During last decades the essential shift occurred in the structure of the economy from industrial product-driven to the post-industrial service-driven economic system. A growing number of manufacturing firms throughout the world are shifting from selling goods in anonymous market to offering more and more services alongside their products. This movement is termed "servitization". The movement is pervading almost all industries but still is weak in agriculture. The aim of this paper is to analyse the factors that have a negative impact on the attractiveness of farming and the needs of new farmers' generation calling to develop agricultural policy in line with challenges of servitization movement. The last chapter highlights the recommendations for CAP2020+ on support for servitization in agriculture corresponding to the success factors of the service--driven business model.

Keywords: service-driven economic system, servitization, business model, post--industrial stage, agrarian and rural development policy
JEL codes: A11, Q01, Q10, Q18

14.1. Introduction

The 21st century is often described as a stage of post-industrial or knowledge society, where people found themselves in a world of totally different values, compared to the several centuries lasted industrial era. In the present stage of post-industrial society the factors of economic success are essentially different from those in industrial society, with difference being as great as between the factors affecting economic success of agrarian and industrial society. This stage began when the service sector have started to dominate in the economic system. These changes can be clearly illustrated by an example of data of the Organization for Economic Cooperation and Development (OECD) – service sector of 16 OECD countries amounted on average to 39% in economic structure in the years 1950–1960 and in the next years of 1990–2000 increased until 70%, when the share of the agrarian sector has decreased from 25% until 4% in the same periods

[OECD, 2006]. Changes occurred not only in the traditionally classified economic structure. In the last decade of the 20th century revealed new tendency to provide services not only by specialized service companies but also by industrial or agricultural enterprises. This new tendency to organise business was called "servitization". The term "servitization" was mentioned firstly in the article "Business servitization: increase of the value by increasing the volume of services" in 1988 written by S. Vandermerwe and J. Rada. Subsequently, this concept has become more and more widely used in academic and professional business literature, and has become one of the most popular newcomers describing the 'new economy' over the last couple of decades.

The servitization of economy forms a new stage in the development of society, essentially different from the previous one – the industrial stage. Disparities in the post-industrial stage are becoming more and more evident every day and can be compared to the previous major transformation of the economic system development from the agrarian to the industrial stage, so-called 'industrial revolution'. However, the concepts of the industrial economy are still used while analysing activities of the agricultural sector and innovations related with specifics of the post-industrial stage are not defined as servitization of farming. For example, all efforts made by farmers to apply new business models aiming to respond to the needs of consumers for fresh, locally produced food are defined as the desire to shorten food supply chain. However, the business model when farmers take direct sales in order to reduce the number of intermediaries involved in the supply chain are fundamentally different from the transformations of the business model when an industrialized agricultural producer implement 'product plus service' system instead supplying their products to an anonymous food market.

The aim of this paper is to analyse the factors that have a negative impact on the attractiveness of farming and the needs of new farmers' generation calling to develop agricultural policy in line with challenges of servitization movement. The last chapter highlights the recommendations for CAP2020+ on support for servitization in agriculture corresponding to the success factors of the service-driven business model.

14.2. Reasons to use servitized business model in agriculture

Although many developed countries in the world have been living in industrial economy for centuries, the industrialization of the agricultural sector has started not so long time ago. Accordingly to the economic history of agriculture massive industrialization of agriculture has started only after the Second World War. Agrarian sector experienced a real revolution in developed (northern) countries due to the widespread mechanization, electrification, irrigation and

chemization of agricultural processes [Clunies-Ross and Hildyard, 2013]. The success of an industrialized farming system was based on a business model combining three production strategies: extensive growth, intensification and specialization [Vidickiene and Melnikiene, 2014]. That allowed ensuring stable farm income level by increasing overall production volume and technical efficiency of production [Van der Ploeg, 2000].

At the end of the 20th century, the success of business model oriented to the scale effect, intensification and narrow specialization has ended. This was a result of the growing list of factors that have a negative impact on the attractiveness of farming:

- The dramatic increase in industrialized labour productivity and the use of monetary and agricultural policy tools have eliminated the food shortages in developed countries caused by the Second World War and the extensive growth strategy has become ineffective.

- Constantly increasing costs of production related to i) 'technological treadmill' pressing farms to invest continuously in new technologies [Cochrane, 1979], ii) increased requirements for nature protection in specialized farms, iii) increased quality of products requested of food industry. The above mentioned factors reduced opportunities for farmers to gain a huge leap in productivity by implementing an intensification and specialization strategies as it was at the beginning of industrialization.

- The growing dynamism of the business environment because in the 1990s many developed countries has started to implement a free market and free trade model in their countries. Climate change is also a growing risk determinant to agricultural businesses.

- The globalization of the economy, which made the success of farming dependent not on personal efforts but on changes in liberalized world markets for food, energy and other agricultural commodities.

Assessing the growing impact of the above listed factors, farmers begin to consider farming as a risky and unattractive activity. Results of empirical studies show the situation that in the developed countries in the last two decades is not only the lack of successors to family farms, but also the lack of individuals who wish to take farms of retired farmers [Baker et al., 2016; Chiswell, 2012; Uchiyama et al., 2008].

Limitations of an industrialized agricultural business model in post--industrial society are calling farmers to use servitized models of business that have started to emerge in other sectors. Manufacturing companies producing technically sophisticated equipment and vehicles have started servitization process first. In addition to their core production, they provided services in financ-

ing, operating, maintaining and updating their own or other manufacturers' products installed in the production process. For example, Rolls Royce, a company that produces jet aircraft engines, earns a share of its revenue by leasing its engine performance on a pay-per-hour basis, and providing its comprehensive product maintenance service to ensure that engines run smoothly. Some industrial companies have started to use a service-driven business model giving priority to the provision of services. For example, the Xerox Company, initially known for photocopiers, now positions itself as an enterprise for business processes and management. In recent years, Xerox has branched out to offer document publishing and production services, document management, and business process outsourcing. Today, over half of Xerox's business comes from services. After some time other manufacturing companies also have started to use servitized business model with system 'product plus service'.

Servitization in manufacturing companies is already widely and thoroughly studied in scientific literature [Lightfoot et al., 2013]. Unfortunately, in contrast to the researchers, being active over the past three decades in creating of business models that integrate products and services of the companies and analyzing their success factors, researchers focusing their research on agribusiness and food industry are still giving little attention on business models in agriculture, assessing their sustainability and innovation [Ulvenblad et al., 2014]. Although recently the issue of the sustainability of the agricultural sector has been analyzed very often, research is not oriented to promote innovative business model in agriculture by shifting from the "product-focused" to a "service--focused" model.

Although the scientific and professional literature is lacking guidelines of business servitization processes in agriculture and in other activities of farmers but these initiatives have started to emerge in the practice. A group of farmers is emerging, called the 'new farmers' generation', aiming to find alternatives to the business models established during the industrialization of the agricultural sector in the servitization framework. At the beginning, the vision of business model of a new farmers' generation was based on willingness to shorten food supply chain, by creating farmers' markets and starting direct selling of farm products to the end-users [Coster, 2004; Coster and Kennon, 2005; Guthrie et al., 2006]. During the period of industrialization of agriculture, many intermediaries as processors, warehouses, transporters, and traders stepped between the farmer and end-users of their food products. Extremely large part of households in developed countries began to buy food at supermarkets, and purchasing food in farmers' markets became increasingly unpopular. Increasing number of intermediaries in the food supply chain had a profound impact on farmers' incomes.

In the sixties and seventies farmers received 40–50% of the food prices set by supermarkets. The share of farmers in developed countries since the eight decade of the 20th century is usually not more than 10% (Guthrie et al., 2006). The new generation of farmers has started new initiatives to develop alternative local food markets, revitalizing traditional farmers markets in cities, creating shops in their own farms, delivering food to the customer' home or workplace, etc.

Although many farmers are using a simple business model for farming servitization by offering production of desirable food box and its delivery to the consumers' home or office (product-oriented service), empirical studies indicate that some farmers have started to use more complex systems as 'product plus service' or 'resource access plus service'. It can be rental of a fruit or kitchen-garden, where residents of the city get the opportunity to grow their own vegetables and fruits, and they are also constantly consulted on how to do all the necessary work. Community-based farming is becoming increasingly popular, when city residents partly finances a production process in the farm, or even engages in economic activities of farming from the very beginning of the production cycle with the aim to get products they want, and also to gain knowledge about agricultural production and spend their leisure time in the way interesting to them.

There are also B2B (Business to Business) models of service provision where small farmers provide services to large ones, for example, chicken of special breds are hatched on request, and then small farmer take them to a large farm, where they carry out further operations in the production cycle: growing up to the time of sale, slaughtering and selling. It allows for the improvement in the quality of the agricultural products, the use of more environmentally friendly technologies and the production of food products that are more nutritious and healthy [Baluch et al., 2017]. Servitized model is used in livestock sector [Pereira et al., 2016], crop protection [Pereira et al., 2018], etc. There is a growing demand for proposals of companies that have started using servitized business model and produce various agricultural machinery, to lease rather than buy farming equipment according to the needs of farmers [Corti et al., 2013].

Conservative policy-makers are quite sceptical about the ideas and opportunities offered by the new generation of farmers to create a sustainable source of income for the production of customized food made to order or other services despite a lot of successful cases demonstrating that the transformative power of business model innovation is really impressive. However, many initiatives of farmers oriented to service-driven business model have failed, as small groups of farmers did not have the capacity and ability to resist global food markets. Therefore, a priority should be given for agricultural and rural policy measures to promote servitization in farming.

14.3. Summary and conclusions

New opportunities to get requested information immediately and ability to manage this flow using modern information and communication technologies have created an extremely dynamic business environment and all previous business risk management practices have become ineffective. In such circumstances it is important not only the increase in labor productivity, but also the reduction of business risk. Services can be attributed to the least risky products, and their demand is growing. In addition, servitized business model helps not only to increase revenue, profit margin and the scale of sales but also creates the opportunity to obtain loyal consumers and reduce the number of competitors. The use of various government programs supporting innovative service-driven business farms can become an effective tool to help develop agriculture and the economy of rural regions. Unfortunately, in the current documents defining agriculture and rural development in the EU, the term 'servitization' is not mentioned at all. In our opinion, the EU needs to develop agricultural policy in the new programming period after 2020 in line with the success factors of the service-driven economic system, which corresponds to the needs of new farmers' generation oriented towards servitization of farming.

Although new farmers' generation become an important organizational force for the development of rural economy and community, there is given little attention to the interests and vision of farming of this generation when planning financial support tools. The new farmers are proposing completely different and innovative business models but their approach is not considered as an important factor that can increase the attractiveness of farming and vitality of the countryside. Although one part of ideas of new farmers' initiatives is in line with EU programme requirements for the European Innovation Partnership (the EIP), which aims to promote a short food supply chain and diversification, creation of support mechanizms based on industrial product-driven business model that focus to provide products for the anonymous market. Therefore, many steps are needed to move to a service-driven business model by building relationships with the client are considered to be irrelevant to increase farm sustainability and are often considered as not eligible for funding.

Transition to a service-driven business model requires radical changes in the paradigm of agricultural and rural development policies because servitization of farming is a multifaceted transformational process. It requires rethinking all aspects of business: production structure and methods, marketing, pricing, service delivery infrastructure and financial management. Summarizing the latest research on the serviced business model in the manufacturing sector [Kindstrom, 2010; Reim, 2015; Foss and Saebi, 2017], it is possible to assume

that the greatest potential to help implement service-driven business vision of the new generation of farmers' by economic policy measures has to be the support for collaboration strategies [Vidickiene, 2018].

The collaboration with consumers is especially big challenge to farmers because the supply chain of agricultural products has become very long and they have lost their connection to their final consumer over the past half century. Therefore, the most important area requiring state aid becomes facilitation of tools for coordination of relations between economic actors. This means that support mechanisms must be based on the latest management theories emphasizing the business model based on the paradigm of co-creation [Ramaswamy and Ozcan, 2014] in service provision, where a part of the new value is generated not by services provider but by the clients. Considering this fundamental change in the value creation process, the key future objective of improving the EU's agrarian and rural policies is to provide support measures to innovative cooperation between farmers, as service providers, and their consumers. The key to success should become the implementation of a variety of new collaboration models reducing farming risk and generating synergetic effect by value co-creation.

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15. The Model of Innovative Rural Entrepreneurship Development Designing

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Abstract

The article is devoted to the necessity of introduction and diagnostics of opportunities for sustainable development of rural areas. The main criterion for the sustainable development of the agrarian sector is to improve the farmers' and rural residents' quality of life, which should be built on preservation of basic life support systems. Therefore, for diversification of the rural economy, promising directions of economic activity in rural areas were identified, namely, the development of organic agriculture and rural tourism. There have been formed the theoretical foundations of designing a model of innovative rural entrepreneurship development in the conditions of market transformation and European integration. There was identified the essence of the concept of "innovative rural entrepreneurship", which should be based on the principles of systemicity, riskiness, science, energy and resource conservation, economic, social and environmental responsibility.

Taking into account the leading foreign experience, there have been identified several new and promising directions for the functioning of the business development innovative model in rural areas, namely the development of organic farming, family farming, cooperation and non-agrarian employment of rural inhabitants.

Keywords: rural entrepreneurship, model of development, rural tourism, organic agriculture, innovative development

JEL codes: A10, B41, C30, O13, Q13

15.1. Introduction

In the conditions of Ukraine's strategic orientation towards an innovative type of development, the adaptation of rural entrepreneurship to the new conditions of a market economy and its active reform are closely linked to innovation as the driving force of economic growth.

Provided and justified in the twentieth century, J. Schumpeter's innovative development as a factor in economic growth is, in our time, a necessary and determining condition for sustainable development and competitive entrepreneurial activity, including in the rural areas. The top countries in the global competitiveness ratings of the national economies are the countries whose outstanding achievements are attributable to the innovation itself: Finland, the United Kingdom, the Netherlands, Singapore, Japan, the USA, South Korea, Ireland [Ivchenko, 2006].

Ukraine's chosen path for integration into the European Union requires the maximum approximation of the national economic system to the systems of the EU countries, which outlined their strategic development goals in March 2000, based on the innovative model of development as the main vector of the unified European economic system formation and confirming the chosen direction adopted in 2002 in the Lisbon Protocol "Innovative Policies: Modern Approaches" [Communication from the Commission to the Council, the European Economic and Social Committee and the Committee of the Regions, 2003].

Innovative development as a component of economic development should include the features of this category (Figure 1).

Figure 1. Features of innovative development (developed by the authors)
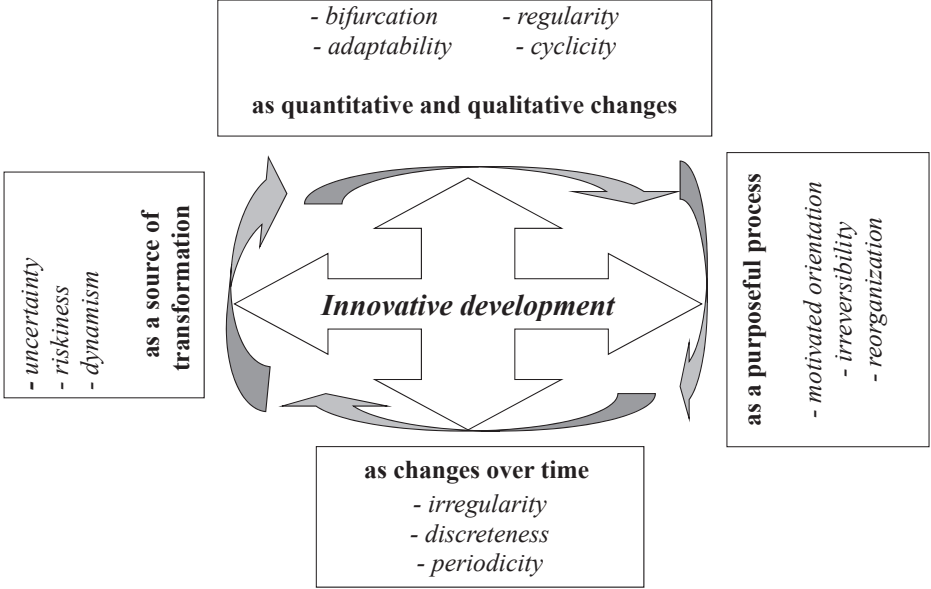
We identify innovative rural entrepreneurship as an initiative, systematic, carried out at its own risk, economic activity, which covers economic relations in the development of innovations, their testing and verification, reproduction,

as well as the introduction into practical activities, and is a decisive factor in the development of the rural economy through more rational use of resources, increase of activity efficiency and provision of competitive advantages. At the same time, innovative entrepreneurship should be based on the principles of systematic, risky, scientific, energy and resource conservation, economic, social and environmental responsibility. To construct an effective innovation model of rural entrepreneurship development, we have developed an appropriate holistic system, which has the ability to self-healing, adaptation to changes in the external environment and the generation of scientific and technological progress, which is amplified or inhibited under the influence of appropriate reformation and state regulation, which allows a reasonable adjustment of the application of achievements of science and technology in agricultural enterprises. They have significant influence on economic processes in rural area.

The model plays the role of a substitute of the research object, the correspondence with which allows obtaining new knowledge about it [Katrenko, 2000]; a sample that reproduces the construction and operation of an object; an imaginary or conditional image of an object, process or phenomenon used as its representative [Osetskiy, 2003]. In addition to the source of new knowledge, the model is a pragmatic means of management, the organization of practical actions, a way to present exemplary actions and their result, that is, a working presentation of goals. Simulation allows to evaluate the influence of exogenous and endogenous factors on future business results, to identify possible risks, to analyse and evaluate the contribution of each element from the chosen direction to the overall result, and therefore, solves the problem of choosing an effective strategy for innovation development from the point of view of the selected complex indicator or indicators group.

Models related to entrepreneurial activities in rural areas are a formal representation of a simulation object properties, research conditions, available research tools [Dorman, 2007]. Therefore, to the formation and choice of rural business innovative model impact (Figure 2):

- Modelling purposes as a factor in selecting simulation methods and vision of results.
- Features of innovative development of rural entrepreneurship as an integral part of economic development of rural areas, the presence of a significant subjective component in its composition and the problematic use of statistical methods and approaches, have a significant impact on the nature and flow of innovative processes.
- The specifics studied by them types of rural entrepreneurship as an design objects that combines individual sets of goals and resources and generates input data of the research [Fedulova, 2004]: accumulated potential; differen-

tiated and specific competencies that determine the direction and scope of possible and potentially effective innovations; forecasting of the economic situation; flexible organizational forms that combine decentralization of management, necessary for the effective development of innovations and centralization, which is necessary for the use of key technologies and constant control over the implementation of innovations; analysis of external factors and phenomena; methods of resources allocating that meet the needs of profitable investment at the moment and creating opportunities for those in the future; peculiarities of mutual relations of Strategic and Innovative Management Strategies that need to be taken into account in order to ensure the systemic links between the objects of the research and their individual elements in the simulation process.

Figure 2. The system of factors influencing formation of a rural entrepreneurship development innovative model (developed by the authors)
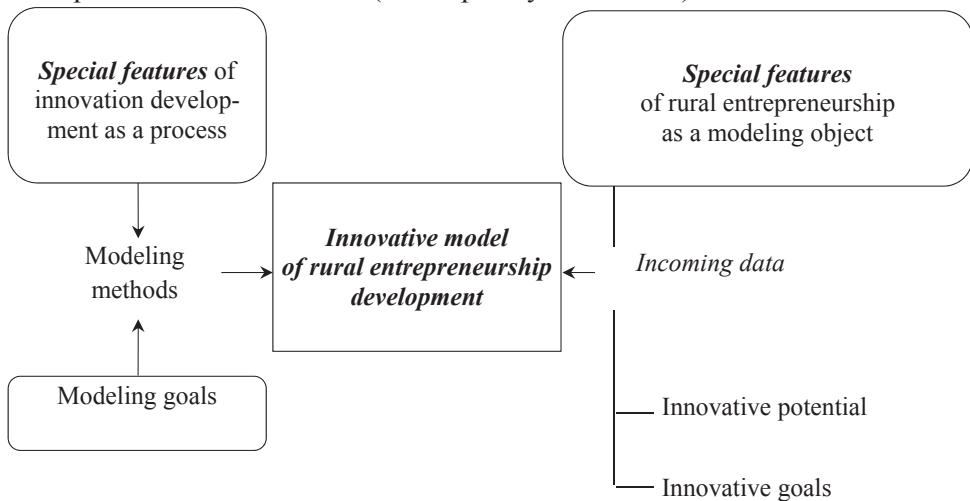
15.2. The aim and methodology of the research

The research aims to determine the theoretical, methodological and practical foundation of assessment of the modern directions of the innovative activity of agricultural enterprises and develop strategic alternatives for innovation growth of the enterprises under research.

We believe that the formation of rural entrepreneurship innovative model requires a complex and integrated approach, since the use of formal mathematical model and a single method to the entire mechanism is impossible due to large dimension systems, lack of prior information, vague evaluation criteria. Mathematical modelling of a complex system consisting of elements mathematical models

and between elements interdependencies mathematical models requires the use of an entire system of economic and mathematical models represented by a set of interrelated models that reflect within mathematical form the existing patterns of the functioning of an economic object in real environmental conditions.

In general, the innovative model of rural entrepreneurship development is a multicriteria task of the multiple objective functions simultaneous optimization for a given set of innovative goals:

$$y_n = f_k(x) \to opt, \ k = \overline{1,m}, \ x \in X,$$ (1)

where m – number of target functions to be optimized;
f_k – separate k – functions from the set ($k = \overline{1,m}$);
X – the totality of planned innovations, the individual element of which is marked through x.

Using the first approach to building a system model allows us to form a common design from the stages of innovative development, which, on the one hand, as elements of the model can provide in the general form an optimal number of steps and measures for the introduction of innovations. On the other hand, each of the stages acts as a separate subsystem with a set of autonomous properties and is characterized by a set of innovations x_i^j, the impact of which is associated with the formation of local criteria for further optimization of the system.

Thus, the overall innovative model of rural entrepreneurship development generated by the system of diverse target functions in the modelling process requires passing through a series of steps that can solve a set of strategic objectives of the innovation entrepreneurship process optimization in rural areas:

– From the formulation of innovative goals to the creation of a hierarchical structure of strategic innovation transformations. At this stage, possible innovative transformations are outlined and their structuring takes place in corresponding directions, which in future will form the stages of the innovation strategy. Since the main task of this stage is the formation of hierarchy goals, the main methods of its implementation through modelling are methods of structuring and methods of expert assessments. The inputs of the target models form the set of innovative goals of entrepreneurship in the rural areas.

– From the planning of the main directions of transformation to the formation of an optimal strategy as a set of its stages. The main criterion for choosing at this stage is the expected efficiency of each direction, the analysis of which allows you to choose the optimal set of innovation strategy stages. Obtaining an optimal solution is achieved by selecting from the set of possible solutions the solution that provides maximum efficiency, and therefore, the main methods are graphical ones that allow explicitly to present the structure of further actions.

– From the analysis of the planned innovation transformations according to the developed criteria to determine their priority. Analysing the essence of innovative goals, in the process of modelling, it becomes necessary to use methods of fuzzy sets, such as those that allow to describe risk factors and uncertainties.

– From the formation of the overall structure of the innovation strategy system to the definition of rules for the distribution of authorities and resources that will be involved in providing innovative transformations. Re-checking of potential compliance to planned destinations. It is advisable to use optimization methods when solving the problems of efficient allocation.

Consequently, methodological support for the process of innovative development modelling of rural entrepreneurship consists of: the theory of graphs – the construction of scenarios for the innovative processes implementation and the structure of the rural entrepreneurship innovative strategy; expert evaluations – formation of necessary resources, selection of innovative goals, directions of innovative development, assessments of the innovative transformations efficiency in entrepreneurial activity in rural areas; the theory of fuzzy sets – the analysis of the innovation goals priority in conditions of uncertainty, structuring of innovative projects; the theory of optimization methods is an effective distribution of the provisioning component based on the selected innovation goals, the formation of the optimal structure of the rural entrepreneurship innovative strategy. At the same time, the offered methods are oriented on the use of modern information technologies, which allow to make decisions in conditions of poorly structured problem and insufficient information provision.

Filed on Figure 3 schematic representation corresponds to the above--mentioned stages of rural entrepreneurship innovation development modelling and allows to split the modelling process into several models related to the resulting indicators. The content of such a breakdown is that it is easier to solve the task, with its allocation of subtasks with a structure not inherent to a generalized problem. In addition, building local criteria and conducting calculations on individual subsystems at different levels simplifies the process of global optimization of the formation process of strategic innovative development. Each subsystem optimizes its target function, and the upper level coordinates the solution of the subsystems of the lower levels in such a way that the optimum of the overall target function is achieved.

15.3. The research results

We have previously established that the basis of socio-economic development of economically developed countries of the West mostly is the innovative model of rural entrepreneurship. It is based on the information method of

agrarian production and the corresponding economic system – the "new econo-my". The main resource of the latter is the creative abilities of people who form the intellectual capital. The traditional exhaustion is not typical for this resource. It provides economic growth without a proportional increase in the total cost of raw materials. Therefore, the most effective are investments in the workers themselves, in improving the creative potential of the human personality, which in fact is inseparable from personal consumption. In this way, is created a self--regulated mechanism which allows investments that stimulate economic growth by maximizing personal consumption.

Figure 3. System innovation model of rural entrepreneurship development (developed by the authors)
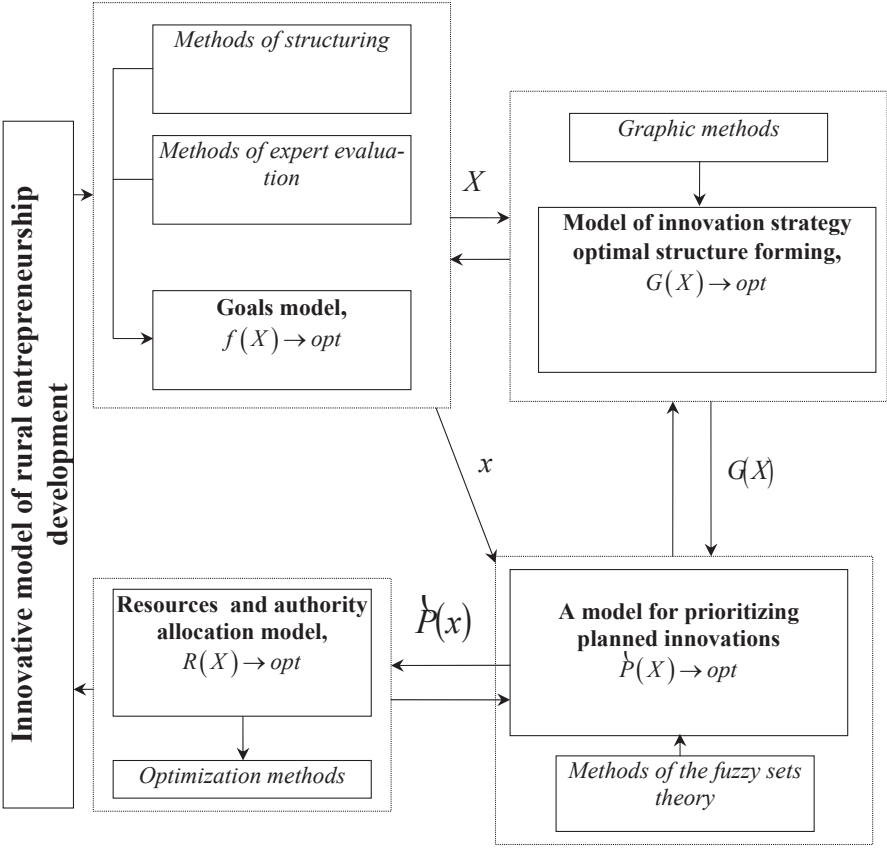
An innovative model of rural entrepreneurship development involves com-bining the interests of business entities among themselves, as well as with the state through the implementation of state policy in the field of entrepreneurship, the pa-rameters of which must be based on a program-targeted approach that allows the

effective use of available bioclimatic and production potential, financial capital, to realize the multi-level interests of both the state and the particular subject of entrepreneurship in the rural area, creation of an effective system of the agrarian market state regulation involves the development of a number of national, interregional and regional development programs for agrarian industry and rural areas.

For today, the innovative way of developing rural entrepreneurship is urgently needed. To overcome the negative situation that has developed in the rural areas and in rural entrepreneurship, it is possible only by developing and consistently implementing a long-term strategy of innovation renewal.

In our opinion, it can include five main blocks, which provides the main directions of innovation development of rural entrepreneurship (Figure 4).

Figure 4. Components of an innovative model of rural entrepreneurship development (developed by the authors)
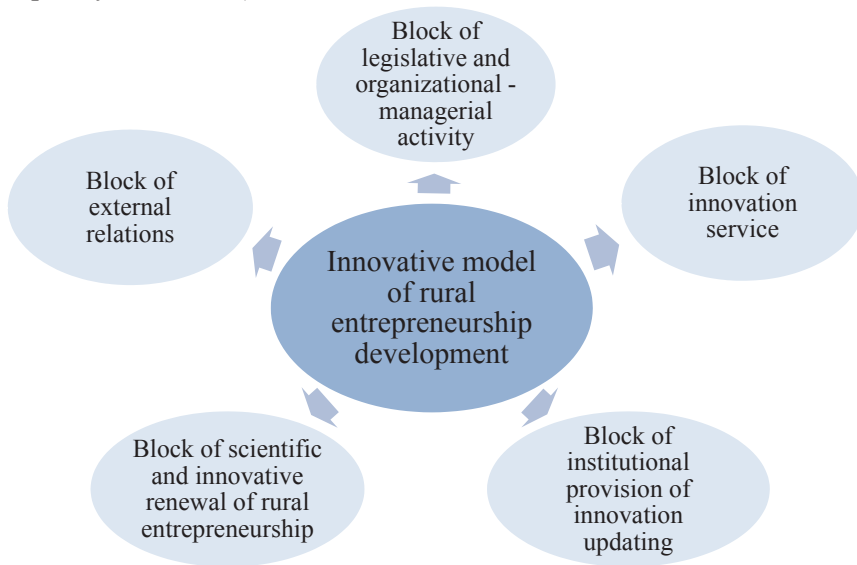
The block of legislative and organizational-managerial activity:
- adoption of the legal acts at the state system, regional and interstate levels;
- scientific support and use in domestic developments and inventions to stimulate entrepreneurial activity in rural areas;
- information provision on scientific and technical achievements and innovations in agriculture of Ukraine and the world;
- staffing (target training and retraining of specialists, integration of agricultural educational institutions, scientific organizations and experienced entrepreneurs in the village, organization of internships in advanced domestic and foreign farms).

Innovation service block:

- development of fundamental, applied research and inventive activity in agrarian sphere;
- creation of new generations of agricultural machinery, including systems of machines for private and farm enterprises, new equipment for processing agricultural products;
- provision of agriculture with new types of mineral fertilizers, fuel, energy, materials;
- development of innovative technologies for transportation, storage and processing of agricultural products;
- control of the quality and ecological purity of agricultural products and foodstuffs.

The block of institutional provision of innovation updating:

- development and innovative renewal of households and farms;
- development of cooperation, small innovative enterprises to improve the technological level and competitiveness of households and farms;
- development of state seed and tribal scientific and practical centres in the field of plant growing, animal husbandry, horticulture, gardening, processing;
- support of small business, development of innovation infrastructure in the rural area.

Block of scientific and innovative renewal of rural entrepreneurship:

- innovative renewal of crop production;
- innovative livestock breeding;
- biotechnological methods for the selection of plants and animals;
- new technologies for conservation and enhancement of soil fertility and environmental protection.

External relations block:

- analysis and forecast of the innovation renewal trends in the world agrarian sphere and the place of Ukraine in it;
- gradual substitution of imports by domestic agricultural products by improving its competitiveness in the WTO;
- adaptation of Ukraine's agriculture to the European agro-food system;
- attraction of foreign investments and technologies in the agricultural sector of Ukraine.

The main strategic priority of the rural entrepreneurship innovative development is the improvement of the investment process, which helps to improve the testing, implementation, reproduction and use of innovations. Among reasons hampering innovation activity of business entities in rural areas (BERA) can outline the following:

− a narrow scope of the created innovations application, lack of technology objects production in which innovations could be used;
− lack of technical documentation, design and experimental base;
− shortage of necessary raw materials, materials, components, equipment;
− the expectation of a positive effect from innovation is not justified;
− change of the entrepreneurship direction of activity;
− identification or creation of a new, more advanced technical solution;
− necessity of innovation approbation;
− belonging the invention to "perspective innovations", which are ahead of the modern technical level of production, the use of which is possible in the future;
− other reasons: organizational, insufficient information, etc.

To minimize the influence of the presented reasons it is necessary to form the concept of the management system for innovation and investment activities of business entities in rural areas. The main objectives of this concept development are:

1. increasing the influence of scientific and technological factors that will promote the economic growth of entrepreneurs in rural areas;
2. the formation of mechanisms for increasing the innovation and investment potential of entrepreneurs in rural areas;
3. an effective restructuring of production, which will increase the competitiveness of entrepreneurs in rural areas in the domestic and international markets;
4. sufficient level of innovative projects financing (Figure 5).

The prerequisites for activation are the regulatory and legal framework for innovation and investment activities of business entities in rural areas and existing domestic and foreign experience, as well as its activation.

Regarding the methodological basis, it is based on the methodology and methods for assessing innovation and investment support, the organizational and economic mechanism of its activation and on the economic and mathematical models.

The combination of these components will allow entrepreneurs in rural areas to achieve such key determinants as: capable innovation and investment potential, institutional support system and internal mechanisms for the accumulation of venture capital investment, innovative communicativeness of the innovation and investment market subjects, optimization of the investment resources distribution in time and complexity management innovation of business entities in rural areas, minimizing risks on the principles of prejudice.

Figure 5. Conceptual provisions for intensification of innovation and investment activities of business entities in rural areas (BERA) (developed by the authors)

The goal is to increase the innovation and investment activity of entrepreneurs in rural areas

ACTIVITY GOALS

Strengthening the influence of factors that will enhance the effectiveness of innovation and investment activities of the BERA

Formation of mechanisms for increasing the effectiveness of management innovation and investment potential

Effective restructuring of production that will increase the competitiveness of the BERA in the domestic and international markets

Sufficient level of funding for innovative BERA projects

Preconditions for activation

Legislative support of innovation and investment activity of the BERA

Existing domestic and foreign experience on activating the innovation and investment activity of the BERA

Methodological basis

Techniques and methods for evaluating innovation and investment support BERA

Organizational and economic mechanism of activation of innovation and investment activity of the BERA

Economic and mathematical models that increase the efficiency of innovation and investment support

Determinants: effective innovation and investment potential, institutional support system and internal mechanisms of accumulation of **venture investments**, innovative communicative behavior of the subjects of the innovation and investment market, optimization of distribution of investment resources in time and the complexity of the measures of innovative updating of the BERA, minimization of risks according to the principles of bias

Conceptual bases of activation of innovation-investment support of sustainable development of BERA

From the proposed conceptual provisions of activating innovation and investment activity of agricultural enterprises, it is possible to achieve their sustainable development by activating innovation and investment support on determinants, creating preconditions and using the methodical basis.

Cooperation plays a significant role in increasing the economic sustainability of agricultural production, as well as provides social support and social protection of the population. We believe that cooperation is effective and extremely important element of the innovative model of rural entrepreneurship development. The cooperative movement builds on a new principle – the growth of the economy from the bottom up – and creates the effect of sustainable development for local communities. This is the path to the revival of the Ukrainian rural areas.

According to M. Tugan-Baranovsky, cooperative enterprises are, in essence, the only form of economic organization that arose as a result of deliberate efforts of the peasants, and as a production structure capable not only to protect their economic interests, but also to achieve their goal. The attractiveness of the cooperative idea is that its implementation is not connected with violence, it is based on high ethical standards of people, mutual assistance and solidarity. A cooperative enterprise is created as a result of conscious efforts of its members and because of this "there is no coercive power and no violence in the cooperative" [Tugan-Baranovsky, 1994].

The purpose of the survey conducted by us in May-June 2017 in rural entrepreneurs was to identify the peculiarities of the entrepreneurial activity development in the agrarian sector on the basis of cooperation. The survey covered 374 respondents (rural entrepreneurs) from Lviv, Dnipro, Khmelnytsky, Vinnytsia and Kyiv district.

The sample was formed randomly, but it reflects the overall structure of the participants in agricultural service cooperatives. When compiling the sample, data was collected from regional state administrations and region state administrations, advisory services, personal contacts.

For a more detailed study of the entrepreneurial activity development peculiarities in the agrarian sector on the basis of cooperation with a view to gender equality, we analysed the number of questionnaires received from rural entrepreneurs from 5 districts of Ukraine (Figure 6):
1. Lviv district;
2. Dnipro district;
3. Khmelnytsky district;
4. Vinnitsa district;
5. Kyiv district.

Figure 6. Division of respondents according to districts of Ukraine, persons (developed by the authors)
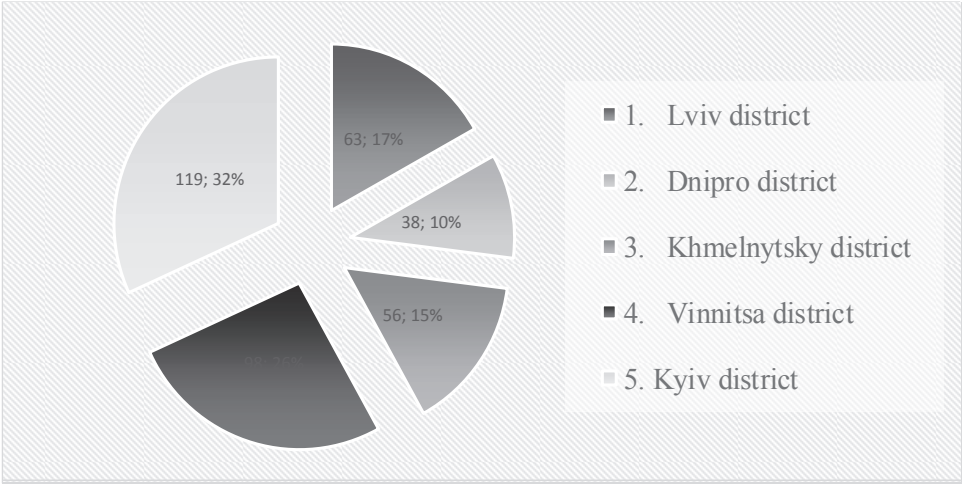
The results of the analysis indicate that the largest number of respondents live in Kyiv, Vinnytsia and Lviv, which corresponds to the data of the State Statistics Committee regarding the prevailing number of rural population in these areas.

For the development of the cooperative movement, it is very important for peasants to understand the possible positive changes that will occur when the cooperative movement in the entrepreneurial activity in the village of Ukraine is spread (Table 1). 49% of the surveyed rural entrepreneurs believe that the main positive change that will occur due to distributing the cooperative movement in entrepreneurship in the rural area in Ukraine is the social, economic and ecological balance and the development of entrepreneurship in the rural area. And 21% of the polled as positive changes in the development of cooperative activities in the rural area see strengthening of food security and public health, increasing labour activity.

It should be noted that the revival of the cooperative movement in the agrarian sector of the economy is very slow. The main deterrent factor is the unfavourable economic environment due to the lack of price parity for agricultural and industrial products and deep crisis in past years. The lack of scientific and methodological developments regarding the advantages of the cooperative way of agricultural development, the principles of cooperative structures, as well as the lack of experience of cooperative management and the construction of economic relations in a market environment affects negatively.

There are quite a few examples of effective cooperative formations in Ukraine that require a thorough study and generalization for practical purposes. The main reason for this is the need to mobilize the internal potential of the co-

operative idea to improve the financial and economic position of commodity producers, the advantages of the cooperative development direction, as well as optimal construction of the organizational structure and economic relations in cooperatives of different directions.

Table 1. Understanding of possible changes, with the expansion of the cooperative movement in the rural areas in Ukraine

No.	Positive changes	Rank	Percentage of respondents
1.	Strengthening food security and public health, increasing labour activity	2	21
2.	Careful attitude to the environment, rational consumption and use of natural resources	3	15
3.	Social, economic and ecological balance and the development of entrepreneurship in the rural areas	1	49
4.	High ranking of Ukraine regarding the investment attractiveness of the agrarian sector in international comparisons	4	9
5.	The formation of a coherent system of Ukrainian society's values, the spiritual and cultural development of human society	5	5
6.	Another option	-	1

Source: developed by the authors.

Only agricultural production and agricultural employment are not able to provide an adequate level of income as a basis for creating quality living conditions for peasants, therefore there is an objective need for diversification of the rural economy, based on the choice of the agricultural farms new to agriculture, the strategic direction of development – diversification of its activities that do not require significant investment from the outside, in particular, state-owned, but guarantees high final results as for the private sector, and society in the face of the state.

Diversification is an innovative process aimed at achieving general, strategic and tactical goals of enterprise development by implementing selected strategies (active, passive, adaptive). The analysis of scientific publications of domestic and foreign scientists testifies that diversification is viewed as one of the implemented innovation form.

Based on the scientific works research devoted to the process of diversification, we have identified certain differences in the notion of "diversification". We believe that diversification is an innovative strategy for reducing business risk and increasing income through expanding the business activity of a business entity by redistributing available resources into other areas of activity that are significantly different from the previous ones.

Diversification of activities through innovative directions also applies to small forms of agricultural production. They can help to expand the scope of employment in the rural area. As noted by scientists M.Ya. Malik and V.A. Pulim, the degradation of the rural economy (reducing its share of agricultural production in its structure) represents a significant step towards the effective development of rural areas and the prerequisites for the formation of private initiative and entrepreneurship in rural areas [Malik, 2007].

A classic example here may be tourism in the agrarian sector, in which the human, material, land resources of farmers or personal peasant farms, produced in them products used to provide services for accommodation, food and other forms of services for tourists and vacationers. However, it is not necessary that farms provide the full range of these services in the world specialization is practiced on individual or several of them.

At present, there is no well-established system of tourist services for tourism entrepreneurship in rural areas. As M.Y. Rutinsky and Yu.V. Zinco [Rutinsky, 2008] note, the services of business entities in the sphere of rural tourism are divided into basic and additional.

Basic unite the services of the organization:
- transportation of tourists;
- accommodation of tourists;
- catering for tourists.

Additional services include:
- to organize excursions;
- attracting tourists to agricultural and folk crafts;
- services of guides, guides-translators;
- services for attracting tourists to participate in folk rituals and cult events, as well as village festivals, fairs, carnival and other mass actions;
- car rental services, boats, tourist equipment;
- household services;
- right to use private recreational areas.

The proposed by the authors division is quite arbitrary, since there is no significant difference in terms of consumer properties between them. Services included in the basic program of staying a tourist in the village, usually referred to the main. Additional tourist services are purchased independently at the place of stay and they are not included in the value of the tour package. In addition, as non-material services, tourists can be offered other goods or material services. For example, maps of the area, folk souvenirs, tourist equipment, etc. Based on the analysis of the tourist services features in rural tourism, we have formed the most detailed system of rural tourism services (Figure 7).

Successful examples of rural tourism initiatives that are advisable to use in Ukraine can be found in many countries around the world on different continents – Argentina, Belgium, France, the Netherlands, Ireland, Canada, Germany, New Zealand, Poland, Russia, Switzerland, Uruguay, USA, UK, Italy and Zanzibar. Among such initiatives can be highlighted:

1. farmhouse for children;
2. agro-tourism farms for fattening of wild animals;
3. cheese production agro-tourism farms;
4. agritourist restaurants.

Farmhouse for children. Small children need direct contact with animals that satisfy many of their emotional needs. Contacting children with animals should be monitored. Marshal Animal Park is an example of a farm that has gone from sheep breeding, the area has been transformed into a park of animals that tourists can inspect. Owners did not focus on the placement of a large number of animal species on a relatively small (about 30 hectares) area. Their purpose is to ensure the maximum contact of tourists with animals. For some pastures tourists can enter freely, instead, on pasture with dangerous animals (e.g. yak), entry is prohibited. Tourists can visit the park on foot or bypass it [Rutinsky, 2010].

When traveling in rural areas, tourists should be able to visit farms that feed wildlife. In the world, for economic purposes, many species of non-domesticated animals are fed, including ostriches, deer, crocodiles, snakes, etc. In the south of France, as in Spain, they organize a bullfight. Feeding bulls is a lucrative affair for peasants in the south of France, as well as a spectacle for tourists. To visit the farms that are fattening cattle for bulls, you have to pay for the entrance. Bulls for fighting for a certain period of time are grown in farms in the Rodan delta, in the autumn-winter period, they are in the Central Massif, where they have plenty of space and pashas, ripen and strengthen. In the spring they are again transported to farms in the Rodan delta. The territory of farms is protected by two grids under electric voltage, so that these dangerous animals do not rush on other animals [Majewski, 2000].

Activity of some agro-tourism farms is based on cheese production. Cheese is one of the most "grateful" agricultural products, which is great for agritourism. There are many types of cheeses worldwide; only in France their number reaches 1000 species. Most often peasants are interested in attracting tourists to a specific cheese, its production, and purchase. Cheese of goats, sheep and buffalo is offered as special product. As an agro-tourism product, cheeses well combined with other products, especially with wine. Such agro-tourism farms are in the UK, Switzerland, Germany, Italy, France and other countries. All farms have a different organization, but are mainly located in mountainous regions. The production of cheese is also combined with a restaurant or shop where the main product is cheese.

Figure 7. The system of rural tourism services (developed by the authors)

THE SYSTEM OF RURAL TOURISM SERVICES

System of additional services

Excursion service:
- sightseeing tours of local monuments organized by the owners of farmsteads, farms (pedestrian and using transport);
- ecological excursions;
- themed excursions;
- event tours (festivals, holidays, etc.);
- walking tours on horses, other animals, etc.

Leisure and recreation:
- sports grounds;
- beaches, swimming pools;
- national parks, gardens, forests, etc .;
- rental services;
- the place of gathering mushrooms, berries, place for fishing;
- places for engaging in agrarian activities;
- playgrounds;
- ski resorts;
- health care facilities;
- Possibilities of preventive treatment (sources of mineral waters, apitherapy, etc.)

The basic services system

Accommodation:
- guest house and rooms in rural homesteads;
- mini-hotels;
- campsites;
- cottages;
- historic buildings (palaces, etc.)

Food:
- food system «Bed & Breakfast»;
- food dishes of national cuisine, which hosts organized in rural households;
- village cafes and other public catering establishments;
- self-catering.

Transport service:
- ground transport (buses, own transport of tourists and owners of farmsteads, bicycles, motorcycles, etc.);
- water (ships, motor boat, boats, etc.).

System of accompanying services

services of the local infrastructure complex

Usually farms offer cheeses, waiting for tourists who stay there for not very long – at most 2-3 hours. The agritourist program is typical: getting acquainted with the production process, tasting and buying cheese. Peasants can also expect tourists to eat at a restaurant on the farm. Extras in the cheese can be decorations that illustrate the fragments of cheese production that visitors cannot see directly. Farms and enterprises focused on agritourism, organize short performances with colourful stories and even musical accompaniment [Sznajder, 2006].

Agritourist restaurants have become an integral part of modern rural tourism. They differ from traditional ones because the owner is a peasant who offers local dishes that are often prepared from products produced in their own household. Farmhouse restaurants can also offer products from local agricultural firms. An example of the use of traditions related to the Lithuanian minority in Poland for agro-tourist purposes is the Sodas farm, which is located in Trakishki, in the territory of the Seinensk region. This county is home to a large group of people who attribute themselves to the Lithuanian national minority. The Sodas farm which is located in the ethnically Lithuanian area of 11 hectares, was engaged in the cultivation of grain and fattening cattle. The owner decided to switch to agro-tourism activities and subordinate the entire household for this. The farm opened in the Punsk restaurant "Sodas" with Lithuanian national dishes. The restaurant also offers traditional Lithuanian pastries. Plans to introduce also the sale of traditional Lithuanian products. In addition, the farm itself was re-qualified for agritourism for families who want to spend their free time in the Lithuanian style. Sodas receives profits from sources such as: restaurant with Lithuanian menu, sale of regional Lithuanian products and reception of agro--tourists [Yeoman, 2000].

The use of world experience in introducing innovative forms and new initiatives in the service of tourists is very relevant for its attachment to the tourist services market. Further scientific and practical developments regarding the introduction of new tourist products and services in rural areas are necessary, taking into account the natural, historical and cultural, economic characteristics of the Ukrainian rural area.

An important direction of diversification of the rural economy on an innovative basis for achieving its sustainable development is also the application organic farming, which can adapt agrarian production to climate change and positively affect the socio-economic development of rural areas. Due to the fact that only organic materials (fertilizers, plant protection products, etc.) are used in organic farming, the content of organic substances in the soil increases. As a result, much more moisture is in the soil due to the effect of natural factors, than when using the traditional agricultural system. Thus, when using the organic

farming system, it is possible to some extent to neutralize the effect of natural factors, which is especially important in the context of global climate change. Another positive moment in using the organic farming system is that, when producing certified products, the prices for it are almost twice higher, than on the usual agricultural products. And this, in turn, allows farms to receive higher incomes and cover production costs, even with insignificant crops.

Priority development of organic production declared in the State target program of development of Ukrainian rural areas until 2015, which justified the need to "renewal soil fertility and preserving the environment, rural development, improving the efficiency of agricultural production, providing the consumer market healthy quality products, strengthening export potential, ensuring food security and improving the well-being of citizens" [Balmann, 2014]. The trend of market growth is observed in all countries of the world, with demand far exceeding the supply even at high prices (Table 2).

Table 2. Development of organic products market in European countries

	Market volume, million euros					
	2006	2010	2012	2014	2016	deviation 2016 to 2006, %
Germany	4600	6050	6590	7040	7550	164.13
Sweden	605	860	885	905	1018	168.26
Estonia	3.2	12.1	18.7	20	22	687.50
Czech Republic	28.7	59	66.2	70	71.3	248.43
Latvia	1.1	3.6	4	4.7	5.3	481.82
Italy	970	1580	1720	1885	2020	208.25
Great Britain	1240	1680	1882	1950	2065	166.53
Poland	58	111	120	127	138	237.93
Ukraine	**0.5**	**2.5**	**5.1**	**9.3**	**12.0**	**2400.00**
Russia	56	109	115	120	123	219.64

Source: developed by the authors.

An analysis of trends in the development of the organic products market in European countries indicates that there are significant positive results. The largest volume of the market belongs to Germany, Great Britain and Italy. These tables also indicate the growth of the organic farming market in Ukraine, but in comparison with other European countries, it is only at the beginning of its development, and therefore small entrepreneurial structures in the rural areas can play a significant role in the development of this trend of innovative agriculture.

For the consumption of organic food per capita, the leaders are Germany and Sweden, where one resident buys them at an average of 93 and 106 euros per year, respectively, in Ukraine, this indicator is only 3 cents per capita per year. Despite the rapid increase in the volume of organic products sales in the

EU, there are certain barriers to their production, namely, poor soils and massive intensification of agricultural production [Dimitri and Oberholtzer, 2009]. In view of this, further growth of organic products markets opens up opportunities for new producers from developing countries, including from Ukraine.

In addition, the feasibility of introducing organic farming in Ukraine is conditioned by the following:
- the need to reproduce the soil fertility and preserve the environment;
- the need to develop rural areas and raise the living standards of the rural population;
- the need to increase the efficiency and profitability of agricultural production;
- the need to provide the consumer market with healthy, high-quality products;
- the need to strengthen the export potential of the state;
- the need to improve the image of Ukraine as a producer and exporter of high--quality healthy organic products;
- to ensure food security in Ukraine;
- welfare improvement of the Ukraine's citizens.

15.4. Summary and conclusions

The research allowed drawing a set of conclusions. The directions of innovative development of rural entrepreneurship are not exhaustive, but their implementation will promote the processes of the output of small and medium--sized rural entrepreneurship of Ukraine to the European level of development, improvement of the business climate, strengthening of the positions of rural small and medium-sized rural entrepreneurs in the general structure of the national economy, modernization in the field of rural small and medium rural entrepreneurship, aimed at increasing its contribution to the socio-economic development of the country, increasing SMEs effectiveness, including an increase in its domestic component in the volume of agricultural production, pumping up the state and local budgets.

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16. Smart Manufacturing – potential of new digital technologies and big data in the food industry

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Abstract

New digital technologies are currently becoming one of the main sources of building a competitive advantage for enterprises. The Internet of Things and big data are opening the previously unknown possibilities for optimising production processes and improving the productivity. The speed, nature and scope of technological changes let us talk about the fourth industrial revolution. The chapter discusses chances related to the use of new digital technologies in the process of implementing the smart manufacturing concept in food industry enterprises. Attention is focused on the benefits of applying analyses of big data. What will be presented are the major types of data used in analyses of big data, characteristics of smart processing and areas for the possible application of digital solutions (inter alia, digital twins) in the food industry.

Keywords: digitisation, competitiveness, food industry, big data, digital twin
JEL codes: L16, L20, L66, O14, O31, O33

16.1. Introduction

Building a smart food economy – smart farming, smart food manufacturing and smart and agile food supply chains is one of the key challenges currently facing the Member States of the European Union (EU). The smart food economy assumes the intense use of information and communication technologies and innovative digital solutions (e.g. the Internet of Things, cloud computing and big data) for complex planning and management of food production and distribution processes. In line with the European Commission's proposals, in the next EU financial perspective for 2021-2027 actions for smart farming are to be covered with dedicated support from the Common Agricultural Policy budget [European Commission, 2017]. Building a smart food economy is also to be supported by structural policy measures, the new Digital Europe programme and the EU Framework Programme for Research and Innovation – Horizon Europe [European Commission, 2018].

It is expected that the widespread use of digital technologies and tools will lead to the more competitive, more efficient and more environment-friendly agri-food sector. According to many analysts, the digitisation of the food economy can be a milestone in tackling global problems and challenges related to the growing demand for food in the world. The technologies of precise use of the means of production, supported by advanced data analytics, also give hope to reduce the negative impact of agriculture on the speed of climate change [Walter et al., 2017]. However, the agri-food sector is at the very beginning of its path to digital transformation. In the case of agriculture, the basic problems are deficiencies and limitations in the area of telecommunications infrastructure in rural areas, unequal access to new technologies and advanced agricultural equipment and an insufficient level of digital competence of farmers. In the other links of the agri-food chain, digitisation processes are more advanced, yet still insufficient to talk about the digital breakthrough in the sector. In addition to financial constraints, the barriers are the lack of the vision and strategy of digitisation adjusted to the capacity and needs of individual entities and the limited knowledge of new digital technologies.

The digital transformation-related improvement in the planning, implementation and control of production and sales processes is particularly important for food industry enterprises. In fact, the smart industrial production enables building sustainable competitive advantages in the more and more demanding international markets. The objective of this chapter is to review the opportunities offered by the smart manufacturing concept and new digital technologies to food industry enterprises. The first part will explain the concepts of smart manufacturing, big data, digital twins. The second part of the chapter presents exemplary applications of the smart manufacturing concept in food industry enterprises, with a particular focus on the context of the operation of such enterprises in Poland. The chapter ends with the summary and conclusions.

16.2. Smart manufacturing

The smart manufacturing concept is defined as the intense use of data, digital technologies and robots at the level of the production hall and outside of it, resulting in smart, efficient and responsive actions [Wallace and Riddick, 2013; Thoben, Wiesner and Wuest, 2017]. It is indicated that smart manufacturing is a natural consequence of the emergence and dissemination of cyberphysical systems in the economy and business. These systems, combining the digital world with the real world, allow to gain fuller and faster insight into production processes and operating conditions of enterprises. The consequence of their emergence are also changes in the manufacturing paradigms, called by some the

fourth industrial revolution (Industry 4.0). The paradigm of the mass and automated production, being a basis of the previous industrial revolution, is progressively displaced by the paradigm of the personalised production adjusted to individual and dynamically changing expectations and needs of consumers. The qualitative improvement with regard to the conceptualisation, planning and management of the production process is enabled by advanced analytics, modelling and simulations based on real-time data and historical data, recorded and transmitted over the network of machines, devices and sensors interconnected under the Internet of Things [Davis et al., 2012]. Ultimately, the enterprise operating in accordance with the smart manufacturing concept should integrate data and information from various sources, including data on the customers, partners and social environment. In this way, it has the potential to become a fully smart organisation which uses its available resources, energy and material inputs in an optimal way allowing to minimise costs, improve the environment and strengthen the competitiveness [Davis et al., 2012].

16.3. Big data analyses – basis for the development of smart enterprises

A central element building smart enterprises and industry 4.0 is the data and its real-time analysis, allowing to make more accurate and effective decisions. Thanks to new technologies and digitisation of many areas of socio-economic life, larger is not only the size and amount of data to be analysed but also its variety and speed with which it appears. What appears in addition to traditional structured data (inter alia, from IT systems for planning corporate resources), is unstructured data (images, videos, signals, text files), partially structured and hybrid data, data from multimedia, residual data (traces and by-products of Internet and mobile user activity), geolocation data, social media data, open data, data generated by machines and other types of data [Mayer-Schönberger and Cukier, 2013].

The growing content of digital data, including real-time data streams, is referred to as big data. Data related to the operation of the enterprise is usually collected at long intervals which results in entries in a form of time series [Munir et al., 2018]. Big data itself does not constitute values for the enterprise until it is properly analysed. Obtaining results useful for the enterprise requires the use of appropriate databases, data purification, preparation of data for analysis, application of appropriate analysis and modelling methods, and visualisation. A significant part of big data analyses uses advanced methods and solutions, including machine learning and artificial intelligence algorithms [Tao et al., 2018]. Traditional analyses use conventional algorithms and data that has been previously stored in information systems databases. In the era of big data – thanks to

automation, artificial intelligence and cloud computing – analyses can be performed in real time. New results are available as soon as there is new data in the databases or other changes are made to these databases.

As noticed by Michael Porter and James Helbilman [2015], the revolution related to constantly growing digital data resources, which is of key importance to smart manufacturing, leads to new conditions of competition among enterprises. Big data can be used for descriptive, diagnostic, predictive and prescriptive analyses. In other words, these analyses can be used for objectives related to describing and explaining phenomena and processes relevant to the enterprise and for objectives related to predicting events or problems within the enterprise and in its environment and prescribing anticipatory and preventive actions. The automation of some analytical processes and new sources and types of data to be analysed, including in particular the data flowing to the Industrial Internet of Things in connection with the sensor systems for machines, production lines and products, open up new opportunities and perspectives for enterprises. The major benefits of big data analyses for production enterprises include: a) more comprehensive insight into production processes; b) discovering new dependencies and facts; c) increasing the production efficiency; d) improving the production quality; e) greater precision in forecasting the supply and demand for individual products; f) traceability of products; g) anticipating failures and breakdown of machinery; h) ensuring the maintenance of equipment operation; i) estimating the impact of the daily production on financial results; j) improving product lifecycle management [Mikalef et al., 2017; Munir et al., 2018]. The basic scheme for advanced analyses of production processes in the enterprise is presented in Figure 1.

The implementation of advanced big data analytics can be a big challenge for many enterprises. Among the main obstacles, there are the lack of capital for development, limited cooperation among individual departments in the enterprise, diversified types and formats of data in analyses, and the lack of adequate staff resources [Nikolic et al., 2017; Munir et al., 2018]. Even greater challenges are associated with analyses of processes outside the production plant [cf. Meriton and Graham, 2016]. As part of the smart manufacturing concept, this type of analyses plays, however, an equally important role. It can bring about a significant improvement in the functioning of supply chains, by contributing to the strengthening of the enterprise's competitive position. It may also indicate new development directions for the enterprise and new outlet markets.

Figure 1. Use of advanced data analytics for improving production processes in the enterprise
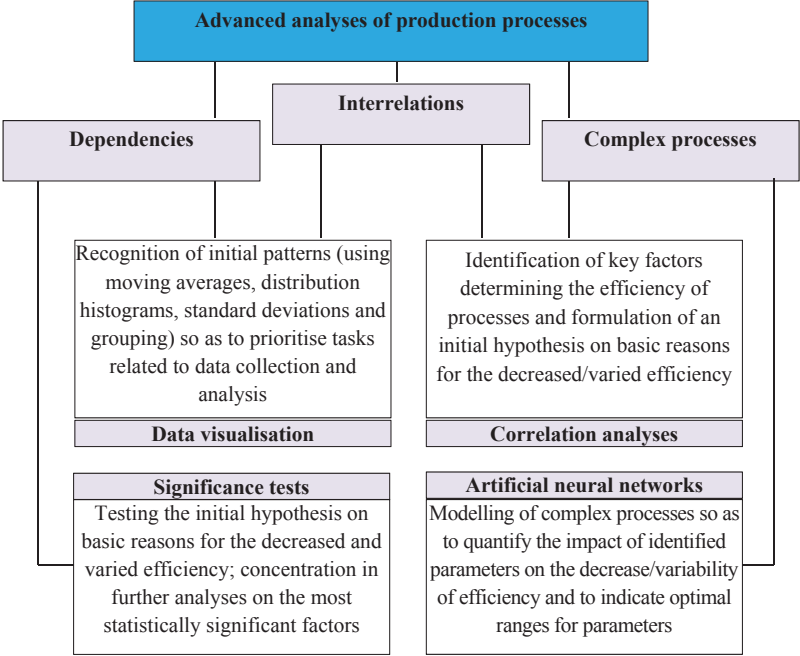
Source: study based on Munir et al., 2018., p. 152.

16.4. Digital twin paradigm

The distinctive feature of a smart enterprise of the Big Data era is its digital twin. In brief, a digital twin stands for a digital reflection of systems, processes and effects of the enterprise's production activities in the virtual world. The concept of digital twins was born in the United States at the beginning of the 2000s as a response to a need to introduce improvements into the product lifecycle management process [Uhlmann, Hohwieler and Geisert, 2017]. One of more frequently quoted definitions of a digital twin indicates that it is a set of virtual information constructs fully describing a potential or finished product, starting with the smallest components at the micro level, and ending with the complete whole at the macrogeometric level [Grieves and Vickers, 2017]. Assuming that the description is complete, the information that is obtained by means of physical and direct testing of the product can also be obtained by using its digital reflection.

The concept of digital twins can be considered a new paradigm for the functioning of enterprises in the digital age. Currently, using dedicated software it is possible to create evolving, digital representation of both products and processes and services [Beetz, 2017; Qi et al., 2018]. Thanks to sensors and data transmission

systems, we can see a virtual reflection of what happened to objects in the past and what happens to them now. It is also possible to carry out forecasts and simulations of how objects concerned will be functioning in the future. These solutions lead to a number of benefits – from reducing the costs associated with maintenance of machinery and production lines, to reducing the number of failures, defects and other problems in final products. After all, the creation of complete digital models and reflections of products, processes and services – due to the complexity of the multidisciplinary modelling tasks – is still a difficult and challenging task. For this reason, more popular are partial models created for specific purposes, inter alia, simulation analyses of machinery's kinematic behaviour or prediction of machinery wear [Uhlmann, Hohwieler and Geisert, 2017].

It can be expected that the more and more common use of sensor technologies and the Internet of Things will be conducive to the development of the software market for the benefit of digital twins. Some high-tech companies are already offering solutions that are to lead to the full digital transformation of enterprises (inter alia, Siemens and its software for enterprises of various sectors and industries, including the brewing industry) [Siemens, 2017].

16.5. Smart manufacturing in the food industry in Poland

The food industry is classified as a low-tech sector. At the same time, it is characterised by a relatively low level of innovation, although it should be stressed that Polish food industry companies, especially beverage producers, are positively distinguished from other low-tech industries in terms of innovative activity they undertake [Firlej and Żmija, 2014; Grzybowska and Juchniewicz, 2014]. In the last two decades, the main source of the competitive advantages of Polish food producers were low prices and low production costs [Szczepaniak, Ambroziak and Kosior, 2018]. The effectiveness of price-cost strategies, both in the domestic and in foreign markets, limited the interest of companies in investing in innovative activities. An important part of technological innovations, related mainly to the modernisation of production facilities and machinery parks, has been implemented during the period of preparing for the EU membership and in the first years after joining the organisation. Currently, thanks to modern machinery and automated production lines, the technological level of food processing in Poland does not differ from the processing level in plants operating in the most advanced European economies [Kowalski, 2017].

Today, the food industry is among the most competitive branches of the Polish economy. Companies in this sector generate about 3% of GDP and employ about 450 thousand people. At the same time, the food and beverage production accounts for about 13% of the global production value in the national economy

[Statistical Yearbook of Industry, 2017]. One of the most significant indicators of the good competitive position of Polish food industry are the results obtained in foreign trade. In the years 2013-2016, the positive balance of trade in foreign food products was at a level of about EUR 8-9 billion [Kowalski, 2017]. Currently, Poland is ranked eighth among the most important food exporters in the EU. Maintaining of such good results in the subsequent years is, however, uncertain due to the ever-changing conditions of the competition of companies in international markets. The growing labour costs in Poland are a reason for which the possibilities of expansion based on price-cost strategies will be gradually depleted. Maintaining and improving the competitive position of Polish food producers will depend, to a large extent, on the ability to adapt to the evolving reality and to the new environmental requirements resulting from the progressive processes of digitisation. Therefore, a turn towards new digital technologies and the smart manufacturing concept seems to be a necessary step on the path towards strengthening the competitiveness of the Polish food industry.

In the most technologically advanced food sector enterprises, the selected elements of the smart manufacturing concept are already present or are being gradually implemented. They include mainly processes related to monitoring of and improvements in automated production lines, analysis of economic and financial data and other data contained in the enterprise's internal resources (e.g. in ERP systems). However, more advanced analyses using big data, including data collected outside the enterprise's borders, are still rarely applied and used. According to the European Commission's reports on the EU data market, in many Member States the number of enterprises using advanced data analyses is still low. In 2017 in Poland the category of data users included 13 thousand enterprises (slightly more than 2% of all enterprises in Poland). The same year in the United Kingdom, the number of enterprises being data users was 174 thousand (11.2% of all enterprises), in Germany almost 111 thousand (8.2%), and in the Netherlands 26 thousand (12.2%) [The European Data Market Monitoring Tool, 2018].

An indirect indicator of the limited use of advanced data analytics is the percentage of enterprises purchasing cloud computing services. Cloud computing provides the full scalability required in the case of the growing data resources to be analysed. Depending on the sector and industry, this percentage in Poland varies from a few to up to thirty several percent, with the highest percentages applying mainly to sectors with a high degree of concentration (such as pharmaceutical and tobacco sectors). In the case of the food industry, in 2016 cloud computing services were purchased by less than 5% enterprises involved in the production of food products and by less than 7% enterprises producing beverages [Statistical Yearbook of Industry, 2017]. However, it is not clear

whether these services are used to create a new value for consumers (new or improved products and services) or only to optimise business processes. The studies carried out by Computerworld in August 2018 show that many enterprises approach digital transformation without a strategic vision of goal [Pietruszyński, 2018a]. More than half (55%) of managers in Poland believe that digitisation of the enterprise requires enormous expenses for infrastructure. As many as 57% of managers do not plan any actions for digital transformation of the enterprise. In the mid-2018, only every tenth company in Poland had a strategic document devoted to strictly digital transformation [Pietruszyński, 2018b].

Building a smart food industry does not imply and does not come down to the adoption and implementation of all digital technologies and solutions available in the market. This process requires preparing a digitisation strategy including both actual problems and needs of individual entities, as well as the account of and economic and social costs and benefits associated with the implementation of technological innovations. The potential of the smart manufacturing concept, supported by advanced data analytics and new digital solutions, can be implemented at various stages and in various areas related to the production process and the wider operation of the company. In the case of food sector enterprises, the benefits of digitisation include, inter alia, the ability to design food products and their packagings in a spirit of consumer-driven design, optimising the process of planning the production types and volumes, automation of production processes and those related to production management, remote monitoring and diagnostics of machinery, and tracking the flow of food products in the supply chain. It is important to stress that the smart manufacturing concept itself in the era of digital breakthrough is changing – new types and kinds of data appear, with the potentially high economic importance and potentially new applications. The selected applications of the smart manufacturing concept in food industry companies based on the currently used and developed technologies are summarised in Table 1.

The functioning of the food industry, based on the paradigm of the smart production and smart supply chains, requires cooperation and involvement of all entities participating in the agri-food chain. It also entails the significant involvement of entities which so far have not been associated with the food production and the agri-food sector – IT companies offering specialised software, high-tech companies specialising in sensing and artificial intelligence technologies, as well as companies offering advanced data analytics services. Large and medium-sized enterprises producing food and beverages have modern machinery parks and software that already enable the implementation of selected elements of the smart manufacturing concept. However, the digital revolution requires the greater opening to new technologies and advanced data analyses.

Table 1. Smart manufacturing in food industry enterprises

Area	Selected methods and solutions	Applications/benefits
Smart design	analyses of data from sales points, analytics of social media, crowdsourcing, 3D modelling and simulations based on digital reflections (digital twins) of products developed based on various formulations/containing various ingredients	adjustment of the composition and packagings of food products to the preferences of specific groups of consumers; identification of potential problems related to the quality of products and their packagings
Production planning	analyses of business processes based on the data from ERP (Enterprise Resource Planning) systems, EAM (Enterprise Asset Management) systems, SCM (Supply Chain Management) systems – *inter alia*, the data on suppliers, data from sales points, financial data; in-depth analyses of the demand for individual groups of food products; economic and market data, data on the weather and climate change	selection of suppliers, increasing the timeliness of raw material supplies, more precise prediction of increases and decreases in the demand for selected food products in specific places and periods of the year, prediction of the adverse impact of external/climate factors on the raw material base, prediction of rises and falls in the prices of raw materials
Automation of processes and optimisation of production	data from sensors and cameras, cognitive sensing technologies, machine learning algorithms, artificial neural networks, platform of the Industrial Internet of Things, tools for the digital twin (CAD – Computer Aided Design, CAM – Computer Assisted Manufacturing, simulation programmes, Product Lifecycle Management programmes – PLM), advanced analyses of production processes	automatic selection of products and raw materials meeting the specific requirements, increasing the efficiency of procedures related to control of safety and quality of food products (inter alia, HACCP procedures), improving parameters of production lines, reduction in costs and improving the productivity
Monitoring of machinery and equipment	data from sensors and cameras, calculation of KPI (Key Performance Indicators), including OEE (Overall Equipment Effectiveness) in real time, early warning systems based on algorithms of decision trees and neural networks	remote diagnostics and maintenance of machinery to prevent malfunctions, predictive maintenance of equipment, improving parameters of machinery, reduction in costs of production, improving the productivity
Smart supply chains	sensors and labels for radio-frequency identification (RFID), systems enabling the integration and exchange of data among various platforms and third party software (open API – Application Programming Interface)	tracking the flow of raw materials and products in the supply chain, insight into the conditions of food transport and storage in real time, food loss and waste reduction

Source: own study.

16.6. Summary and conclusions

The ability to use the opportunities related to digital technologies and big data in the near future will provide the opportunities to maintain and strengthen the competitive position of enterprises in the more and more demanding markets. However, the Polish food industry is just at the beginning of its path to digital transformation. In addition, the prospects for accelerating the necessary transformations are uncertain as the interest of Polish enterprises in digitisation and new business models is still limited. The discussed applications of the smart manufacturing concept show only some opportunities offered by digital technologies, advanced data analytics and artificial intelligence to the food industry. The additional opportunities involve, inter alia, additive manufacturing, which is based on the use of graphics software and 3d printers for the food production. The enormous opportunities associated with various paths and areas of digitisation should, therefore, be a subject of a strategic choice of enterprises thinking of the further development and expansion.

The imperative of digital transformation of the food industry – and more broadly, of the entire agri-food sector – also raises questions about priorities in spending public funds, both from the CAP budget and the EU Structural Funds and from the national budget. At the EU level, new programmes and opportunities to support innovative business solutions are emerging. In the next EU financial perspective for 2021-2027, the pool of funds allocated for strengthening the competitiveness of the European economy is expected to increase significantly. At the same time, in line with the European Commission's proposals, the Member States are to be given more freedom in deciding on the objectives and directions of spending allocated funds. This freedom applies not only to structural and rural development programmes but also to the first pillar of the CAP. It will, therefore, be important to ensure that actions for digital transformation are appropriately supported also in national programmes and strategies dedicated to agriculture and the agri-food sector.

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17. A paradigmatic view on the possibility of applying the provisions of the Common Agricultural and Fisheries Policy of the EU in the agrarian sector of the economy in Ukraine

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Abstract

The question of the possibility of applying experience in the implementation of Common Agricultural and Common Fisheries Policy of the EU in Ukraine was raised in the scientific work. Components of the Common Fisheries Policy of the EU in the context of the system for conservation and sustainable usage of fishery resources were analysed. The results of the survey of fishery producers during AGRO-2018 on the possibilities of implementation of the provisions of the Common Agricultural and Fisheries Policy of the EU in the fisheries were disclosed. It is proposed to set a fixed minimum rent amount for land plots used for the production of fisheries commodities in the context of EU-Ukraine Association Agreement in order to optimize the activity of business entities in the field of aquaculture in a part of the rent amount and reduction of production costs.

Keywords: European Union, agricultural market Common agricultural policy, competitiveness, subsidies, agroindustrial complex.

JEL codes: F36, F37, Q12, Q18

17.1. Introduction

The following scientists were engaged in the study of the agro-industrial complex and the common agricultural policy and the common fisheries policy of the EU: Sokol L., Duhiyenko N., Vinichenko I., Kvasha S., Omeliyanenko T., Bazylevych V, Kovalchuk S. and others, however, not all aspects are sufficiently studied and reflected, which makes further research necessary and relevant.

The goal of the study is to analyse the common agricultural policy and the common fisheries policy of the EU, to systematize its main stages and principles, and to formulate effective mechanisms that will contribute to the development of Ukrainian agricultural market and production.

17.2. The development of the EU Common Agricultural Policy and Common Fisheries Policy and its impact on the competitiveness of the fisheries sector

For the first time, the Common Agricultural Policy (CAP) is aimed at agriculture supporting that provides food security and contributes to the balanced development of the whole Europe at rural areas, including those where the conditions of production are difficult. The five European structural and investment funds supporting the Europe economic recovery for period up to 2020 ("ESI Funds"), administrated by the European Commission and EU countries as researches show. Within the framework of the Common Agricultural Policy (CAP) reform, the European Commission proposed that the European Maritime and Fisheries Fund (EMFF) was also included to the new common strategic concept, accompanied by the European Regional Development Fund (ERDF), the European Social Fund (ESF), the Cohesion Fund (CF), the European Agricultural Fund for Rural Development (EAFRD) [http://ec.europa.eu/fisheries/cfp/emff/index_en.htm].

The EU rural areas development policy is funded through the European Agricultural Fund for Rural Development (EAFRD), which is going to function in 2014-2020. Its covers 100 billion euro at the reporting period. The funds are distributed from the Fund for 7 years for each EU country. These funds also involve government funding of 61 billion euro. During this period, there are 118 different rural development programs in 28 Member States, from which 20 are common national programs, while 8 Member States have chosen a decision with two or more (regional) programs. Member countries and regions are developing the rural development programs based on the needs of their area and focus on at least four from the six EU's common priorities: promote knowledge and innovation in agriculture and forestry industries, rural areas; increase the profitability and competitiveness of all types of agriculture and promote an innovative agrarian technology and sustainable forest management; promote food chain organization, animal welfare and risk management in agriculture and fisheries industries; restore, preserve and enhance the ecosystems associated with agriculture and forestry industries; promote the efficient usage of resources and support the crossing to a low carbon economy prepared for climate change in agricultural industries; promote social integration, poverty eradication and economic development of the rural areas.

Priorities for rural development are divided into priority areas. Particularly, priorities of resource conservation include "reducing greenhouse gas and ammonia emissions in agriculture" and "promoting carbon conservation and inclusion in agriculture and forestry industries." Member countries and regions set quantitative targets in these priority areas in its rural development programs.

Then they outline in which ways these goals would be achieved and how much it would be directed at each action. At least 30% of funding for each rural development program has to be directed towards actions which connected with environment and climate changes.

Agriculture is important for natural environment of the EU. Agriculture and natural environment are affecting to each other: a) for centuries agriculture has contributed to creation and maintenance of unique rural areas. Land management in agriculture has become a positive force for the development of rich diverse landscapes and habitats, including mosaics of forests, wetlands and large massifs of open rural areas; b) ecological integrity and original value of the landscapes make the rural areas attractive for the creation of business, places for living, as well as for tourism and recreation business. The connection between the richness of the natural environment and practices of agriculture is complicated. Many valuable habitats in Europe are supported by a large farming, and they rely on a wide range of wildlife species. But an unacceptable agricultural practices and land management can also have a negative impact on natural resources, such as soil, water and air pollution, fragmentation of habitats, loss of wildlife. The CAP ensures that the rules are compliant with environmental requirements and that the CAP measures contribute to development of agricultural practices, preservation of the environment and protection of the rural areas. Farmers are encouraged to continue playing a positive role in supporting rural areas and environment.

The primary tasks of the central authority that ensure implementation of the policy in the fishery field are: ensuring the sustainable fish catching from the environment; harmonious development of the fish industry of Ukraine; ensuring the protection of water biological resources and struggle against illegal, unreported and unregulated fishing, other illegal economic activities for fish catching and fish sale as interfere the implementation of sustainable development principles, rational usage of the existing natural resources base, restoration of the fishing fleet. The indicated directions fully correspond to the basic theoretical-methodological principles and provisions of the Common Fisheries Policy of the European Union, Regulation (EU) of 11.12.2013 No. 1380/2013 [On amendments to the Council of the EU regulations, 2015; On the Common Fisheries Policy, 2013; Zalizko and Martynenkov, 2016; http://ec.europa.eu/fisheries/cfp/emff/index_en.htm]. The Common Fisheries Policy of the EU (CFP) – the fisheries policy of the European Union which was introduced in 1957. The CFP as known as "Blue Europe" has become a full-fledged community policy only since 1983. The CFP has legal grounds (Articles 32-38 of the Treaty establishing the European Community) and similar objectives with agrarian policy such as: stabilization of markets; fish productivity increasing;

guarantee of security and delivery products to the consumer at a proportional price. The CFP is a sphere of common responsibility of the European Union and its Member States as the Common Agricultural Policy of the EU.

The CFP represents a certain set of rules for managing European fishing fleets and preserving of fish stock. It is designed to manage common resources and provides equal access to EU waters and fishing ground for all European fishing fleets and allows fishermen for actively compete. The initial objectives of the CFP during several reforms were supplemented and cover the following issues: rational usage of resources, environmental protection, ensuring a high level of health protection, as well as economic and social cohesion. A new updated CFP came into force on January 1, 2014, aimed at ecological, economic and social sustainable usage of common resources, including the competitive production of aquaculture products. At the same time, Eurostat based on EU legislation collects and processes data on fishery, fish production and production of fish commodities, aquaculture products and fishing fleets.

Taking into account the above and analysing the market environment surrounding fishery producers, we have investigated the specific features of the CFP, including the fact that fishery activities and aquaculture have been environmentally, economically and socially sustainable, and have supplied food for population. Its purpose is to encourage the dynamic development of the fisheries sector and to ensure fair standards of living for fishing communities. Despite the fact that it is important to maximize a catch, some of aspects should be limited. Humanity has to make sure that the fishing activities do not harm fish populations to reproduction. The current CFP provides for necessity to establish between 2015 and 2020 years fixed catch limits that are sustainable and support fish stocks in the long period.

It is evident that, until now, an impact of fishery activities on the marine environment is not entirely understandable. It is for this reason, the CFP had adopted a precautionary approach that recognizes an impact of human activities on all components of the ecosystem. It focuses on making the fishing fleet to be selective for catching and stopping the practice of throwing unwanted fish.

The research underlines the issue that the problem of diversification national economies is actual nowadays. Obviously, these aspects are directed to the sustainable development of coastal regions, areas with activities in the field of aquaculture, fishery in inland waters [Shepeliev, 2016; Shepeliev, 2015; http://ec.europa.eu/fisheries/cfp/emff/index_en.htm; Zalizko, 2017]. Thus, it has been established that fishery be able to increase the catches only in case of the suspension of overfishing and the opportunities of restoration fisheries stocks.

17.3. Components of the Common Fisheries Policy of the EU in the context of the conservation system and sustainable usage of fisheries resources

The research highlights that the Common Fisheries Policy covers the relevant components (Figure 1). Today, the EU is committed to pursuing an effective policy, covering fisheries, environmental protection and maritime fishery. The CFP sphere of influence includes the saving of marine biological resources and management of the process determination these species in fisheries.

Figure 1. The components of the Common Fisheries Policy of the EU in the context of action of the system for saving and sustainable usage of fishery resources

Components of the Common Fisheries Policy

rational usage and protection of fishery resources for the conservation of fish stocks

organization of market trade in order to ensure the equal supply and demand in the interests of producer and consumer

structural and political measures to support fishery and aquaculture in adapting their equipment and organizational forms to the requirements arising from the exhaustion of resources and market situation; community support is mainly provided in way of financing fishing gear in this area

interactions between third countries and international organizations for the international trade treaty-making in the field of fishery and aquaculture

community measures for the conservation of fish stock of marine and ocean fisheries

Source: [Vdovenko, 2016; Vdovenko, 2015; United Nations Convention..., 1998; Zalizko and Martynenkov, 2016; http://ec.europa.eu/fisheries/cfp/emff/index_en.htm; Zalizko, 2017].

In addition, in view of market and financial measures, the CFP includes the freshwater bioresources protection, activities in the field of aquaculture, as well as the processing, fish and fish production marketing [Zalizko and Martynenkov, 2016; Vdovenko and Chuklin, pp. 79-84]. The Common Fisheries Policy is able to ensure fisheries activities which contribute to long-term environmental, economic and social sustainability, including rules direct to ensuring the origin, traceability, safety and quality of products.

In addition, for example, aquaculture may contributes to preserve the sustainable food production potential throughout the EU, in order to ensure long--term food security, as well as food supplying, the development and employment of citizens. It should makes a contribution to meeting the growing global

demand of food from water bioresources. The Commission's Strategy for the Sustainable Development of European Aquaculture, approved by the Council in 2009 and endorsed by the European Parliament, emphasizes the need to create and promote a level-playing field as the basis for the sustainable development of aquaculture. Activities in the field of aquaculture in the EU are under the influence of various conditions within national boundaries, including those which relate to permits for operators.

Thus, the Community strategic guidelines for national strategic plans should be designed in order to enhance the competitiveness of the fisheries sector, support its development, as well as to encourage economic activity, diversification and quality of life in the coastal and inland areas. In addition, mechanisms should be imposed to exchange information and best practices among Member countries through an open method of coordination of national measures relating to business security, access to water and space of the EU, as well as simplification of permitting procedures [Sharilo Yu. and Vdovenko, 2015, pp. 9-13]. At the same time, through such policies it is possible to pursue the promotion of productivity, fair standards of living in the fisheries sector, including small-scale fisheries and the markets stability. The CFP encourages to ensure an availability of fish commodities at an affordable price. It is necessary to take into account the fact that, when such activities carried out in the territory of the Member countries, in EU waters, particularly, fishing vessels under the flag of third countries or registered in third countries, union fishing vessels, as well as citizens of the Member countries, without prejudice to the basic obligations of the flag State and comply with article 117 of The United Nations Convention on the Law of the Sea of 10.12.1982, while the CFP had been agreed with the Strategy Europe-2020 in order to achieve rational, sustainable and full growth [Zalizko and Martynenkov, 2016; Kvasha and Vdovenko, 2011, pp. 7-11].

17.4. Fundamental principles of CFP reforms

The results of researches show the basic principles of the reform in the PSA, highlighting its characteristics, since it gives the EU-countries more control over the national and regional levels. The analysis of economic literature allowed to distinguish four directions of the PSA: a) fisheries management; b) international politics; c) market and trade policy; d) financing policy (The European fisheries fund, EFF (2007-2013) and The European Maritime and Fisheries Fund, EMFF (2014-2020)). It can be noted that the European Maritime and Fisheries Fund (EMFF) is one of the five European structural and investment funds which supports recovery of the economy in Europe up to 2020 and has specifically dedicated to addressing European seas and coasts. It is one of the five

EU-funds that complement each other and aimed to improve the economic growth, fishing industry competitiveness and employment in Europe. From the above-mentioned conditions for the approval of the provisions of the European Fund for Maritime and Fisheries, which replaced the existing European Fisheries Fund had created [http://ec.europa.eu/fisheries/cfp/emff/index_en.htm]. The European Fisheries Fund provided financial support to enterprises in 2007-2013 to adapt for changes in the fisheries sector, achieve sustainable development and be economically vital. The EFF budget had amounted to 4.3 billion euros.

Financial assistance covered all areas of the fisheries sector. The projects were funded based on the strategic and operational plans which were prepared by the national authorities. The EFF covered 5 priorities: a) adaptation of the EU fleet and assistance in decommissioning fishing vessels; b) aquaculture, fishing in internal waters, processing and marketing, assistance in application of environmentally friendly methods of production; c) measures to improve the traceability of production and labelling of commodities; d) sustainable development of the fisheries zones; e) technical assistance (funds' management assistance). The functioning of the European Maritime and Fisheries Fund contributes to the application of new rules of the EU's CFP and the maintenance of initiatives which improve the economic, environmental and social performance of the sector [Zalizko and Martynenkov, 2016; Vdovenko, 2016, p. 27].

The total budget of the European Maritime and Fisheries Fund is 8.6 billion euro (EU + national budgets). The EU contribution amounts to 6.4 billion euro and is aimed not only at reinforcing the renewed CFP, bringing fishing activities and aquaculture to profitable business [Vdovenko, 2016]. There is 5.7 billion euro from these funds using in general management. The EMFF operates on the basis of six main priorities. There are main blocks: 1. Sustainable fishing (26,9%). Forecast of balance between fishing capacities and available natural resources, fish extraction in a selective way, cessation of fish catch caught as by--catch, which is not a target fishery [Vdovenko, 2016]. 2. Sustainable aquaculture (21%). Directed to make the sector profitable and competitive with a focus on improving the quality of products, human health, and the production of ecologically safe aquaculture products. It is also intended to provide consumers with high-quality, nutritious and trustworthy fish products [Vdovenko, 2016; http://ec.europa.eu/fisheries/cfp/emff/index_en.htm]. 3. Introduction of the provisions of the updated Common Fisheries Policy of the European Union (19.1%). Improvement of the procedure for collecting information, scientific knowledge, and fisheries legislation in terms of control and application of legal acts [Vdovenko, 2016]. 4. Marketing and processing (17.6%). Improvement of market organization, market infrastructure, coverage of market information and informing

consumers about the state of the world's largest fish and seafood market [Vdovenko, 2016]. Population employment and strengthening the unity of territories (9%). Assistance is provided to coastal fishing communities and engaged in fishing in inland water bodies. Providing communities with aquaculture activities. Growth of income from activities in fisheries and aquaculture. Diversification of national economies into other areas of maritime business, including the provision of recreational services [Vdovenko, 2015]. Integrated maritime policy (1.2%). Improve knowledge in the field of marine science. Obviously, planning of marine activities is important, promoting cooperation in marine monitoring and management of sea basins in accordance to their basins' needs in current conditions. The remaining 5.1% relates to technical assistance.

Therefore, we have an opportunity to make conclusion that, beyond these priorities, the European Maritime and Fisheries Fund does not determine how funds should be used and appoints an appropriate share of the budget to each country. It should be noted that the management of the EMFF remains the question of choosing business projects and decisions to improve the functioning of the economy for each local organization and any national competent authorities. The costs of the European Maritime and Fisheries Fund are used to finance projects, in addition to national funding. Each country receives a share of the fund's total budget in proportion to its fishing sector and prepares an operational program indicating how the funds would be spent. The national authorities decide on which projects to fund after approved by the Commission. The national authorities are responsible for implementing the program. However, as highlighted by the study, the statement confirms that in order to access the funding from the European Maritime and Fisheries Fund, it is necessary: a) to verify that the project is eligible for funding; b) consult with the national authority; c) comply with the relevant application procedure so that the managing authority can control the eligibility of the project and see if it meets the selection criteria and investment priorities. At present, the European Union has adopted an investment program for maritime sectors, fishery and aquaculture for different EU Member States.

As studies have shown EMFF, in this regard, would seek to maximize cooperation and synergies from usage of different funds and would create optimal conditions for economic recovery, so that local businesses and communities be able to work together in order to create a bright, blue and sustainable future of European seas and coast.

Functioning of the EMFF evidently promotes:
- European fish industry receives support to facilitate the implementation of reforms and overcome informational gaps;

- European farmers, farmers who produce fish products and farmers who process fish receive funding for introduction of new technologies, modern equipment, raise standards of health and environmental attitudes or diversify their activities towards the usage of new aquaculture facilities and new open-air markets;

- Public authorities receive support in strengthening and improving the system for collecting information and compliance with their obligations to control fishing activities;

- Producers' organizations, professional organizations receive support temporary until 2019, to ensure the storage of their products in cases where market demand is too limited. Manufacturers have an opportunity to receive financing for their production and marketing plans for the long term in the conditions of transformation processes. As a result of the introduction of such plans, the processing industry is going to be benefit from the stable supply of products from wild and raised fish. The consumer has an opportunity to gain access to healthy, nutritious and sustainable crops or fish and fish products grown under constant conditions. As seen from the analysis, the practical introduction of these measures are going to improve the level of informing the consumer about grown, caught fish and products produced from it. Selective financing of selective fishing is effective in the process of local growth and development. Scientists and researchers are going to receive funding for exploration in the areas of fisheries management, ocean management, impacts of climate changes, coastal protection, marine economies etc. Private companies which are close to the shore or are away from it are going to receive support in way of introduction green technologies.

A key element of the EU's CFP is the gradual by-catches reduction of non-target species of fish – an economically ineffective practice that makes a significant contribution to reducing stocks. Therefore, to unload all caught fish without exception are required from fishermen and assistance will promote landing, processing and marketing of such products. At the same time, fishermen will be able to receive the funding for attempts to use fishing gear which minimize an environmental impact and provides what fishers exactly want to catch (desirable, target species). The Council were adopted Regulation (EU) No. 1303/2013 in December 2013, for better usage of European Structural Funds and investment funds, which includes financial instruments for implementation policy of cohesion, rural and fisheries development.

Thus, in the European Union common provisions were adopted in order to optimize the impact of structural funds and European investments, which include financial instruments for implementation rural development and fisheries policies.

17.5. Results of aquaculture producers activities on the possibilities of provisions' implementation of the Common Agricultural and Fisheries Policy of the EU in fisheries during AGRO-2018

There was a survey of aquaculture actors that were engaged into pond, crop, basin fish cultivation and production in recirculational fish farms during the annual AGRO-2018 exhibition in Ukraine. This survey was conducted in order to identify opportunities for reducing the cost of aquaculture production, simplifying business at aquaculture field and improving the investment environment for fish farms in the context of implementing the provisions of the Common Agricultural and Fisheries Policy of the EU in Ukraine.
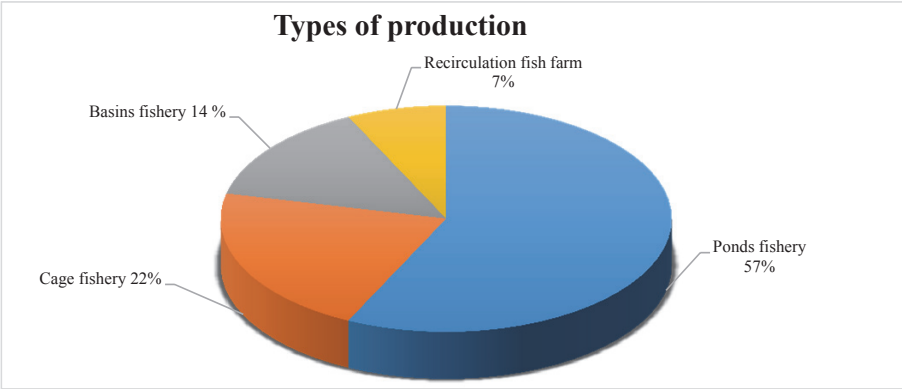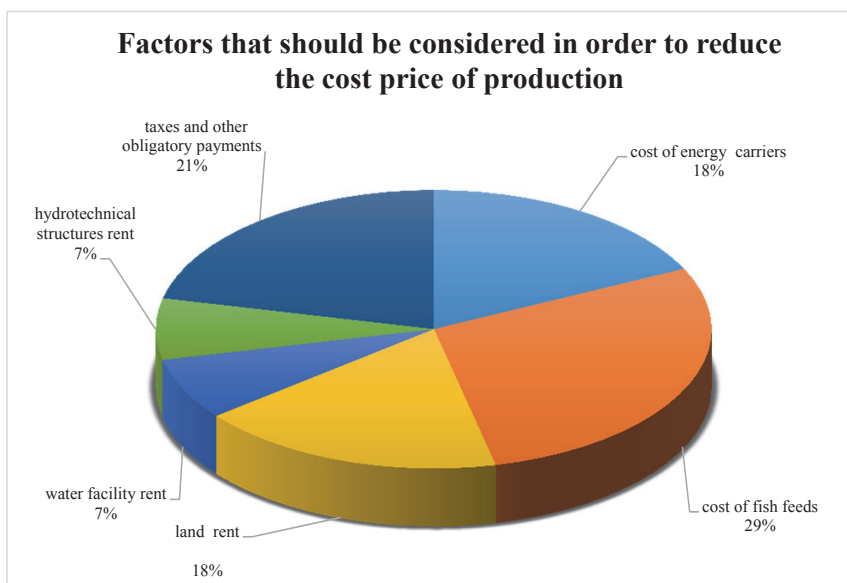

The factors which affect to the cost price of commodities in aquaculture include: cost of energy carriers; fish feeds; fish-plant material; land rent, water facility rent, hydrotechnical structures rent, operating costs, taxes and other obligatory payments and other costs.

As established the following costs are most affected by the cost of production: cost of energy resources (28%), fish feed (28%) and land rent. The rent for hydraulic engineering (7%) and operating costs (3%) have the smallest impact. According to results of research it was found that in order to reduce the cost of fish products in fish farms, the following factors should be reduced firstly: feed costs (29%), taxes (21%), land rent (18%) and energy resources (18%).

Factors that affect to the cost price of production

- operation costs 3%
- cost of energy carriers 28%
- cost of fish feeds 28%
- land rent 14%
- water facility rent 10%
- hydrotechnical structures rent 7%
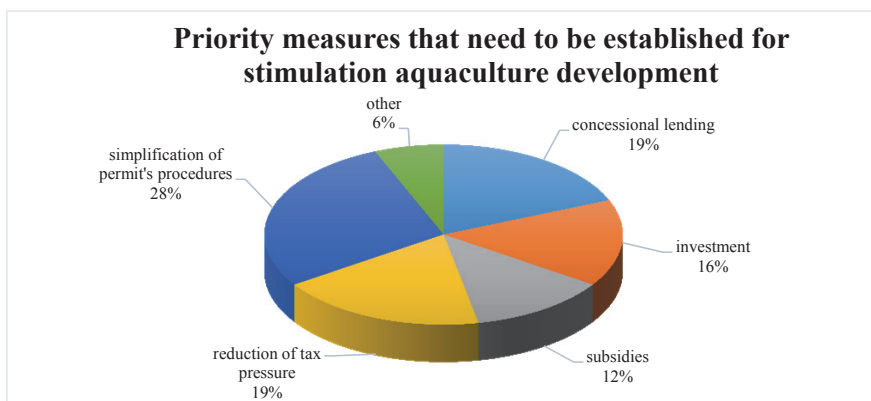- taxes and other obligatory payments 10%
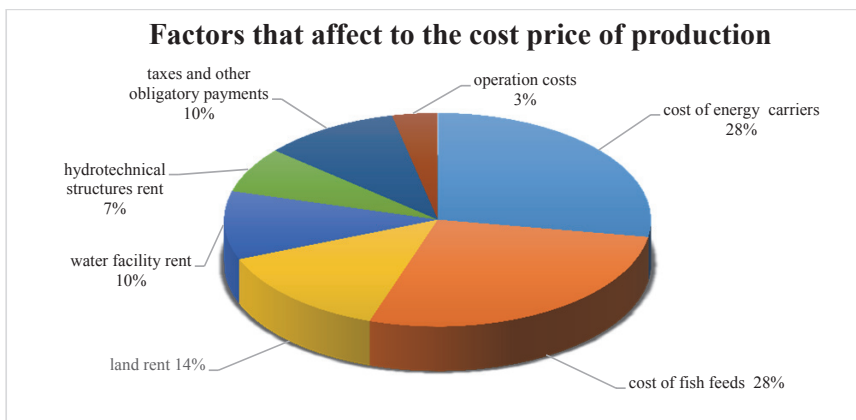
Producers (41%) have responded that firstly it is necessary to build the state fodders plants to production of high-grade feed for different types of fish in the context of determining the possibilities of reducing share of feed costs. At the same time, 41% of producers believe that it is necessary to provide fishery subsidies on the development of own fodder production, and 18% of producers indicate that it is necessary to reduce taxation. For example, the subsidy affects to reduction of the cost price in the EU-countries. The part of the cost of feeds which has been spent on production is reimbursed by the state in this case.

Factors that should be considered in order to reduce the cost price of production

- cost of energy carriers 18%
- cost of fish feeds 29%
- land rent 18%
- water facility rent 7%
- hydrotechnical structures rent 7%
- taxes and other obligatory payments 21%

According to 62% of respondents in order to reduce energy resources expenses energy-saving technologies need to be established at aquaculture enterprises. At the same time, 38% of respondents believe that the share of expenses can be reduced by lowering the tariffs. In the course of the analysis was established that it is possible to reduce operating costs during the mechanization and automation of production processes in process of production of aquaculture products (67%).

More than 80% of respondents believe that the current legislation needs to be clarified for aquaculture sphere in order to reduce the cost of production. There were identified next changes and additions for current legislation: a) simplification of obtaining documents' package for fishing activities; b) legislative acts to promotion the development of own feed production; c) improvement of customs policy in relation to fish feeds, fish-plant material and equipment; d) reduction of administrative procedures when issuing permits. In order to stimulate the development of aquaculture from the proposed solutions simplification of permit's procedures were placed by the respondents (28%) at the first place; the second place were divided between concessional lending and tax reduction (19%), investment took the third place (16%) and fisheries subsidies (12%) at the fourth place.

Priority measures that need to be established for stimulation aquaculture development

other 6%
concessional lending 19%
simplification of permit's procedures 28%
investment 16%
reduction of tax pressure 19%
subsidies 12%

According to producers' opinions, the most attractive and economically advantageous objects among aquaculture are: carp species (carp – 25%, herbivorous – 21%). The next place is going to sturgeon and catfish (18%), and salmon has approximately 11%.

The most attractive and economically profitable production of aquaculture objects for nowadays

others (molluscs, crustaceans) 7%

carp 25%

catfish 18%

salmon 11%

sturgeon 18%

herbivorous 21%
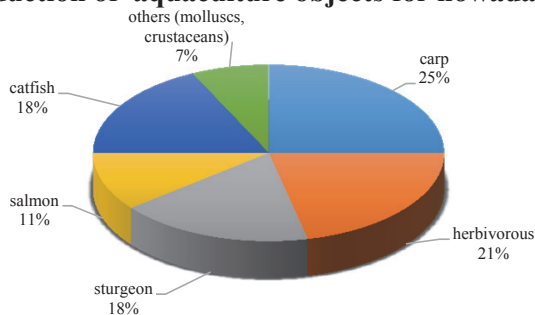
It was established that the most attractive and economically profitable for aquaculture business remains pond aquaculture (29%), the next one is production in aquaculture recirculating systems (25%), the basins fisheries (17%) and the last one is the cage aquaculture (13%).

Branches of aquaculture that are the most attractive and economically beneficial for business nowadays

Others 4%

Mariculture 4%

Recreational 8%

Recirculation fish farm 25%

Ponds aquaculture 29%

Cage aquaculture 13%

Basins fisheries 17%
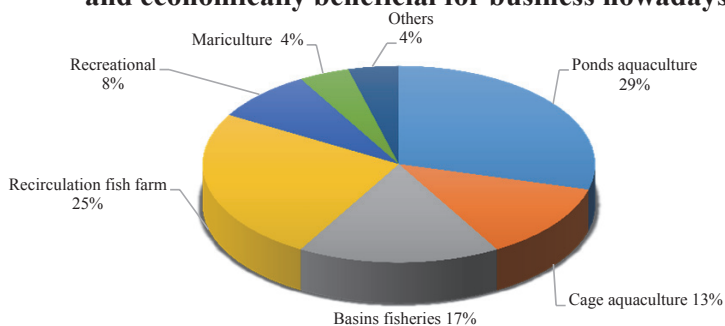
Producers consider that the main reasons that hamper the development of Ukrainian aquaculture are corruption, tax pressure, weak banking system, customs policy, lack of state support, high expenses of fish feeds, equipment and fish-planting materials etc. The study and assessment of global subsidies in the fisheries sector indicate that the domestic industry is only at the beginning of its development in the context of assessing the content and implications of usage fisheries subsidies as a tool for competitive advantages and direct government support. Europe has the highest level of subsidization among all major fisheries actors as well as the integrated fisheries and aquaculture (26%), followed by Japan (21%) and China (20.7%).

Considering the specifics of this particular research, it is worth differentiating the methodological approaches to estimation of results of aquaculture producers activities on the possibilities of provisions' implementation Common Agricultural and Fisheries Policy on the micro- and macrolevels.

Thus, on its microlevel the proposed here methodology includes the construction of integral subindices which would later help estimating the aquaculture producers activities on the possibilities of provisions' for national enterprises of the agrarian and industrial sectors as well as for those working in the social sector. The mentioned here indices would be calculated on the basis of the Kharazishvili-Zalizko algorithm (more – in the author's previous work on this algorithm [Zalizko, Martynenkov, 2016; Zalizko, 2017]. This universal algorithm includes the following steps:

1. To form an open dynamic system of indicators which, for the convenience purposes, can be written down by means of the matrix method, for example:

$$\Psi_k = \begin{pmatrix} \varphi_{11} & \varphi_{12} & \cdots & \varphi_{1j} \\ \varphi_{21} & \varphi_{21} & \cdots & \varphi_{2j} \\ \cdots & \cdots & \cdots & \cdots \\ \varphi_{k1} & \varphi_{k2} & \cdots & \varphi_{kj} \end{pmatrix}, \quad k, j \in N. \tag{1}$$

Quantity of elements in such a system can be different and depends on the availability of statistics data and specifics of each stage in evaluation.

2. Using the method of comparison with the reference value, all statistical values are normalized to be further used in the dynamic series of integral indices, applying formula (2).

$$z_i = \begin{cases} \dfrac{x_i}{x_{i,\max}}, & if \ x_i \ is \ the \ stimulator, \ i \in N, \ x_{i,\max} \neq 0; \\ \dfrac{x_{i,\min}}{x_i}, & if \ x_i \ is \ the \ destimulator, \ i \in N, \ x_i \neq 0; \end{cases} \tag{2}$$

where z_i – the normalized statistical values of the indicators x_i; $x_{i,\min}$ and $x_{i,\max}$ – the smallest and the biggest values, accordingly. In the case if some of the indicators in the dynamic statistical series are equal to zero or are negative, we suggest shifting the statistical axis by several scale units, so that the inequality $x_i > 0$ is satisfied. As a result of normalizing we get the values within the interval (0; 1) keeping the accuracy of estimations.

3. Then we can find the vector matrix of dispersions D_i and the matrices of the absolute values of the factor load A_i, using the axis rotation and quartimax normalization, so that to set simple correlations between the related variables and

factors, separately for each group of indicators (depending on the level of a particular research).

For this matrices A_i and D_i are to be determined by means of the following formulae:

$$
A_i = \begin{pmatrix} a_{11} & a_{12} & ... & a_{1j} \\ a_{21} & a_{21} & ... & a_{2j} \\ ... & ... & ... & ... \\ a_{j1} & a_{j2} & ... & a_{jj} \end{pmatrix}, \quad D_i = \begin{pmatrix} d_1 \\ d_2 \\ .... \\ d_j \end{pmatrix} i, \; j \in N,
$$

where a_{jj} – the absolute values of elements in the matrix after the axis rotation and quartimax normalization; d_j – the values of dispersion (i, j – quantity of groups and indicators, respectively).

4. Then we find the weight of influence for each factor for further estimation of results of aquaculture producers activities on the possibilities of provisions' implementation Common Agricultural and Fisheries Policy on the microlevels. For this, we form the following matrix Ω_i :

$$
\Omega_i = A_i \times D_i = \begin{pmatrix} d_1 a_{11} + d_2 a_{12} + ... + d_j a_{1j} \\ d_1 a_{21} + d_2 a_{22} + ... + d_j a_{2j} \\ .... \\ d_1 a_{j1} + d_2 a_{j2} + ... + d_j a_{jj} \end{pmatrix}.
$$

Then we can form the matrix of weights for each of the factors:

$$
Y_i^{(1)} := k Y_i, \quad k = \left(\sum_j \alpha_j \right)^{-1}.
$$

This enables the final estimation of scalar values of the estimated integral index and the related subindices in the multiplicative form (3):

$$
I = \prod_{j=1}^{n} z_j^{\alpha_j}, \quad \sum_j \alpha_j = 1, \quad \alpha_j > 0, \; n \in N.
$$

(3)

5. After that we carry out the integral convolution in two stages: first – for separate groups of indicators, second – on the level of integral indices of groups. This process involves using the principal components method for determining the weight coefficients, and also T criterion – for grounding the margin values and some other features as well as the multiplicative form of the integral index and its key components which enables presentation of the final values in the dynamic series as tables.

Moreover, this algorithm allows you to evaluate rural development programmes based on the needs of their areas and focus on at least 5 EU's common priorities:

- promote knowledge and innovation in agriculture and forestry industries, rural areas;
- increase the profitability and competitiveness of all types of agriculture and promote an innovative agrarian technology;
- promote food chain organization, animal welfare and risk management in agriculture and fisheries industries;
- restore, preserve and enhance the ecosystems associated with agriculture and forestry industries;
- promote the efficient usage of resources and support the transfer to a low carbon economy prepared for climate change in agricultural industries.

17.6. Summary and conclusions

Consequently, we have reasons to make the following conclusions: a) priority tasks for searching the ways to raise the level of competitiveness of the fish industry are to establish effective interaction between producers, consumers, financial and credit system in order to make decisions that would maximally satisfy the economic interests of all entities in relation with sphere of aquaculture; b) for promotion an aquaculture development it is important to improve the customs policy on fish feeds for usage by fisheries actors in the field of aquaculture and establish a concessional lending in that field under conditions of implementation the basic principles of the Common Fisheries Policy; c) for optimization activity of fisheries actors its expedient to establish fixed minimum rent amount for land plots which are used for fish production in the context of the EU-Ukraine Association Agreement; d) to improve the effectiveness of estimation of results of aquaculture producers activities on the possibilities of provisions' implementation CAP and CFP it is necessary to more widely apply the economics and mathematical apparatus, in particular, the algorithm that is presented in the study.

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18. Direct producer support measures and level of harmonization with Common Agricultural Policy in Bosnia and Herzegovina

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Abstract

This paper aims to analyse the level, structure and number of direct payment schemes, the achieved level of harmonization with the common agricultural policy (CAP), and to point out the threats and challenges of the agricultural sector in Bosnia and Herzegovina (B&H). The complexity of the political system in B&H has negative effect on the overall economic development of the country, and especially on sensitive sectors such as agriculture. As a result, agricultural policy in B&H shows great deviations from the foreseen objectives, which are often changed without clearly defined development goals. This is also reflected in the fact that direct support is the most important form of support for agricultural producers in B&H. In the structure of direct payments, considerably higher share of payments is per output than per hectare/livestock unit. Although B&H as a clear objective has European integration and harmonization of agricultural policy with the CAP, this process is slow, with no visible signs, without political readiness for faster improvement, and will in the future require significant changes.

**Keywords:** direct payments, agricultural policy, harmonization, CAP, B&H

JEL codes: Q18, Q14, E60

18.1. Introduction

Bosnia and Herzegovina (B&H) is a mountainous country, with 62% of the land 700 m above sea level, and exposed to the influences of the continental and Mediterranean climate. Diversity in weather and natural conditions makes agricultural production highly diversified, ranging from fruit production, vineyards, vegetable and crop production, animal husbandry, beekeeping, etc. Traditional production without the use of chemicals and heavy machinery preserved soil fertility, while available labour force, small and mixed farms make B&H

suitable for agricultural and related activities [FMAWMF, 2015]. On the contrary, the complexity of the political system in B&H has negatively reflected the overall development of the economy, and more particularly sensitive sectors such as agriculture [Bajramović et al., 2006; Bajramović et al., 2014 cited in Volk et al., 2014; Bajramović and Nikolić, 2014]. The war, which broke out in 1992, ended by the Peace Accords, agreed in Dayton (USA) and signed on 15th of December 1995 in Paris. The Peace Accords defined the Constitution of B&H and established a complex state (Figure 1), composed of two entities and one State District. Federation of Bosnia and Herzegovina (FB&H) with 51,08% of the territory, Republic of Srpska (RS) with 48,92% of the territory, and after arbitration – District Brčko (DB) was officially established on March 8, 2000, one year after an arbitration process. The territory of the District belongs simultaneously to both entities, the RS and the FB&H. A complex administrative structure has the effect that agrarian policy is implemented at several levels. Agrarian policy at the State-level is limited, where it is competent only for foreign trade policy (including the exchange of agricultural commodities).

Figure 1. Administrative structure of Bosnia and Herzegovina
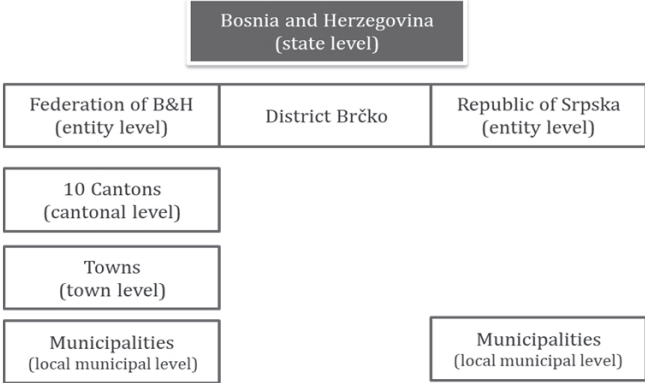
Majority of the agricultural policy problems are related to the lack of adequate institutional-regulatory frameworks and the selection of strategic directions. It is most often mentioned that B&H must continue to work on market consolidation, institutional building, harmonization of laws and regulations, improving data collection systems, increasing financial resources, capacity building, etc. [Vittuari, 2011]. These problems are manifested in the foreign trade deficit of agricultural production, the low growth rate in the agricultural sector, the lowest average salaries in the region, as well as the very high unemployment rate [MOFTER, 2017, WB, 2017]. In addition, the low level of technical-technological equipment of agri-

cultural holdings, low level of innovation as well as competitive advantages imply that agriculture and the accompanying sectors require rooted and systematic reforms to achieve some notable improvements. Although the strategic direction of B&H is European integration and the harmonization of agricultural policy with the requirements of the Common Agricultural Policy (CAP), this process is very slow, without visible signs of political readiness for improvement. The lack of institutional structures results in a loss of significant financial resources that could be used for the improvement of the agricultural and accompanying sectors.

The agricultural sector of Bosnia and Herzegovina is in the responsibility of various administrative units (Figure 1), entities, cantons and municipalities. None of the above mentioned administrative units shows significant changes in the process of policy-making and shows the limited application of contemporary approaches. In such conditions, agricultural policies are created where the majority of budgetary support is used for direct support measures for producers. In the structure of direct payments, there is a significantly higher share of payments per output than payments per area, which in the context of European integration is the measure that EU left a long time ago. The aim of this paper is to: (i) analyse the level, structure and number of measures within direct payments support; (ii) analyse the compliance of B&H agricultural policy with CAP requirements; (iii) identify the threats and challenges that the agricultural sector faces.

18.2. Materials and methods

An analysis of agricultural policy in B&H was carried out for the period 2010-2017. Data for this study were collected on the basis of an overview of public and internal documents of the responsible institutions. The methodology used in this study is the APM (Agri-Policy Measures), developed by Rednak and Volk [2010]. The main characteristic of this methodology is a uniform classification of agricultural support. This methodological framework is based on the use of the EU-based support concept with pillars and axes for a higher level of aggregation and the OECD (Organisation for Economic Co-operation and Development) PSE (Producer Support Estimate) classification for lower aggregation levels. The above-mentioned pillars relate to (i) market and direct producers support measures, (ii) structural and rural development measures, and (iii) general measures related to agriculture.

As agricultural policy, measures and support for rural development in B&H is under the jurisdiction of entities and district, so an analysis of budget support is done for entities (Federation of Bosnia and Herzegovina and Republika Srpska), and for District (District Brčko), as well as for overall country of Bosnia and Herzegovina.

18.3. Economic and agricultural development of the country

The current economic and political situation in the country is described by the extremely high unemployment rate and unsatisfactory GDP growth (Figure 2).

Figure 2. Main macroeconomic indicators
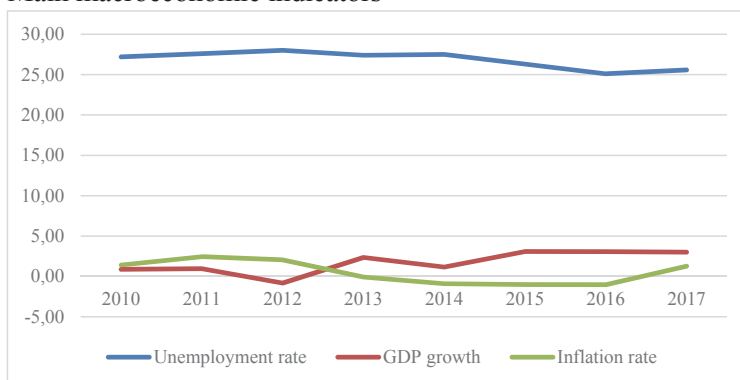
Source: WB, 2018; available on: https://data.worldbank.org/country/bosnia-and-herzegovina access: 5/4/2018.

Agriculture and agricultural production have always been an important sector in the overall development of the country, and importance is reflected in the employment of the population, contribution to the gross value added (GVA), trade exchange, etc. The number of employed in this sector in 2016 was 18% (registered and unregistered agricultural holdings), while the gross added value of agriculture, along with forestry and fishing, is growing in absolute terms but in relative decline, due to the significant growth of GVA of other sectors. The annual trade deficit is increasing year by year, due to a significant increase in imports of food of products, while export is also increasing but with smaller growth.

Figure 3. Agriculture in the economy
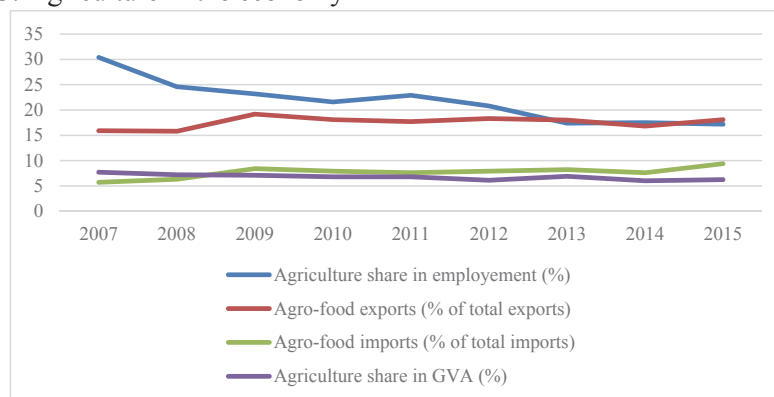
Source: MOFTER, 2017.

The negative macroeconomic image is partly the result of a complex political environment, and in the same time, the complex political environment is manifested in the fact that agricultural policy in B&H is under the jurisdiction of different administrative levels. The establishment of institutions responsible for policy--making at the state level was initiated by the adoption of the B&H Strategic Plan for Harmonization of Agriculture, Food and Rural Development (2008-2010). Within the same document, operational programs were prepared for B&H, FB&H, RS, and they should lead to the harmonization of policies with EU standards. Unfortunately, agricultural policy in Bosnia and Herzegovina shows a great deviation from its intended goals, and it has often changed without clearly defined development goals and elements of modern business policy-making that are based on monitoring and evidence-based evaluation and assessment [Bajramović et al., 2014; 2016]. There are no real reforms, although strategic documents have been adopted with a clear commitment to the harmonization with the EU and CAP requirements. As a result of disharmonized policy managed by different administrative units, competitiveness of agricultural producers is endangered. At the State level, there is no ministry of agriculture, so the jurisdiction for the development of the sector has been transferred to the entity, cantonal and municipal levels. Each of the above levels has its own budget, its own support measures, and ways to provide support.

18.4. Budgetary support to the agricultural sector

The current agricultural policy in B&H is regulated by the strategic documents at the Entity level, Medium-term Strategy for Agricultural Sector Development in the Federation of Bosnia and Herzegovina for the period 2015-2019, and Strategic Plan for Agricultural and Rural Development of the Republika of Srpska for the period 2016-2020, while in District Brčko there is no such document[1]. Given the fact that agricultural policies (the number of budget transfers, types of measures, implementation criteria, etc.) are under the jurisdiction of entities and the District, the analysis in this paper will be addressed individually for each of the administrative units, and overall country. The focus of this work will be the analysis of direct payments as the dominant form of support in B&H. Agricultural policy support measures in Bosnia and Herzegovina are divided into three pillars, the three groups of measures that are identical to the EU model of agrarian support. The first pillar is the one that consists group of measures named Market and direct producer support measures, the second pillar is the Structural and rural development

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[1] Although a Strategy for Agriculture, Food and Rural Development of Brčko District for the period 2008-2013 has been drafted, it has never been sent to the official adoption procedure. Under the patronage of FAO, the new Strategy for Agriculture, Food and Rural Development of Brčko District for the period 2019-2024 is currently under development.

measures, and the third one General measures related to the agriculture. As a result of the high foreign trade deficit and the high level of unused agricultural land, the stimulus to increase production volume has become a priority task of agrarian policy in Bosnia and Herzegovina. Under these conditions, direct payments become the main and almost the only support measure to which 90% of the total funds from the agricultural budget of B&H are allocated. This type of support has a positive character for agricultural producers in the short term, in the long run, this model is not sustainable and has been abandoned in EU a long time ago. In addition, in a case of bad weather conditions or the occurrence of some diseases when agricultural output is significantly reduced, consequently the amount of support is reduced and the position of agricultural producers are further threatened.

In this paper, overall budgetary support structure, structure and type of direct producer support measures, and structure of direct payments schemes will be presented for overall country, as well as for entities, for the period 2010--2017. The main feature of the agricultural budget in B&H is the lack of consistency as shown in figure 4.

Figure 4. Overview of budgetary support in agriculture in B&H (million of euros), 2010-2017
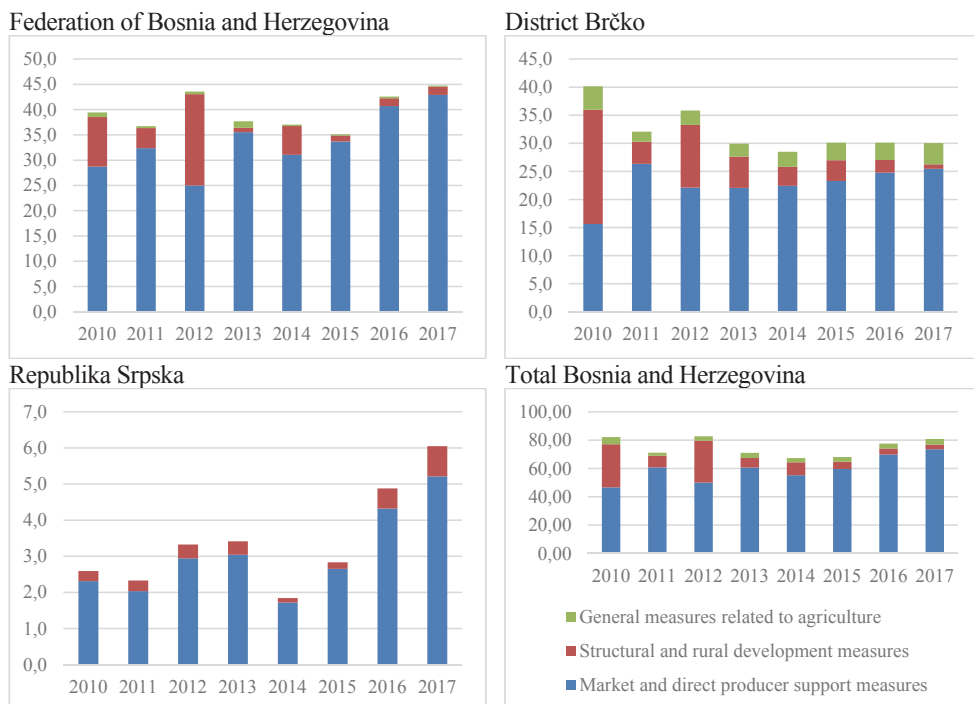
Source: Bosnia and Herzegovina APM Database.

The first pillar (Market and direct support measures) represents the majority of total budgetary support in Bosnia and Herzegovina, which arise from 57% in 2010 to 91% in 2017. The second pillar, measures related to structural and rural development measures, which represent 37% support in 2010 but dropped significantly in 2017 to only 4%. General support measures in agriculture (third pillar) are of less importance with an average share of 4.6% in the observed period. Reduced amounts of total budget support in certain years did not have a significant impact on direct support to producers. On the contrary, direct support to producers increased in the period 2010-2017, indicating that this measure is a priority support instrument in the agricultural sector in Bosnia and Herzegovina [Volk et al., 2017].

In the Federation of Bosnia and Herzegovina, the total budget support achieved the largest amount in 2017, worth 44.8 million EUR, and the lowest in 2015 with 35.1 million EUR. Market and direct producer support measures represent the majority of total budget support in the FB&H, which varies from 25 million EUR in 2012 to 43 million EUR in 2017. The average relative share of this group of measures in total support in the period 2010-2017 amounted up to 85.5%. Structural and rural development measures share in overall budget support clearly shows the less importance comparing to the first pillar measures. This group of measures is also characterized by a high variation, from 18 million EUR in 2012 to 0.9 million EUR in 2013 and a percentage share of total support ranged from 41% in 2012 to only 2% in 2013. Overall, measures for rural development have declined in recent years, mainly as a result of the current economic crisis. The lowest percentage of total support has a third pillar, General measures related to agriculture with the average share of 1.3%.

In the Republika Srpska, total transfers to the agri-food sector in the observed period decreased from 40 million EUR in 2010 to 30 million EUR in 2017. Except for 2010, when the measure of the market and direct support represents half of the total support. In the other observed period, this measure was a major part of overall agricultural support. The absolute value of market and direct support measures for producers varied between 15.6 million EUR in 2010 and 26.4 million EUR in 2011 and their relative ratio ranged from 39% (in 2010) to 85% (in 2017). Support for the second pillar, rural development measures has significant fluctuations, from 20.3 million EUR in 2010 to just 0.8 million EUR in 2017. In relative terms, rural development measures accounted for about 51% in 2010, or 31% in 2012 and decline to 2.6% of total budget support in 2017. General support measures have a much greater share in the Republika Srpska than in the Federation of Bosnia and Herzegovina, with 9% of the total budget support on average.

Inconsistency in agricultural support during the observed period is also present in the District Brčko. Amount of support varies from year to year and range from 1.8 million EUR in 2014 to 6 million EUR in 2017. The largest amounts of support relate to direct payment measures and account for about 90% of total agricultural support. Rural development measures account for very small amounts in all years of the observed period, from 0.1 million EUR in 2014 to 0.8 million EUR in 2017. Third pillar, general support measures in agriculture does not exist in District Brčko.

18.5. Direct producer support measures

The most important form of agricultural support in Bosnia and Herzegovina is direct producer support measures. It consists of direct support based on output, payments based on area or animal numbers and payments for variable inputs. The number of these measures varies between the entities, and in 2017 there were 21 schemes in FB&H, 21 in RS and 23 in BD. This does not mean 65 different schemes in the country, but the conditions of implementation are different in the entities and district, although it is about the same type of measures[2]. Compared with the initial year of the observed period (2010), the total number of direct producer support measures has changed over the years and has generally increased in all administrative units except in 2017. Following table represent type and number of direct producer support schemes in Federation of Bosnia and Herzegovina, Republika Srpska and District Brčko.

Table 1. Number of implemented direct farm support schemes by type of payment

| Type of payment	Federation of B&H		Republika Srpska		District Brčko	
	2010	2017	2010	2017	2010	2017
Output payments	9	2	7	9	0	0
Area payments	3	10	1	1	6	10
Payments per animal	8	9	9	10	10	13
Input subsidies	0	0	0	1	0	0
Direct payments (total)	21	21	17	21	16	23

Source: Bosnia and Herzegovina APM Database.

The total direct producer support (Figure 5) in B&H in 2010 amounted to 41.7 million EUR and increase up to 73.2 million EUR in 2017, which is also the highest amount of support so far. The largest share of direct producer support had direct payments ranging from 68% to 97%. The remaining support was paid in the form of subsidies for inputs.

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[2] I.e. support of milk production in FB&H and RS is based on output payments while in BD is based on payments per animal.

Figure 5. Overview of direct producer support in B&H (million of euros), between 2010 and 2017
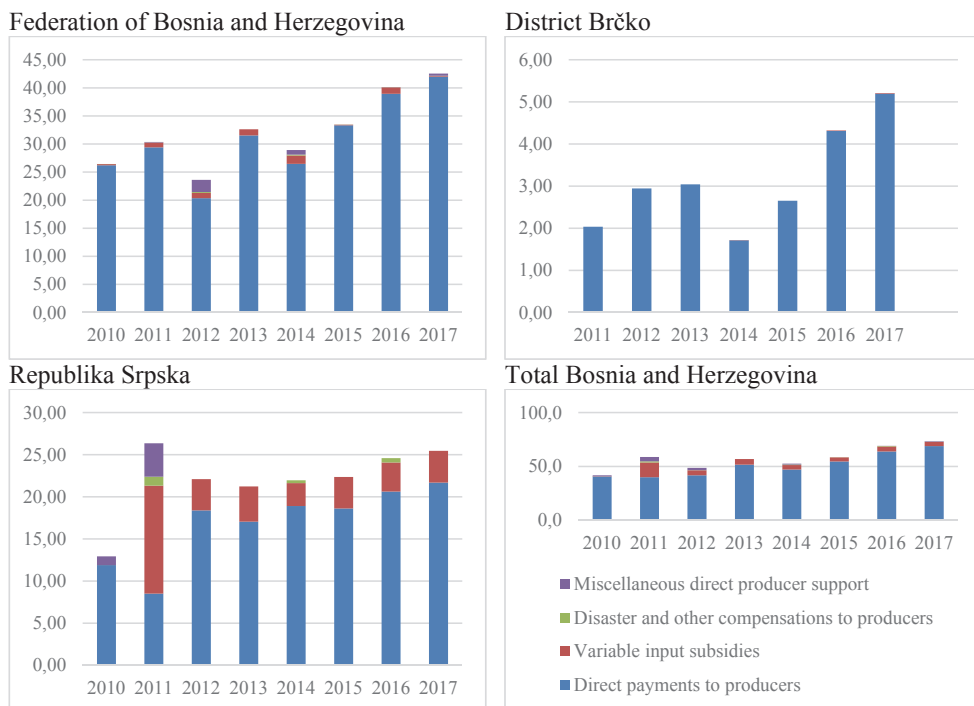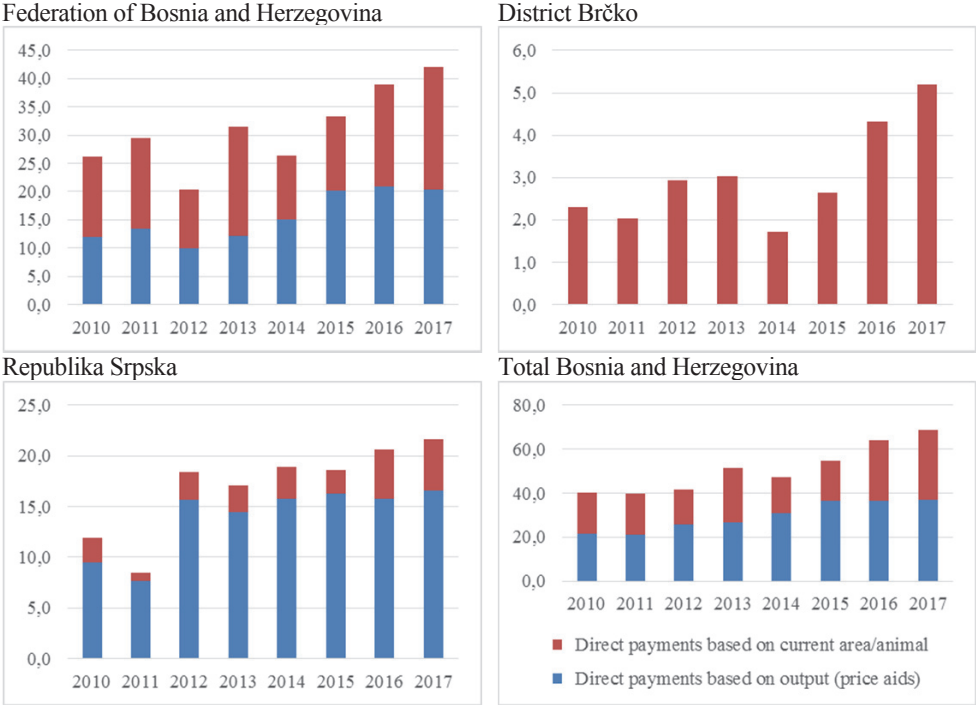

Source: Bosnia and Herzegovina APM Database.

When it comes to entities, in the Federation B&H direct producer support ranged from 24 million EUR in 2012 to 42.6 million EUR in 2017. In the support structure, the entire amount goes to direct payments (FB&H) while in the RS there is a slightly different percentage. In the first years of the observed period, significant fluctuations occurred in RS, when in 2011 support is increased by 100% compared to 2010, and the increase was from 13 million EUR to 26.4 million EUR. Over the next few years, there were no major changes and the amounts came down to 23 million EUR. Unlike the Federation of Bosnia and Herzegovina, the share of the measures of subsidizing variable inputs in RS is considerably higher and it is about 4 million EUR in 2017, while in 2011 was up to 12 million EUR, which significantly contributed to the increase in the total amount of direct support measures in that year. Direct support measures in District Brčko also feature oscillations in the observed period. Significant difference compared to the other two entities is that the DB does not have support measures for output payment and subsidize inputs. The transition in DB to direct payments based on area payment and payment per animal was made in 2009.

18.6. Direct payments

In Federation of Bosnia and Herzegovina, measures of direct payments are divided into two groups, output payment and area payment/payment per animal, and they have almost the same percentage of share during the observed period. However, in the last years of the observed period output payment have a greater share in overall direct payments which is totally opposite from a chosen direction and commitment toward harmonization with the Common Agricultural Policy. In RS output payments over the entire period had a significantly higher share (76% in 2017 to 90% in 2011) comparing to the other type of direct payments. It is important to note that the highest amount of output payment is paid for one product and that is milk. The corresponding support for this production in 2017 makes up to 48% of the total budget support in Bosnia and Herzegovina. Other products or groups of products with the most significant support are wheat 7%, beef meat 7%, fruit 5%, pig meat 3% [MOFTER, 2017].

Figure 6. Overview of direct payments for producers in B&H (million of euros), 2010-2017

Federation of Bosnia and Herzegovina

District Brčko

Republika Srpska

Total Bosnia and Herzegovina

■ Direct payments based on current area/animal
■ Direct payments based on output (price aids)

Source: Bosnia and Herzegovina APM Database.

18.7. Summary and conclusions

Bosnia and Herzegovina has a very heterogeneous agricultural policy in three administrative units because they all have the power to design, adopt and implement their own policy measures. Agricultural policies differ between administrative units in terms of implemented measures as well as in the targeted sectors. The analyses show that production-related payments are still playing a major role in the structure of agricultural support in Bosnia and Herzegovina. This is opposed to the philosophy of CAP, which implies that future agricultural policy in the Bosnia and Herzegovina will have to change and adjust, especially in a case of the successful accession of Bosnia and Herzegovina to the European Union. The current support programs for agricultural production in Bosnia and Herzegovina have minimal or virtually no effects, which is best described with the total available and unused agricultural areas – over 50%. As most of the cultivated areas are located in rural areas, it is obvious that the focus of agricultural support should be the measures of support for rural development. To support above mentioned, there is a trend of high depopulation rate, aging population, low employment rate and poor socio-economic situation in the rural areas. Restructuring of support measures with the aim of improving market position, adequate protection of production/producers, availability of favourable loans (longer repayment period, appropriate grace period, etc.) is just some of the activities that are necessary to undertake in order to overcome the current problems. These changes in policy will serve as a stimulant and the catalyst for the further development of agriculture, as well as the accompanying sectors – ecotourism, food industry, wood industry, etc.

B&H has a strategic approach to EU integration and that means adapting the institutional and legal framework to the requirements of the European Union. Much of this adaptation relates to the agricultural sector, so it is of utmost importance to adapt the instruments of support to the EU and CAP requirements, and bearing in mind that it is very important to consider further CAP changes expected in the post-2020 period. Due to the global pressure, major social problems, the current EU and CAP funds could be revised and reduced. Also, EU desires and aspirations will probably continue to be measures that have a minor distorting effect, support for productions using renewable energy sources that have a lesser negative impact on the environment and society, as well as measures that stimulate the development of rural regions to fight back issues of migration, depopulation and decreasing of living standards. Although the current measure of direct payments support is also the dominant EU support aspect and accounts for more than 70% of total CAP allocations, and almost 30% of the overall EU budget, this measure is recognized as unsustainable and the EU tries to reduce its share in the

country member support models. This model of support is considered ineffective as a tool to address issues such as food availability, risk management, efficient use of resources, environmental protection and rural development.

B&H on its way toward the EU, and with the aim of creating an environment where political stability and sustainable socio-economic development become strategical direction must continue to work on income stability, improving business environment conditions, strengthening competitiveness of agriculture, forestry and rural areas, increasing investment levels, improving knowledge transfer, promoting innovation, improving market orientation of agricultural and food products, improving quality and product safety, strengthening linkages within value chains and sustainable management of natural resources.

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19. The Hungarian and Polish agricultural trade in the light of CAP budgetary restrictions

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Abstract

Agriculture plays an important role in both the Hungarian and Polish economy. Although Hungary has significant agricultural trade plus far before the accession to the EU, while Poland turned to be net exporter only in 2003, right before it joined the Union. Its trade surplus has remarkably increased and stabilized around 7-9 billion USD in the last couple of years (WTO database).

The agricultural sector is heavily dependent on CAP supports, especially on 1st pillar sources, most notably on direct payments. However direct payments are strongly criticized for their unfair distribution and leakage (driving up land prices). Taking into consideration the anticipatory CAP budgetary restrictions, it is a question of how Hungarian and Polish farms/farmers are able to deal with productivity and competitiveness issues with lower support level.

Keywords: Common Agricultural Policy, agricultural production, agricultural trade
JEL codes: E23, Q17, Q18

19.1. Introduction

The Common Agricultural Policy (CAP) was established almost 60 years ago. Although it has changed significantly during these years, mostly by more or less effective reforms, but it still plays a vital role in the European agriculture. It still affects the life of 8.6 million farmers [Eurostat, 2018]. From agricultural trade aspect, the most important characteristics of the CAP are its main principles. They were set out at the Stresa conference in 1958 [Shucksmith, 2005]:

- community preference, which basically means market protection against third-country imports by common border and border protection (tariffs, quotas, etc.).
- financial solidarity is an important idea behind the European Union (or European Community that time), where each country must contribute to the common budget and developed countries (or regions) help the less developed ones.

- market unity has two major elements. First of all, it covers the so-called custom union where there are no internal barriers to trade meaning free intra--community trade. Its other element was the single market achieved in 1992. It made possible the "four freedoms", the free movement of capital, goods, labour and services. From the trade aspect, free movement of goods matters most.

International examples show that trade agreements accelerate trade between the members and reduce it with other countries outside the ratifying countries. One of the major findings of Jayasinghe and Sarker on NAFTA (North American Free Trade Agreement) was that it has resulted in substitution effect in case of the six analysed agri-food products [Jayasinghe and Sarker, 2004]. NAFTA members traded among each other more and reduced their import from the rest of the world. They have proved accelerated trade within the NAFTA members. It was the initial expectation with the European Single Market[1]. By using an extended gravity model, they have received the same results for the European Union's six major agri-food products where intra-EU trade has increased at the expense of the third countries outside the EU [Sarker and Jayasinghe, 2007]. However, Coughlin and Novy [2012] found that domestic border effect can be higher than international one. They have built an own dataset that combined within county, county-county and county-foreign country trade flows. Informal trade barriers or bureaucracy can be the bottlenecks of free trade even on the European Single Market [Román et al., 2014]. But undoubtedly, trade declines dramatically with the distance [Leamer, 2007]. It is especially true for agricultural bulk products, e.g. wheat or corn.

Hungary and Poland have accessed the European Union (EU) together in 2004 as a part of the Eastern enlargement. Since then, it is often used two country blocks at EU level, EU-15 for the old member states (OMS) and EU-12 (or EU-13 with Croatia) for the new member states (NMS). It was already proved that trade connections have been tightened with the start of the integration process in every new member state [De Santis et al., 2005].

The chapter 18.2 deals with methodological issues and introduces data sources used for the calculations. It also describes the analytical framework of the study.

The chapter 18.3 gives a detailed overview of the importance of the Hungarian and Polish agriculture. Indicators used for this are the share of agricultural employment within the total workforce, the agricultural value added as a share of GDP and the share of agricultural trade value within the total export revenues on the country level.

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[1] The European Single Market consists of 32 countries, EU-28 plus Iceland, Liechtenstein, Norway and Switzerland.

The chapter 18.4 is about the trade characteristics of the Hungarian agriculture, followed by the same analysis for the Polish agriculture in the following chapter 18.5. It includes trade balance broken by the world, EU and country level (Poland for Hungary and Hungary for Poland). These chapters also consist of the TOP5 agricultural export commodities on HS-2 level.

The chapter 18.6 compares the most important characteristics of the Hungarian and Polish agricultural trade. It is finished by the evolution of cross--country trade balance.

The final chapter gives an overview of the results together with conclusions.

19.2. Methodology and data sources

The fundamental tool of the research is the time series analysis. In order to catch the so-called "accession effects", the time horizon starts from 2000 to the latest available year in the most commonly used databases, which is 2017. Importance of the agriculture is measured by the most commonly used indicators, such as share of agricultural employment or the agricultural value added (VA) as a share of gross domestic product (GDP). It is followed by the share of agricultural export within the total export for both countries. Major data sources used for the first chapter is the World Bank's World Development Indicators (WDI) database.

Analysis of the trade characteristic is based on the analysis of trade relations starting from the world, via the European Union to the other country's level (Poland and Hungary in case of Hungary and Poland). The major data source for trade issues is the World Bank's World Integrated Trade Solution (WITS) database at HS-2 level between 2000 and 2017 on agricultural products, chapters 1 to 24. The list of the product categories can be found in the Appendix.

The framework of the study is given by the present Common Agricultural Policy (CAP) and its most probable future path. In order to employ the most up-to-date version of the future CAP, the latest communications of the European Commission will be used. Basically it means two documents. The first one is "The Future of Food and Farming", which contains mostly general issues, however, the future directions can be perceived [EC, 2017]. The second one is a regulation on the financing, management and monitoring of the Common Agricultural Policy, which was issued on 1st of June, 2018 [EC, 2018a].

19.3. Importance of the agriculture

Importance of the agriculture can be measured and demonstrated by different indices. The two most commonly used are the share of agricultural employment within the total workforce and the agricultural value added as a share of GDP. Figure 1 shows these two indicators for Hungary and Poland.
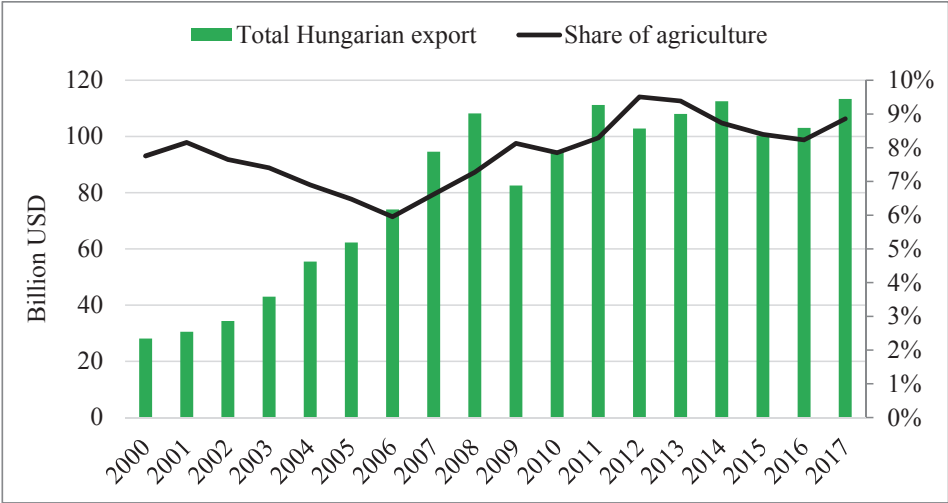
Figure 1. Evolution of the agricultural employment and value added in the analysed countries (%)
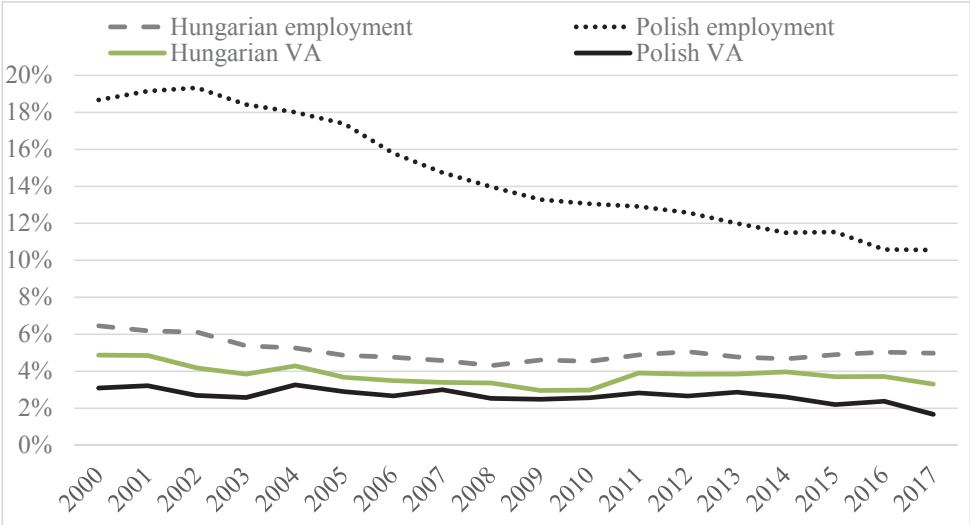
As it can be seen from the figure above, the share of agricultural employment has been decreased in both counties. At the beginning of the period, it was a bit above 6% in Hungary and by a slight decrease, it has stabilized around 5% at the end of the analysed period. It has almost reached 20% in 2002 in Poland, but decreased rapidly after the accession. Despite this remarkable reduction, agricultural employment is still above 10%.

Figure 2. Evolution of the Hungarian export and the share of agriculture

Regarding agricultural value added as the share of GDP, the sector has played and still plays a more important role in Hungary. From its initial value (4.9%), it went back to 3.3% by 2017. In Poland, it gave only 1.7% of the total value added in 2017.

From the trade aspect, the share of agricultural trade value within the total export revenues is also a general index of measuring the importance of the agriculture. It is illustrated in Figure 2.

Total export is measured in billion USD on the primary Y axe. From the initial 28.1 billion USD, it has increased fourfold to 113.4 billion USD. As it can be clearly seen in Figure 2, this growth has been accelerated after the EU accession. The global crisis resulted in a decline from 2008 to 2009, however, the export reached that level again within two years. The other drop in 2015 is caused mostly by the sanctions against the Russian Federation. Taking a look at the agricultural export revenues as a share of total export, it went down to 6% after the accession and then fluctuated between 8 and 10% (secondary Y axe).

As a matter of Poland's export and agricultural export share, they are demonstrated in Figure 3. Export revenues show the same patterns as it was seen in the Hungarian case: rapid growth after the accession with two declines in 2009 (global crisis) and 2015 (Russian embargo).

Figure 3. Evolution of the Polish export and the share of agriculture

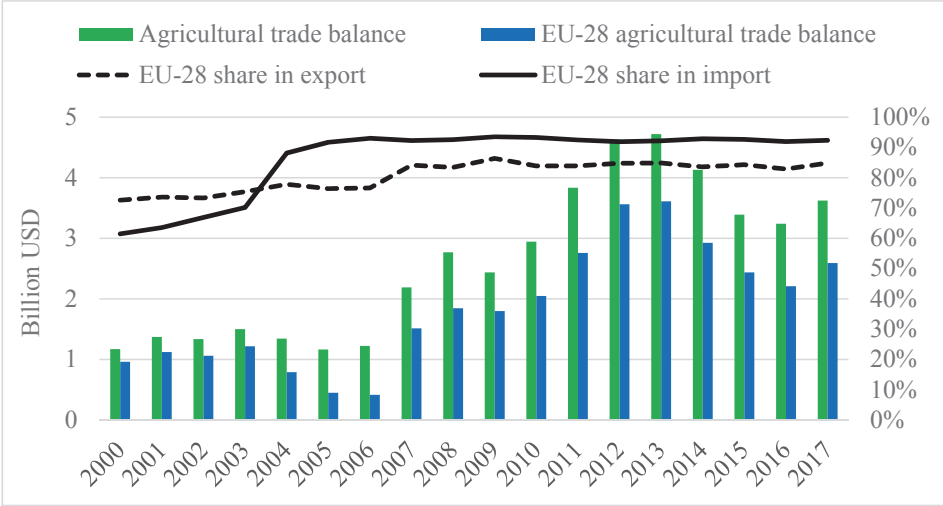*Source: author's composition based on the World Bank's WITS [2018] database.*

However, it should be mentioned that the growth of the Polish export during this 18-year period was almost double of the Hungarian one. Compared to the four times higher Hungarian export, the Polish one became 7.2 times higher.

The share of agriculture fluctuated between 8 and 10% in the first half of the period and started to increase rapidly during the global crisis and it was above 13% in 2017. While the growth of Hungarian agricultural export was broadly the same as the growth of total export, the Polish agricultural export growth was even higher than the total export's one (11.5 compared to 7.2 times).

19.4. Trade characteristics of the Hungarian agriculture

Historically, the European countries are the major export partners of Hungary, especially because of the production structure: it is dominated by raw materials, mostly cereals. These kinds of bulk products cannot be transported to far distances due to high transportation unit cost[2]. Figure 4 gives an overview of the Hungarian agricultural trade markets.

Figure 4. Destinations of the Hungarian agricultural trade

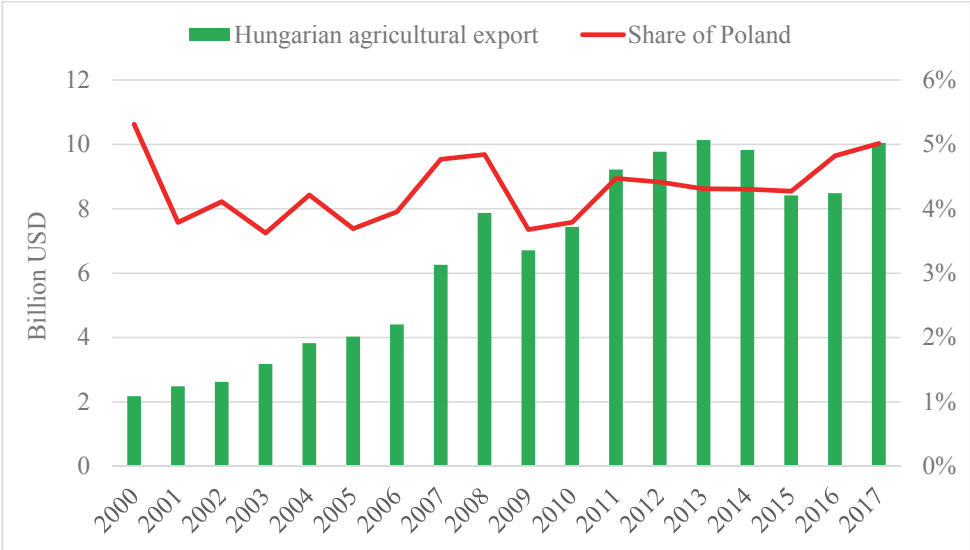*Source: author's composition based on the World Bank's WITS [2018] database.*

Even before the accession, Hungary has been traded with the present members of the EU. As a matter of EU-15, accession does not result in significant changes in the Hungarian export, the share of OMS was about 50% even before 2004. However, it was not the case with import. Before 2004, Hungary imported 48-52% of its agricultural needs from the EU-15, but since 2005, it fluctuated between 55-64%. It can be seen on the black line which has increased significantly from 2003 to 2004. In agricultural terms, it basically means that, due to the enlargement, OMS were able to find new markets for their agricultural commodities in Hungary.

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[2] Hungary has no cheap, water-based routes.

Compared to the beginning of the analysed period, the Hungarian agricultural export increased appreciably, it became roughly five times higher by 2017 (Figure 2). Another important fact is that Hungary was able to maintain and increase its agricultural trade surplus in both directions (world, EU-28) by the end of the period. However, the accession had a negative effect on it which lasted for 3 years. The sign of the other two relevant factors (global crisis, Russian embargo) can also been seen on Figure 4.

If we look at country-level data, the Polish share within the Hungarian agricultural export has not changed notably between 2000 and 2017. It was mainly between 4 and 5%, despite the remarkable expansion in Hungarian agri-food export to Poland (from 120 to 500 million USD). Figure 5 summarizes it.

Figure 5. Poland, as a trading partner of Hungary

The deeper analysis of the agricultural export requires product group level data. According to the methodology part, it was carried out on three different levels: world, EU-28 and finally Poland. Table 1 contains the five major agricultural export products, their export value and export share. Export share is the share of export value of the given product group divided by the total agricultural export.

The world and the EU-28 level are more or less the same, only there is one difference in the ranking of the TOP5 products: Hungary exports more meat and meat products to the world than to the EU-28. The high similarity in the export structure is not surprising, because EU-28 is the major trading partner of Hungary (Figure 4).

Table 1. The major Hungarian agricultural export products, 2017 (million USD)

Product group	Export value	Export share
World		
10	1 731	17.23%
02	1 096	10.91%
23	949	9.45%
22	721	7.18%
12	714	7.10%
Altogether	5 211	51.88%
EU-28		
10	1 519	15.12%
23	801	7.97%
02	784	7.80%
22	658	6.55%
12	646	6.44%
Altogether	4 408	43.88%
Poland		
23	59	0.59%
22	52	0.52%
20	49	0.49%
10	46	0.46%
21	43	0.42%
Altogether	249	2.48%

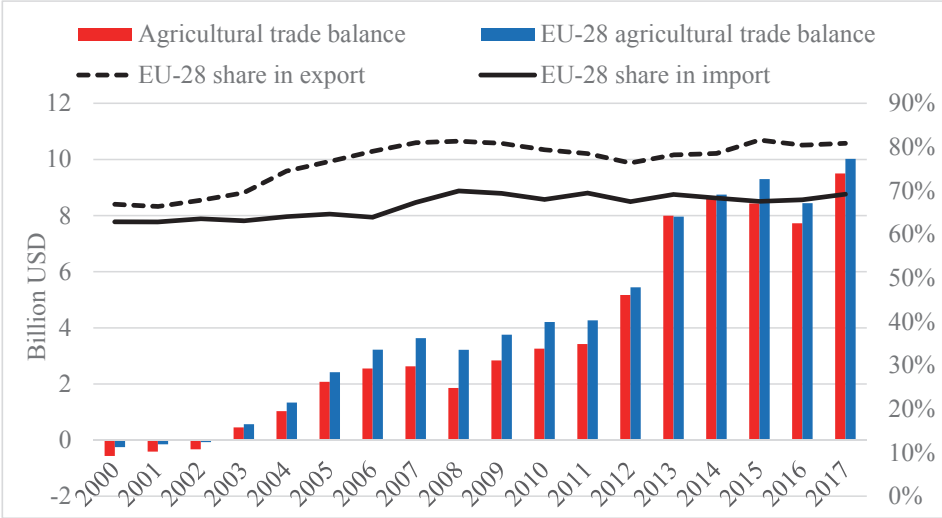*Source: author's composition based on the World Bank's WITS [2018] database.*

The most important export commodity is undoubtedly cereals; they give 17.2% of the total agricultural export. Cereals are followed by meat and meat offal (02), and residues and waste from food industries, prepared animal fodder (23). The last two items on the list are beverages, spirits and vinegar (22) and (mostly oil) seeds and fruit (12). The 5 major product groups out the total 24 give 51.9% of the total Hungarian agricultural export. 43.9% of export finds market in the European Union. In Polish relation, there is no big difference in volume as it is 59 million USD for the major product group (residues and waste from food industries, prepared animal fodder – 21) and 43 million USD for the last one (miscellaneous edible preparations). Apart from the last one, there is only one other item on the list which has not appeared on the world or EU-28 level, preparations of vegetables, fruit, nuts or other parts of plants (20). As it can be seen from the table above, the TOP5 product groups on country level give 2.5% of the total agricultural export which is exactly the half of the Polish share in the Hungarian export (Figure 5).

19.5. Trade characteristics of the Polish agriculture

The EU member states are the major trading partners of Poland as well. Their share fluctuated between 63-69% in case of import and it has not changed significantly during the analysed period. The accession had not any impact on it, the export share increased only from 2006 to 2007 by 4 percentage points (Figure 6). Regarding the export, it has increased remarkably right after the accession by 5 percentage points. Separating the EU-28 to OMS and NMS, it can be concluded that this increase was entirely realized on the EU-15 markets, meaning that Poland was able to successfully use the elimination of the remained trade barriers and to conquer new markets. The export share of the EU-28 went up from 74.5% (2004) to 80.8% (2017).

One should notice the remarkable change in the Polish trade balance. At the beginning of the period, it showed trade deficit which turned into a surplus in 2003. Starting from 0.5 billion USD, its size surpassed 10 billion USD in 14 years. Another important characteristic of the trade balance is the higher volume of the EU-28 than of the world. It means that Poland became even more successful on the European markets than on the third countries' markets.

Figure 6. Destinations of the Polish agricultural trade

Source: author's composition based on the World Bank's WITS [2018] database.

Despite the relative closeness, Hungary is not among the most important trading partners of Poland. While the volume of the Polish agricultural export became almost 12 times higher, the share of Hungary decreased within it. Except the notable increase after the accession, its share was exactly the same in the beginning and at the end of the analysed period (Figure 7).

Figure 7. Hungary, as a trading partner of Poland
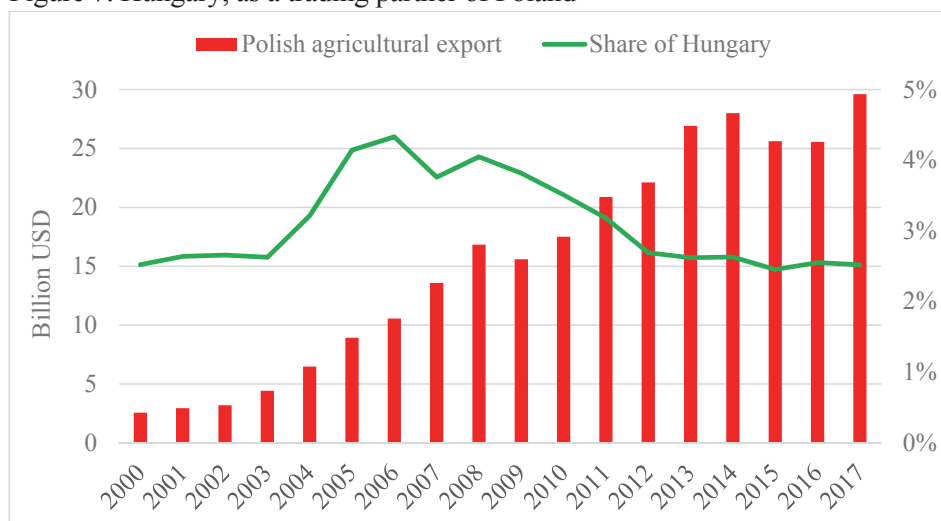
Source: author's composition based on the World Bank's WITS [2018] database.

Table 2. The major Polish agricultural export products, 2017 (million USD)

Product group	Export value	Export share
World		
02	5 090	17.19%
24	3 340	11.28%
04	2 607	8.80%
19	2 510	8.48%
21	1 838	6.21%
Altogether	15 386	51.95%
EU-28		
02	4 187	14.14%
24	3 102	10.48%
04	2 055	6.94%
19	1 886	6.37%
21	1 487	5.02%
Altogether	12 717	42.94%
Hungary		
24	112	0.38%
02	101	0.34%
04	76	0.26%
19	68	0.23%
21	67	0.23%
Altogether	424	1.43%

Source: author's composition based on the World Bank's WITS [2018] database.

Analysing the agricultural trade on product group level, the same items can be found on every (world, EU-28 and Hungarian) level, although their ranking is different. Generally, it means that Poland does not differentiate between the markets, it exports the same products to these directions. These are meat and edible meat offal (02), tobacco and manufactured tobacco substitutes (24), dairy produce, birds' eggs, natural honey, edible products of animal origin (04), preparations of cereals, flour, starch or milk, pastrycooks' products (19) and miscellaneous edible preparations (21). Their ranking, export volume and export share can be found in Table 2.

The share of the TOP5 product groups is 52%, it goes down to 43% if only the EU-28 is considered. Their share within the total export is only 1.4% for Hungary, which is a bit more than the half of the total Hungarian export (Figure 7).

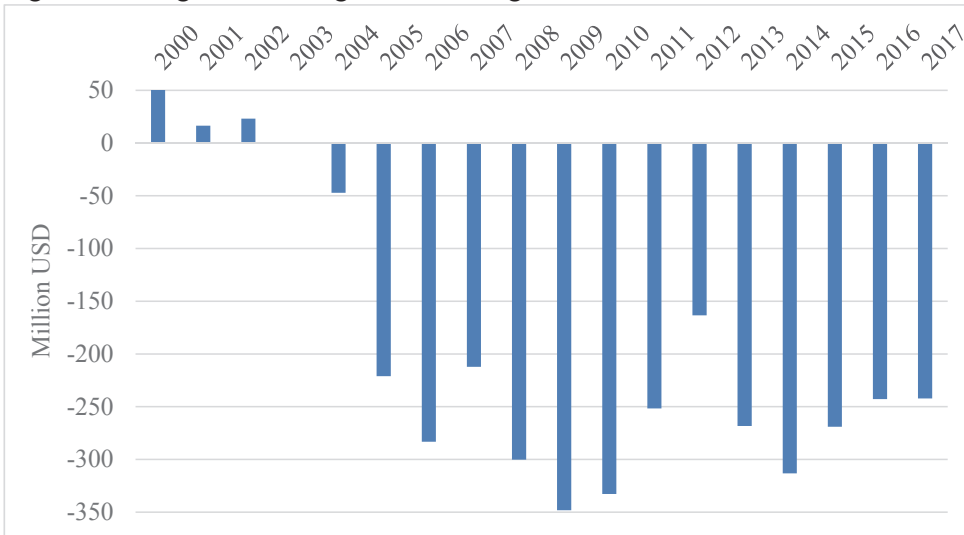## 19.6. Comparison of the Hungarian-Polish agricultural trade

Agriculture, especially if its contribution to the export revenues is taken into account, plays an important role in both countries. However, there are remarkable differences between Hungary and Poland:

- Both countries have an agricultural trade surplus, however, they went on a different path. Hungary had it even before the accession, while Poland reached it in the preparation period;
- Accession (and preparation period) had significant positive effect on the Polish agricultural trade balance, while negative short-term effect on the Hungarian one;
- The EU countries are the main export partners of the analysed countries, their share in the export is around 80%. As a matter of the import, there are different values, 92% for Hungary and only 69% for Poland. That is the reason why Poland has a higher trade surplus towards the EU-28 direction than to the world;
- As a matter of the export structure, specialization can be seen, as both countries produce and export agricultural commodities according to their endowments. Hungary's top product group is cereals (good climate condition and high share of arable land), while in Poland the livestock sector is more significant as it has given more than the half of the total agricultural production over the last 3 years [EC, 2018b];
- Poland exports the same products to every (world, EU-28 and Hungarian) level, while Hungary exports two products to Poland out of its list of TOP5 agricultural product groups.

The boosted Polish export performance resulted in remarkable changes in the Hungarian-Polish direction as well. The Polish agricultural trade deficit turned into an increasing surplus within a few years. It has started even during the preparation period. It is summarized in Figure 8.

Figure 8. Change of the Hungarian-Polish agricultural trade balance

Another remarkable fact from the figure above is that Poland was able to increase its surplus during the global crisis, it went down only in 2011 and 2012. It is a result of one component. Although the Polish export value to Hungary decreased by 12.7% from 2008 to 2009, but simultaneously, the Hungarian export declined by 35.3% in the same period.

19.7. The future of the Hungarian-Polish agricultural trade in the light of the possible budgetary changes

The Common Agricultural Policy, especially its financial supports, plays a crucial role in the European agriculture. These resources are even more important in the NMS, as they had no budgetary opportunities to subsidize their agricultural sector to that extent before the accession. Table 3 gives an overview of the present agricultural income composition of the two analysed countries.

It can be seen from the table above that crop sector is more important in Hungary, it gives 60% of the total agricultural production. This ratio is only 45% in Poland. The other, and at the same time more important fact, is the much higher share of subsidies within the factor income. The value of this ratio is 36%

for Hungary and only 21% for Poland, meaning that the Hungarian agriculture depends more on subsidies than the Polish one. As budgetary restriction will be applied, it requires more competitiveness from the Hungarian farmers than from the Polish ones. According to the latest communication of the European Commission, this restriction will be 4% in nominal prices along with the accelerated external convergence of the direct payments from 2020 (EC, 2018a). As Hungary is slightly above the line of 90%, while Poland is below that[3], it means an additional disadvantage for the Hungarian farmers in terms of income generation. It can again negatively affect the competitiveness of the Hungarian agricultural trade. These expected changes require doing more with fewer financial resources which can be a great challenge for the farming community. In this country-level comparison, it definitely seems to be a greater challenge for the Hungarian farmers.

Table 3. Agricultural income composition of Hungary and Poland, 2017 (basic price, million euro)

Agricultural income items	Hungary	Poland
Agricultural output	7 509	23 898
- crop output	4 475	10 701
- animal output	2 445	12 587
- other output	589	610
Intermediate consumption	4 594	14 104
Gross Value Added	3 240	10 116
Subsidies	1 317	2 171
Factor income*	3 611	10 222

* Factor income = Gross Value Added – Consumption of fixed capital – Taxes + Subsidies.
Source: author's composition based on EC [2018b] for Poland and EC [2018c] for Hungary.

It should be aware of other challenges like climate change. The new CAP is planned to answer it by enhanced sustainability, mitigation or adaptation [EC, 2018a]. Although, global warming may result in changes in production structure even in the short run, e.g. switch to new, drought-tolerant varieties or other commodities. On the other hand, it may result in new production technologies and both of them are pointing in the same direction: further investments, especially into human resources. However, according to the dual nature of the EU's decision-making process (national and EU level), the extent of market integration is determined by the most stringent national rule, therefore it likely causes risk-averse behaviour and concerns about new technologies [Young, 2004].

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[3] It is 259.7 euro/ha for Hungary and 215.1 euro/ha for Poland [EC, 2011].

Specialization is another tool to deal with financial restrictions. If farmers are able to produce a few numbers of commodities in a cost-effective way, they may increase their market share. In the Hungarian-Polish destination, they could be some of the crop or fruit and vegetable products for Hungary, while livestock products for Poland according to the present production and trade structure.

19.8. Summary and conclusions

Hungary and Poland became the members of the European Union in 2004. According to the main principles of the CAP, principally market union (including four freedoms), trade has been accelerated and tightened among the member states.

Although major indicators (agricultural employment and agricultural value added as a share of GDP) show a decreasing trend, agriculture is still an important sector of both Hungarian and Polish economy. It is strengthened by the significant share of agriculture export revenues (roughly 9% in Hungary and 13% in Poland of the total export revenues). Accession resulted in remarkable export growth in both countries, it became four times higher in Hungary, but 7.2 times higher in Poland. As a matter of agricultural export, this difference is even bigger, 4.6 (Hungary) versus 11.5 (Poland).

Hungary has traditionally agricultural trade surplus and it was able to maintain it over the analysed period, Poland had an agricultural trade deficit before the accession which turned into trade surplus already in 2003. The major trade partner of these two countries was the EU member states even before the enlargement and trade connections became tighter after it. However, it is remarkable that the accession resulted in the higher increase of the EU's agricultural import share in Hungary, while in Poland the EU's agricultural export share growth was more significant. It is the reason why Poland has a higher trade surplus towards the EU-28 than to the world.

According to the trade data, Poland is a more important trading partner of Hungary than the opposite, but due to the higher total Polish agricultural export, it results in significant Polish trade surplus in the Hungarian direction. The lesson from the country level analysis is the complementary trade. Hungary's major export commodity is cereals, while in Poland's case it is meat and edible meat offal. It is in line with the production share of the crop and animal sector. Cross-country analysis confirmed specialization as Hungary export animal fodder and field commodities to Poland and imports meat and meat products.

As a matter of future CAP, at least 4% of nominal budget cut can be anticipated. Due to higher Hungarian share of subsidies to the factor income, it will cause greater problems for the Hungarian farmers compared to the Polish ones. It is even strengthened by the further and accelerated external convergence which

affects only the Hungarian amount of direct payments. It seems that Poland has used CAP resources more efficiently in the past (positive trade balance, especially on the OMS markets) and future changes will take less negative effect on its agriculture. Altogether it may result in even more agricultural trade success in the Hungarian direction. Efficiency and competitiveness become even more important with less financial resources, especially for Hungary in this comparison.

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Appendix

PRODUCT GROUPS BY HS2 CLASSIFICATION	CODE
Live animals	1
Meat and edible meat offal	2
Fish and crustaceans, molluscs and other aquatic invertebrates	3
Dairy produce, birds' eggs, natural honey, edible products of animal origin not elsewhere specified or included	4
Products of animal origin, not elsewhere specified or included	5
Live trees and other plants, bulbs, roots and the like, cut flowers and ornamental foliage	6
Edible vegetables and certain roots and tubers	7
Edible fruit and nuts, peel of citrus or melons	8
Coffee, tea, mat and spices	9
Cereals	10
Products of the milling industry, malt, starches, inulin, wheat gluten	11
Oil seeds and oleaginous fruits, miscellaneous grains, seeds and fruit, industrial or medicinal plants, straw and fodder	12
Lac, gums, resins and other vegetable saps and extracts	13
Vegetable plaiting materials, vegetable products not elsewhere specified or included	14
Animal or vegetable fats and oils and their cleavage products, prepared edible fats, animal or vegetable waxes	15
Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates	16
Sugar and sugar confectionery	17
Cocoa and cocoa preparations	18
Preparations of cereals, flour, starch or milk, pastrycooks' products	19
Preparations of vegetables, fruit, nuts or other parts of plants	20
Miscellaneous edible preparations	21
Beverages, spirits and vinegar	22
Residues and waste from food industries, prepared animal fodder	23
Tobacco and manufactured tobacco substitutes	24

20. Implementation of innovation projects in the context of agribusiness 4.0 in Ukraine

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Abstract

In the European Union works have been launched about perspective directions of the Common Agricultural Policy (CAP) and national priorities within the EU budget after 2020. One of the expected problems is the reduction in the amount of funding, particularly in the form of subsidies. For Ukraine this issue has been relevant before. At the same time, the level of implementation of innovations in the agricultural sector remains low. The paper examines the current state of implementation of the most important innovation projects in agribusiness in Ukraine and their financing sources. Results of cluster analysis of the implementation of investment and innovative projects in Ukrainian regions allowed to identify four clusters, each of which is represented by relatively homogeneous parameters of the potential of innovative development of agribusiness 4.0. Given the fact that contemporary agribusiness both in Ukraine and in Europe remains weakly digitized, we propose one of the strategic priorities of agrarian policy to recognize the promotion of the implementation of digital agricultural projects (projects connected with agribusiness 4.0). The investments in digital agricultural projects are an important tool for improving competitiveness and economic efficiency of Ukrainian enterprises and development of agriculture 4.0 in Europe.

Keywords: innovation projects, implementation, agribusiness 4.0, agricultural enterprises, digital agriculture

JEL codes: Q12, Q13, Q14, Q18

20.1. Introduction

In the modern world literature the problem of development of agriculture 4.0 and implementation of digital technologies in agribusiness is among the most topical academic and practical issues [Cofre-Bravo et al., 2018; De Clercq et al., 2018; Deichmann et al., 2016a, 2016b; Fatusin and Oladehinde, 2018; Gwaka, 2017; Krzyżanowska and Sikorska, 2016; Ozdogan et al., 2017; Wolfert

et al., 2017; Zhudro, 2017a, 2017b; and many others]. However, there are some problems with the implementation of these innovations in developing countries.

Digital technologies have significantly affected practically all sectors of the economy and agriculture is no exception [Deichmann et al., 2016a]. The new information and communication technologies promote the rise in efficiency by complementing other production factors, and innovation by reducing transaction costs. Digital technologies overcome information problems that hinder market access for many small-scale farmers, and they provide novel ways for improving agricultural supply chain management [Deichmann et al., 2016b].

The implementation of digital technologies in some European countries is at different stages. For example, in Turkey digital agriculture applications are in the early development stage [Ozdogan et al., 2017].

The paper by Wolfert et al. [2017] focuses on the Smart Farming is a development that emphasizes the use of information and communication technology in the cyber-physical farm management cycle. New technologies are expected to leverage this development and introduce more robots and artificial intelligence in farming. This is encompassed by the phenomenon of Big Data, massive volumes of data with a wide variety that can be captured, analysed and used for decision-making [Wolfert et al., 2017].

The study by Fatusin and Oladehinde [2018] established that enterprises that made use of smart technologies tend to be more efficient in terms of production and marketing especially in identification of new markets.

The literature identifies multiple factors that can affect the adoption of innovation in agriculture, such as farmers' socio-economic characteristics and the characteristics of the promoted innovation, among others. One of the relevant components of innovative behaviour is farmers' ability to generate and implement new ideas, to extend their networks and to involve the workforce in the adoption process [Cofre-Bravo et al., 2018].

The paper by Zhudro [2017b] investigates the new methodological research platform worker-ness agribusiness organizations in an economy 4.0, which is based on the dominance of hybridization "live" and "smart" management and generates the possibility of permanent and total system-situational managers correction specialists AIC organizations management. Another article by Zhudro [2017a] examines the practice of agrarian smart business, which involves the domination of "smart" agrotechnologies and creates the need for a permanent system-situational correction of managerial decisions carried out by managers and specialists of the agroindustrial complexes. The author describes the methodology and tools of "smart" and traditional management in the modern agrarian economy 4.0 [Zhudro, 2017a].

The problem of implementation of innovative projects and project management in agricultural enterprises is considered in publications of the following scientists: Babenko [2017]; Butenko [2017]; Chemerys et al. [2017]; Ilchuk and Shpomer [2017]; Lytvynchuk [2017]; Prysiazhniuk and Plotnikova [2017]; Roucan-Kane et al. [2013]; Turnera et al. [2017]; Volodin [2017].

Innovation projects are an important factor for the economic development. Ukraine has a strong position in the development of human capital (education, availability of skilled personnel, the labour market, patent activity of the population, educational and scientific infrastructure). But the organizational, institutional components and market and business environment hamper the development of innovation, the formation of economic growth [Butenko, 2017].

Implementation of innovative projects increases interest in the issue of the transfer of intellectual property rights. According to Lytvynchuk [2017] there are two opposite groups of IP assignment legal models in the agriculture being taking into account – classical models based on obtaining exclusive rights of ownership and alternative models within the framework of fair use, generis sui and public domain doctrines. Further progress of the intellectual property institutionalization processes requires flexible mechanisms of public management based on the economic efficiency of assignment legal models but without losing connection with the humanistic context [Lytvynchuk, 2017].

The paper by Volodin [2017] presents methodical approaches and organizational tools for the preparation of commercial proposals by scientific institutions, on the basis of which the fast plant-technology is created and projects of their use in the science-intensive niche business.

In the European Union works have been launched about perspective directions of the Common Agricultural Policy (CAP) and national priorities within the EU budget after 2020. One of the expected problems is the reduction in the amount of funding, particularly in the form of subsidies. For Ukraine this issue has been relevant before. At the same time, the level of implementation of innovations in the agricultural sector remains low. However, there are practically no studies on implementation of innovative projects in the context of development agribusiness 4.0 in Ukraine.

20.2. Methodology

The purpose of the paper is to present results of one of the first studies of the current state of implementation of the most important innovation projects in the context of agribusiness 4.0 in Ukraine and their financing sources.

The methodological basis of the research is the fundamental postulates of economic science and system approach to studying the economic phenomena and processes. This study used the following methods: abstract-logical (definition of essence of the category „agribusiness 4.0", theoretical generalization and formulation of conclusions); analysis and synthesis (assessment and analysis of the state of implementation of innovation projects); monographic (depth analysis of the issue under study and specific innovative enterprises); graphic and cartographic (visual representation of the results and the construction of cartograms); cluster analysis by the Ward's method (Euclidean distances) and the k-means method (determination of the main clusters of innovative development of agribusiness).

To achieve the goal we utilize datasets at regions or at national levels collected from Ministry of Agrarian Policy and Food of Ukraine, data of the Association „Ukrainian Agribusiness Club" (UCAB) and the data of some innovative public enterprises.

20.3. Implementation of the most important innovation projects in agribusiness in Ukrainian regions: current state and problems of their financing sources

Summarizing the results of theoretical analysis and synthesis of literature, it can be concluded that agribusiness 4.0 – provides for the massive implementation of cyberphysical systems in agriculture (industry 4.0) for its automation, computerization and robotization. The main directions of agribusiness 4.0: digitalization, big data, blockchain, vertical farms, unmanned technology, automation of production, smart machines, precision farming, etc.

According to the Ministry of Agrarian Policy and Food of Ukraine, as of January 1, 2018 in the agricultural sector of the economy of Ukraine enterprises generally implemented 474 investment projects, which is by 94 projects (24.7%) more than the corresponding date of 2017 (Table 1).

Among the regions, the largest numbers of investment projects are implemented in: Poltava – 69 units (+ 29 units or by 72.5% more compared with 2017); Lviv – 64 units (+ 16 units or 33.3% more); Vinnitsa – 48 units (+ 3 units or 6.7%); Chernivtsi – 43 units (+ 20 units or 2.2 times more); Cherkassy – 41 units (- 2 units or 4.7% less); and Kherson – 38 units (- 1 unit or 2.7% less) regions. The expected social effect from the implementation of these projects is the creation of more than 16 thousand jobs [Analytical note, 2018].

The total amount of the estimated cost of investment projects was almost 41.3 billion UAH, of which the main source of financing were own funds – 30.7 billion UAH (74.3%). The cost of investment projects realizing in the regions ranges from 0.1 million UAH to 9.6 billion UAH. Compared to the data as

of 01.01.2017, the total sum of the estimated cost of investment projects increased by 13.4 billion UAH, including own and raised funds increased by 11.5 billion UAH and 1.9 billion UAH, respectively.

Table 1. The state of preparation and implementation of the most important investment and innovative projects in Ukraine as of 01.01.2018*

| Names of regions	The total number of projects	Cost of projects, bln UAH	Completed projects	The amount of investments, bln UAH
Vinnytsya	48	19.9	16	0.4
Volyn	8	0.2	4	0.1
Dnipropetrovsk	10	0.4	1	0.001
Donetsk	0	0	0	0
Zhytomyr	16	1.1	5	0.7
Zakarpattya	5	0.02	0	0
Zaporizhya	6	0.2	3	0.2
Ivano-Frankivsk	6	0.1	2	0.01
Kyiv	23	3.3	3	0.5
Kirovohrad	25	1.0	9	0.03
Luhansk	4	0.03	0	0
Lviv	64	1.1	23	0.5
Mykolayiv	27	2.0	1	0.004
Odesa	8	2.8	0	0
Poltava	69	1.0	44	0.3
Rivne	9	0.3	2	0.009
Sumy	4	2.3	0	0
Ternopil	8	0.7	0	0
Kharkiv	4	0.2	0	0
Kherson	38	1.5	9	0.6
Khmelnytskiy	3	0.1	1	0
Cherkasy	41	2.1	11	0.03
Chernivtsi	43	0.4	25	0.2
Chernihiv	5	0.5	2	0.3
Total	474	41.3	161	3.8

Notes. * 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 Ministry of Agrarian Policy and Food of Ukraine [Analytical note, 2018].

Figure 1 shows of the implementation of investment and innovative projects in agribusiness in the regions of Ukraine. Regarding the regional distribution of the number of investment and innovative projects in agribusiness in the regions of Ukraine, it should be noted that their high concentration is in the central and western regions, the lowest concentration – in the north-eastern regions.

The most common directions for the implementation of investment agricultural projects in Ukraine as of 01.01.2018 were the following (construction or reconstruction): development of cattle breeding (23.6%); development of pig farming (12.4%); development of poultry production (5.7%); perennial plantations (4.2%); processing, storage of cereals and technical crops (18.6%); vegetable and fruit storage (12.2%); irrigation (3.0%) (Table 2).

Figure 1. Cartogram of the implementation of investment and innovative projects in agribusiness in the regions of Ukraine, 2018
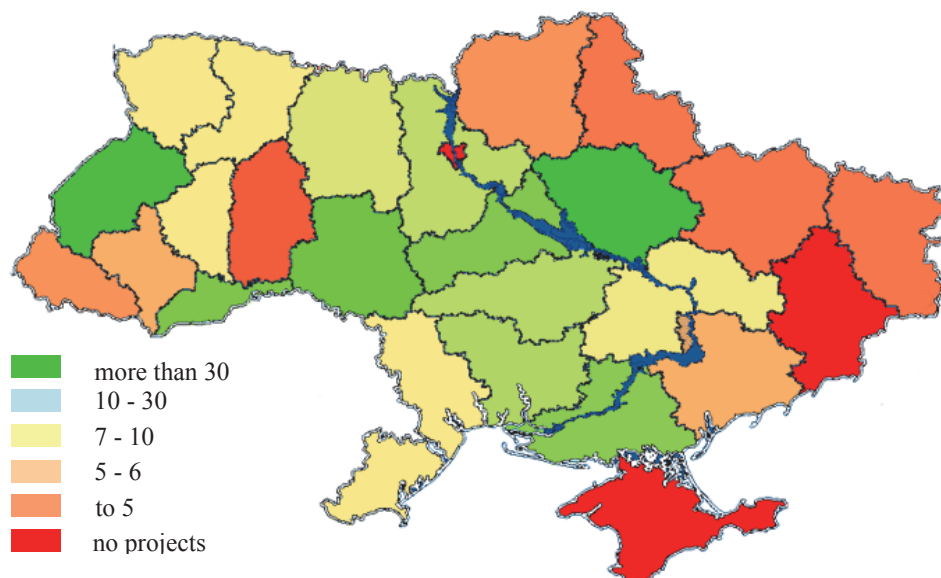
Source: author's presentation based on the data of Ministry of Agrarian Policy and Food of Ukraine [Analytical note, 2018].

Table 2. Directions of the implementation of the investment and innovative projects (construction, reconstruction), units

Directions of implementation of projects	01.01.2017		01.01.2018	
	units	%	units	%
Development of cattle breeding	89	23.4	112	23.6
Development of pig farming	62	16.3	59	12.4
Development of poultry production	23	6.1	27	5.7
Perennial plantations	13	3.4	20	4.2
Processing, storage of cereals and technical crops	73	19.2	88	18.6
Vegetable and fruit storage	35	9.2	58	12.2
Irrigation	13	3.4	14	3.0

Source: author's calculations and presentation based on the data of Ministry of Agrarian Policy and Food of Ukraine [Analytical note, 2018].

The average estimated cost of the investment agricultural project, realized as of 01.01.2018, in terms of the regions, ranged from 4.0 million UAH in the Zakarpattya region to 575.0 million UAH in the Sumy region, with an average value of this indicator in Ukraine at 87.1 million UAH (Figure 2).

Figure 2. Rating of regions of Ukraine by the average cost of an investment agricultural project as of 01.01.2018
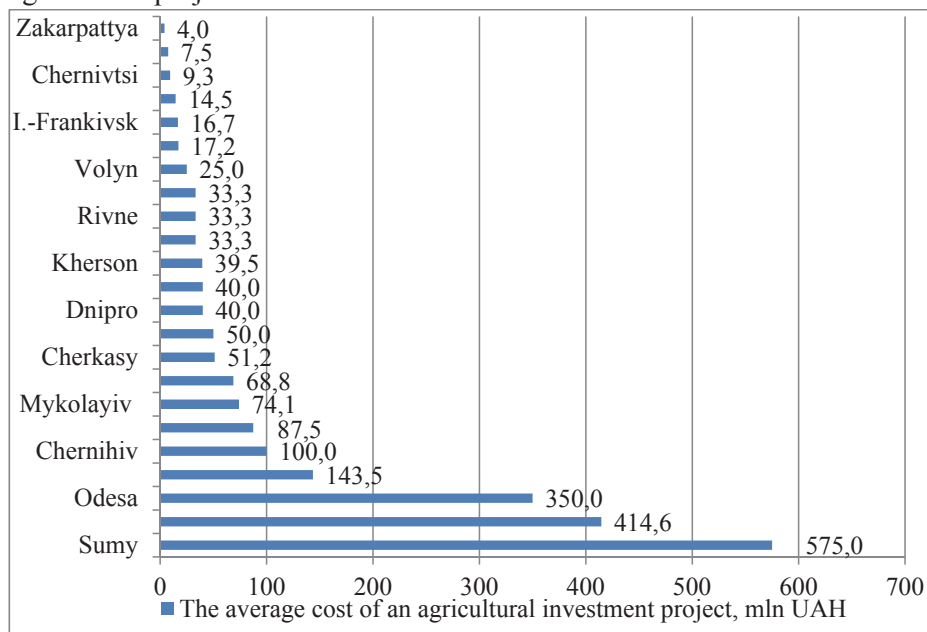
Source: author's calculations and presentation based on the data of Ministry of Agrarian Policy and Food of Ukraine [Analytical note, 2018]

Considering at the regions level data, we can state a significant differentiation of the cost of projects. For example, the largest investment agricultural project can be found in the Sumy region, their average cost was 575.0 million UAH in 2018. The Sumy region is followed by the Vinnytsya region (414.6 million UAH) and Odesa region (350.0 million UAH). On the other side, in Zakarpattya, Lviv and Chernivtsi regions realize the lowest by average cost of investment projects; their average cost is 4.0, 7.5 and 9.3 million UAH, respectively.

In the Ukrainian agro-industrial complex, according to the regions, mainly investment projects were implemented, the estimated cost of which was up to 10.0 million UAH – 277 units (or 58.4% of the total), from 10.0 million UAH to 50.0 million UAH – 112 units (23.6%), the total value of almost 780 million UAH and more than 2.6 billion UAH, respectively. The number of projects costing from 50.0 million UAH to 100.0 million UAH is 32 units (6.8%) with a total

value of almost 2.2 billion UAH; from 100.0 million UAH to 500.0 million UAH – 28 units (5.9%) with a total value of more than 5.9 billion UAH; from 500.0 million UAH to 1.0 billion UAH – 1 unit (0.2%) worth more than 0.5 billion UAH; more than 1 billion UAH – 7 units (1.5%) with a total value of more than 27.3 billion UAH.

Characterizing the structure of sources of financing for investment agricultural projects (Figure 3), it should be noted that the majority of own sources – 74.3%.

Figure 3. Sources of funding of investment agricultural project in Ukraine, %
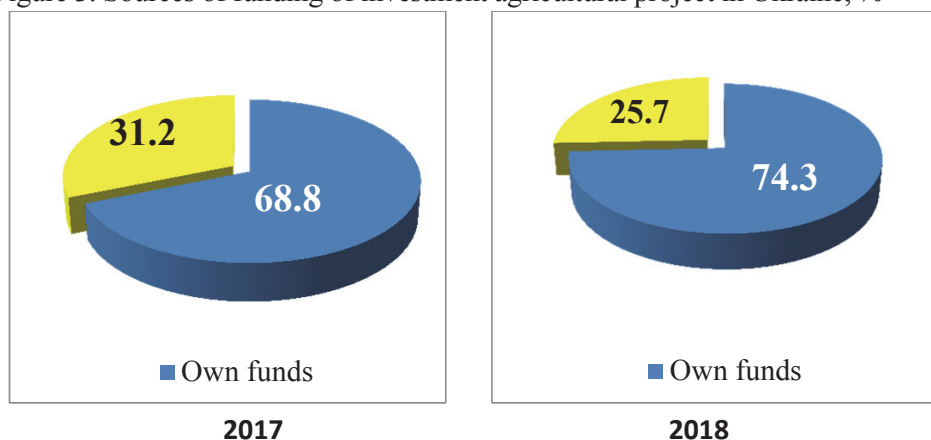
Source: author's calculations and presentation based on the data of Ministry of Agrarian Policy and Food of Ukraine.

The largest intensity of investment activity in 2017 was observed in the Vinnytsya region – the volume of capital investments was 6.3 billion UAH (or 31.7% of the total value of projects implemented in the region); in the Kyiv region – 1.1 billion UAH (or 32.8% of the total value of projects implemented in the region); in the Poltava region – 614.7 million UAH (or 63.0% of the total value of projects implemented in the region); in Cherkassy region – 444.6 million UAH (or 20.8% of the total value of projects implemented in the region); in the Sumy region – 431.0 million UAH (or 18.7% of the total value of projects implemented in the region).

20.4. Cluster analysis of the implementation of investment and innovative projects in agribusiness in Ukrainian regions

Creation and support of the functioning the clusters give possibility for the revival of various sectors of domestic production and for providing innovative, competitive regional and national development [Stoianets, 2017; Chemerys

et al., 2017]. Thus, the cluster structure in the relevant territory can contribute to its innovative development based on the initiation and implementation of innovative projects in the context of agribusiness 4.0.

The results of cluster analysis by the Ward's method (Euclidean distances) made it possible for us to form four clusters (Figure 4).

Figure 4. Vertical dendrogram of cluster analysis results for implementation of investment and innovative projects in agribusiness in the regions of Ukraine, 2018
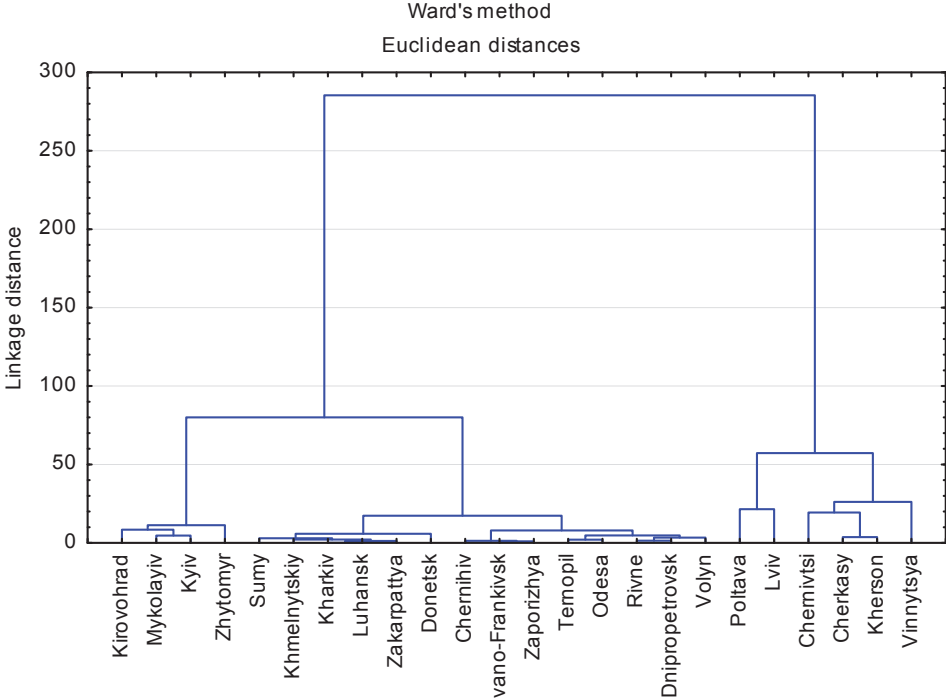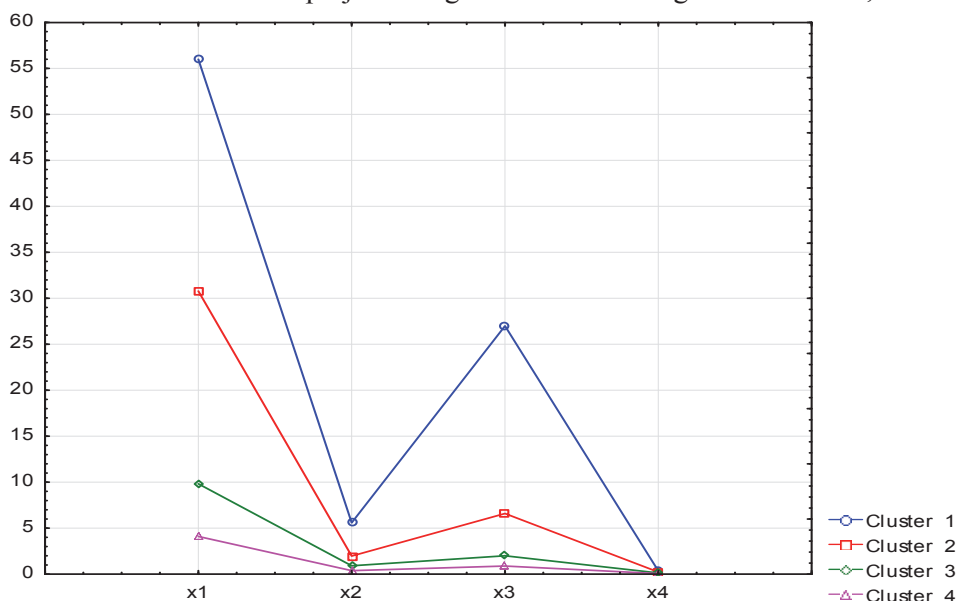

Source: author's calculations and presentation based on the data of Ministry of Agrarian Policy and Food of Ukraine [Analytical note, 2018].

At the second stage, we performed a cluster analysis by the k-means method (Figure 5). Its results were very close to the previous ones. According to group-based clustering, Ukrainian regions can be divided into four clusters, each of which is represented by relatively homogeneous parameters of the potential of innovative development of agribusiness 4.0.

Cluster 1 – "Leading regions with high potential for innovation development". The first cluster includes Vinnytsia, Lviv, Poltava and Chernivtsi regions. The regions participating in this cluster (16.7% of the total number of regions) are characterized by the greatest innovative activity: (i) the average total

number of projects per region is 56 units; (ii) the average cost of projects per region is 5.600 bln UAH; (iii) the average completed projects per region is 27 units; (iv) the average amount of investments per region is 0.350 bln UAH.

Figure 5. The results of cluster analysis (by k-means method) of implementation of investment and innovative projects in agribusiness in the regions of Ukraine, 2018

Note. x1 – the total number of projects; x2 – cost of projects, bln UAH; x3 – completed projects; x4 – the amount of investments, bln UAH.
Source: author's calculations and presentation based on the data of Ministry of Agrarian Policy and Food of Ukraine [Analytical note, 2018].

Cluster 2 – „Regions are followers of leaders with an average potential of innovation development". The second cluster includes Kyiv, Kirovohrad, Myko-laiv, Kherson and Cherkasy regions. The regions participating in this cluster (20.8% of the total number of regions) are characterized by the average (middle) level of innovative activity: (i) the average total number of projects per region is 30.8 units; (ii) the average cost of projects per region is 1.980 bln UAH; (iii) the average completed projects per region is 6.6 units; (iv) the average amount of investments per region is 0.232 bln UAH.

Cluster 3 – „Medium-sized regions with low potential for innovation de-velopment". The third cluster includes the following regions: Volyn, Dniprope-trovsk, Zhytomyr, Odesa, Rivne and Ternopil. The regions participating in this cluster (25.0% of the total number of regions) are characterized by the low level of innovative activity: (i) the average total number of projects per region is

9.8 units; (ii) the average cost of projects per region is 0.917 bln UAH; (iii) the average completed projects per region is 2.0 units; (iv) the average amount of investments per region is 0.135 bln UAH.

Cluster 4 – „Regions-outsiders with very low potential for innovation development". The fourth cluster includes the following regions: Donetsk, Zakarpattya, Zaporizhya, Ivano-Frankivsk, Luhansk, Sumy, Kharkiv, Khmelnytskyi and Chernihiv. The regions participating in this cluster (37.5% of the total number of regions) are characterized by the very low level of innovative activity: (i) the average total number of projects per region is 4.1 units; (ii) the average cost of projects per region is 0.383 bln UAH; (iii) the average completed projects per region is 0.9 units; (iv) the average amount of investments per region is 0.057 bln UAH.

Examples of implementation of digital technologies in agribusiness of Ukraine

Analysing the practice of implementation of digital technologies in the agricultural sector of Ukraine, it should be noted that there are five agricultural holdings in the TOP-20 innovative companies of Ukraine (Figure 6).

Figure 6. TOP-5 innovative agroholdings of Ukraine
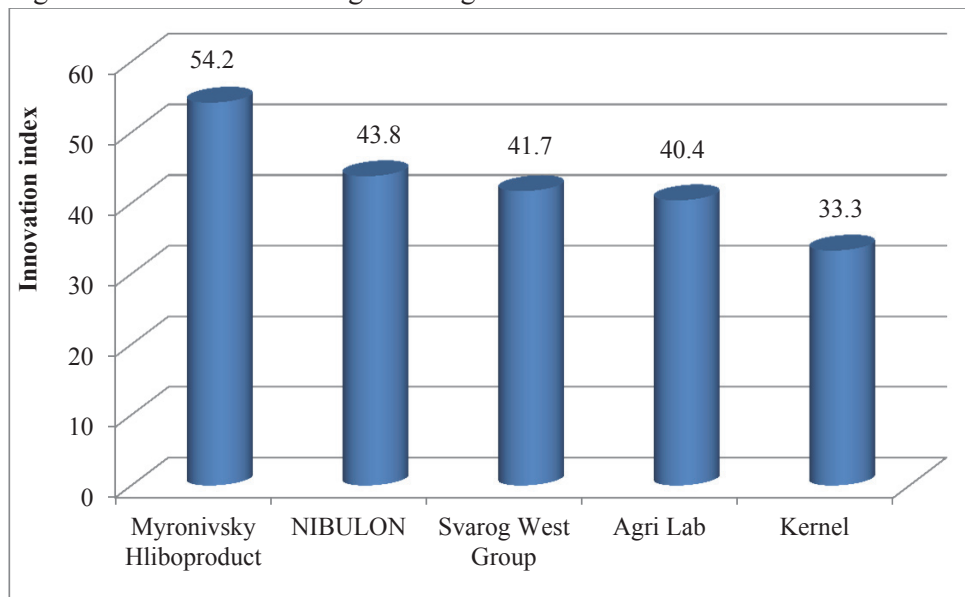
Some Ukrainian agricultural enterprises are already working on automation of production processes, buying more technologically advanced equipment, more and more implementing precise farming systems and other innovative so-

lutions. This increases to equipment cost per unit of land area. In Ukraine, the average expenses of agricultural enterprises for the purchase of machinery and equipment in 2017 were about 51 USD/hectare, while in Germany this indicator was 417 USD/hectare, in France – 281, in Poland – 193 USD/hectare (Figure 7).

Figure 7. The costs for the purchase of agricultural machinery in some European countries, USD/ha
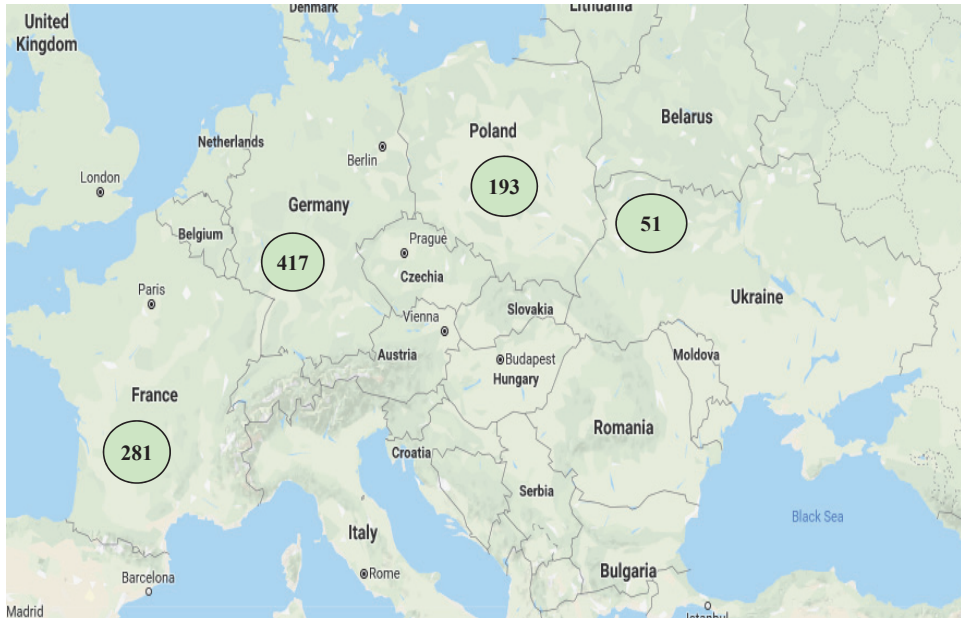
Source: author's presentation based on the data of UCAB [Lakhai, 2018].

Such a significant difference in the costs of agricultural machinery is due, first of all, to the use of more technologically advanced equipment by German, French and other European farmers. Such equipment, respectively, is much more expensive and is aimed at attracting as few employees as possible and more efficient use of land [Lakhai, 2018].

At the same time, the level of implementation of innovations in the agricultural sector remains low [The level, 2018]. According to expert estimates, no more than 10% of Ukrainian agrarian companies implement IT-technologies. According to IDC, by 2019 organizations that have made a digital transformation will receive at least 45% of their income from new business models [9 Steps, 2018]. Given the fact that contemporary agribusiness both in Ukraine and in Europe remains weakly digitized, we propose one of the strategic priorities of agrarian policy to recognize the promotion of the implementation of digital agricultural projects (projects connected with agribusiness 4.0).

The investments in digital agricultural projects are an important tool for improving competitiveness and economic efficiency of Ukrainian enterprises and development of agriculture 4.0 in Europe.

According to the International Society of Precision Agriculture (ISPA), today UAV technology and drone are used by about 39% of farmers; by 2020 their number will increase by 34%, that is, almost doubled. In Ukraine, according to expert estimates, UAV technology and drones use about 7% of agricultural enterprises. Considering this, we propose to provide the state financial support for the implementation of innovative solutions. For example, in Ukraine drones should be added the list of machinery and equipment for the agriculture, for the purchase of which the state provides subsidies.

Digital technologies in agriculture in Ukraine are implemented primarily by agricultural holdings. For example, agroholding "Myronivsky Hliboproduct" develops digital agriculture in the following main directions [Melnyk, 2017]:

- precision farming as an element of digital agriculture;
- observing the harvest using drones, mapping, satellite systems, radar surveillance;
- annual replenishment of the technical park, in particular, for digital farming. Each year, agroholding buys machinery for 25 mln USD or 68 USD/ha;
- management system of land bank based on agrarian GIS technologies.

Agroholding „Mriya" develops digital agriculture in the following main directions [Khmeliuk, 2018; Hryhorov, 2018]:

- creation of own IT-solution in which all data is combined – 1C, GPS and GIS;
- equipment of machinery by GPS trackers for control the consumption of fertilizers and fuel;
- development and use of its own „Planner of the agronomist";
- monitoring of crops using drones and unmanned aerial vehicles.

According to expert estimates, there are about 15 robotic dairy farms in Ukraine. The most famous of them – Dairy Complex "Terezino" – a system of robotic milking of cows and management of Delavar Delpro™ Farm Management.

For effective implementation of digital technologies in agribusiness experts offer 9 steps to successful digital transformation [9 Steps, 2018]:

1. To develop a detailed digital strategy;
2. To convince the importance of the transformation of each manager;
3. To assign a person responsible for implementing the strategy;
4. To provide additional staff training at all levels;
5. To review organizational structure;

6. To get rid of old thinking patterns;

7. To hire consultants (if necessary);

8. To involve suppliers and customers as co-authors;

9. To evaluate the results.

20.5. Summary and conclusions

This paper examines the current state of implementation of the most important innovation projects in agribusiness in Ukraine and their financing sources. Now in the agriculture of Ukraine enterprises generally implemented 474 investment projects. The total amount of the estimated cost of investment projects was almost 41.3 billion UAH, of which the main source of financing were own funds – 30.7 billion UAH (74.3%).

The cartogram showing the distribution of the number of investment and innovative projects in agribusiness in the regions of Ukraine is constructed. It is established that the majority of investment and innovative projects are located in Poltava (69 units), Lviv (64 units), Vinnitsa (48 units), Chernivtsi (43 units), Cherkassy (41 units) and Kherson (38 units) regions. We identified a significant variation of the cost of projects. The largest investment agricultural project can be found in the Sumy region, their average cost was 575.0 million UAH. The Sumy region is followed by the Vinnytsya (414.6 million UAH) and Odesa region (350.0 million UAH). On the other side, in Zakarpattya, Lviv and Chernivtsi regions realize the lowest by average cost of investment projects; their average cost is 4.0, 7.5 and 9.3 million UAH, respectively.

According to results of cluster analysis, Ukrainian regions can be divided into four clusters, each of which is represented by relatively homogeneous parameters of the potential of innovative development of agribusiness 4.0: (i) "Leading regions with high potential for innovation development"; (ii) "Regions are followers of leaders with an average potential of innovation development"; (iii) "Medium-sized regions with low potential for innovation development"; (iv) "Regions-outsiders with very low potential for innovation development". The results of clusterization can be taken into account when forming a regional and agrarian policy on innovative development.

According to expert estimates, no more than 10% of Ukrainian agrarian enterprises implement digital technologies. Given the fact that contemporary agribusiness both in Ukraine and in Europe remains weakly digitized, we propose one of the strategic priorities of agrarian policy to recognize the promotion of the implementation of digital agricultural projects (projects connected with agribusiness 4.0). The investments in digital agricultural projects are an im-

portant tool for improving competitiveness and economic efficiency of Ukrainian enterprises and development of agriculture 4.0 in Europe. Consequently, there are significant reserves of increase of efficiency of agrarian enterprises implement digital projects that require the appropriate management of them, it may be the prospect for further research.

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21. The impact of globalization on farmers income. Evidence from Poland and Romanian agriculture

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Abstract

The process of globalization, explained in a variety of dimensions of factors such as capital and production as well as the fiscal problems in the European countries make the debate of tax competition relevant even today. This paper examines how globalization affects financial efficiency, farm income, the rural areas, with emphasis on Poland and Romania. Globalization challenges and opportunities as well as its consequences on the revenues and incomes have been presented for the 2008-2017 period. The research is based first on data extracted from FADN, European Union reports, Eurostat Database and National Statistical Institute of Romania and Poland. On the basis of the analysis of the literature and general statistical reports, strategic pricing equilibria under different indicators such as agricultural factor income, agricultural trade balance and vertically integrated the globalization it was identified and described. It was noted that the efficiency depends not only on a more globalized form but also on the toughness of competition.

Keywords: globalization, farmer income, agriculture, small farms, Romania, Poland

JEL codes: F02, Q14, O15, R51

21.1. Introduction

Through globalization, we have become "a single river". On this basic and generalizing framework are then added all the other components that make up the postmodern society in which we live: economic, financial, political, cultural and even religious. Nothing of what is happening now in our society remains uncontaminated by the scourge of globalization. Globalization has become the symbol of the times we live in. It is believed that the driving force that directed the evolution of the world to this point is the "mirage" of free market capitalism, with all the ben-

efits that come from it. Integration into the mechanisms of this politico-economic system in order to benefit fully from its effects is a desideratum of all people belonging to European and other European culture. Those who have once known, directly or indirectly, the superiority of free market capitalism in comparison with other types of economic and political societies are irreversibly attracted to it.

Romania enjoys its development potential, but is underutilized. He joined the European Union almost three years later than Poland. According to the National Institute of Statistics, it has an area of 238 thousand km^2, 6% of the total area of the European Union and a population of 18.5 million inhabitants, representing 4% of the total EU population. Although we are endowed with good land, water resources and why not human resources, the identification of agricultural capacity is limited, without enjoying its natural advantages.

With a remarkable rural occupation, with an area of 87% of the country's population, with a population of 46.2% and 8.54 million, their basic activity is agriculture, giving it a vital and social role. From this distribution of territory we can begin to approach the emergence of globalization and its way to affect both positively and negatively Romanian farmers. Studying the effects of globalization would be meaningless if we did not focus on studying it in the most important sector, namely the agricultural sector.

It is known that over 30% of Romania's population is employed in agriculture. Its contribution to the Gross Domestic Product, however, has not only seen growth periods but also gaps, analysing the past decades. At present, agriculture contributes with 3.9% of Romania's GDP, however, the trade balance is deficient, with more imports than exports.

21.2. Literature review

Since Theodore Levitt mentioned the concept of Globalization in 1983 for the first time, many studies were made in order to define this process that affects all the fields and areas of life and to define the benefits and risks. In 2003, the sociologist and Professor George Ritzer in the paper 'Globalization of nothing' explained the benefits and the risks of the globalization process that is speeding worldwide: Almost all countries and lives of billions people everywhere are transformed, sometimes dramatically, by the globalization phenomena. Its impact, visible at any level, is more pronounced and more obviously in the economic field, in the activity of company's transnational and international organizations. Also, professor mentioned that the local should be preserved.

In 2008, Philip McMichael published a paper "Globalization and the Agrarian World" where the impact of globalization on agriculture and rural areas was studied. Professor McMichael noticed that there was a resistance of the

rural areas and agriculture against the globalization phenomena and that even though it resisted so many centuries today it is difficult to maintain the local in the global sea. According to the German author Tom G. Palmer, professor at CATO University in Washington DC, globalization has brought major benefits to trade and jobs market. The author affirms that there are many myths about the phenomenon of globalization, but he succeeds in highlighting the benefits that would contradict them. It defines globalization as diminishing or eliminating state restrictions on foreign trade. Policies do not necessarily produce changes in the number of jobs, but they affect job types. The author finds the viable link between the prices paid on imports, which defines it as being the price of exports, just as imports are the price paid by foreigners for our exports.

Therefore, if the value of the imported goods is reduced and a tax is applied, the value of the exported goods, which is necessary to pay for those imports, is also diminished. This translates into loss of jobs in exporting industries. Tom G. Palmer also believes it is a myth that globalization directs capital to poorer areas, exploiting the poor and poorly paid. If it were true, all poor countries would have a wealth of foreign investment. By contrast, in the 1990s, 81% of foreign direct investment by the United States turned to Japan, Western Europe and Canada. Developing countries such as Indonesia, Brazil and Thailand accounted for 18%, with only 1% accounting for underdeveloped areas such as Africa.

Even though it's been a few decades since it was first mentioned, a definition that includes all the topics and fields has not been published yet: George Ritzer (2003) in "Globalization of nothing" study defines the globalization phenomena as a phenomena which emphasizes the ability of modern governments and organizations of capitalists to increase their power and influence worldwide; Anthony Giddens, in 2000 in the 'Runaway World' book; offers a definition containing predominantly sociological elements: globalization is changing the fundamental nature of our everyday experiences.

According to the German author Tom G. Palmer[1], professor at CATO University in Washington DC, globalization has brought major benefits to trade and jobs. In a presentation in front of his students, the author says there are many myths about the phenomenon of globalization, but he succeeds in highlighting the benefits that would contradict them. It defines globalization as diminishing or eliminating state restrictions on foreign trade. Policies do not necessarily produce changes in the number of jobs, but they affect job types.

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[1] Tom Gordon Palmer is a libertarian author and theorist, a Senior Fellow at the Cato Institute and Vice President for International Programs at the Atlas Network.

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21.3. Globalization impact on rural areas

Globalization is a current trend being a complex phenomenon and a process of integrating the global economy. It has an influence on all sectors, also on the agricultural one, finding positive aspects and trying to solve the negative ones. Globalization of agriculture means that every country in the world should have free access to markets in other countries. In Romania, according to the Farm Accountancy Data Network (FADN), the labour force situation in agriculture is not very good, as it is confronted with a decrease in the unemployment rate, as shown in the figure below (Figure 1). There are now many people who are at the retirement age but who will leave in a few years while young people do not come to school because there are no schools to train them. We are facing a serious crisis that the authorities do not pay enough attention to. According to the Ministry of Agriculture and Rural Development of Romania, a number of about 40 agricultural high schools will be reactivated, but graduates will only be after finishing a four-year course. Meanwhile, many manufacturers cannot grow due to shortage of qualified staff.

The situation in Poland is similar in terms of labour force in agriculture. Values for the active population and employees (generally) fluctuate constantly over the period 2008-2017, but in the agricultural field, the Farm Accountancy Data Network (FADN) database shows, as in Romania, a visible decrease from approx. 2 million people worked in agriculture in 2008, compared to 1.6 million in 2017.

Figure 1. Labour force in Romania
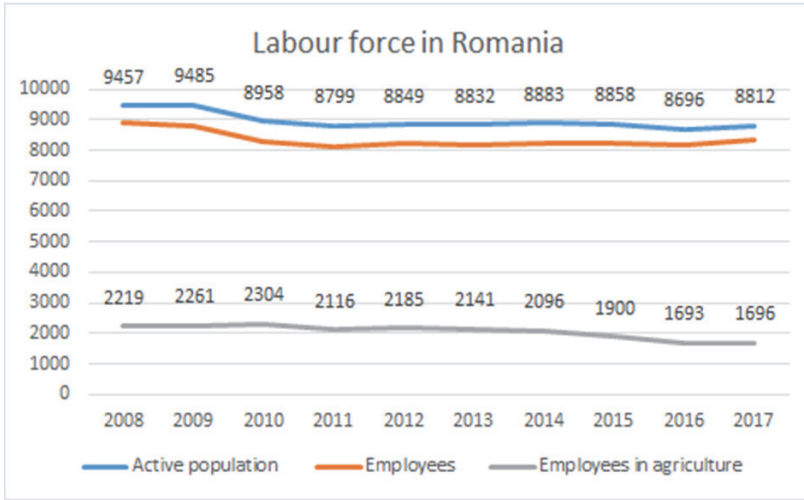
Figure 2. Labour force in Poland

Compared to Romania, Poland has constant values for the active population and generally employed, at a time when the phenomenon of globalization is becoming more and more pronounced. The farmers of both analysed countries face the situation when they have to bring specialized mechanizers from the EU member states, being paid much more than the average of both states.

Table 1. Farms number

	2007	2010	2013	2016
Romania	3 931 350	3 859 040	3 629 660	3 422 030
Poland	2 390 960	1 506 620	1 429 010	1 410 700

Source: Farm Accountancy Data Network.

According to the FADN database, the number of farms in both Poland and Romania has fallen sharply, being a constant change to the adaptability of market demands. The decline of farms does not necessarily manifest itself negatively, which means greater collaboration and cooperativization in order to succeed together in the new conditions created by common policies.

The above table shows that the percentage of the decrease in the number of farms in Romania (13%) is exceeded by that of Poland (41%), due to the large number of small farms in the Romanian state. In Romania, in 2016, the total number of agricultural holdings was 3.422 million (Table 1), 5.7% less compared to the Structural Survey in Agriculture in 2013 and 11.3% against the General Agricultural Census in 2010. Specifically, the number of agricultural holdings without legal personality was 3.396 million, 5.7% lower than in 2013, while the number of agricultural holdings with legal personality was 26 000, 6.4% lower than in 2013.

Table 2. Gross farm income

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	5861	7881	6015	7284	8270	7519	7812	7316	6250	7659
Poland	15548	15173	12073	15913	17018	17160	16685	15635	14868	14651

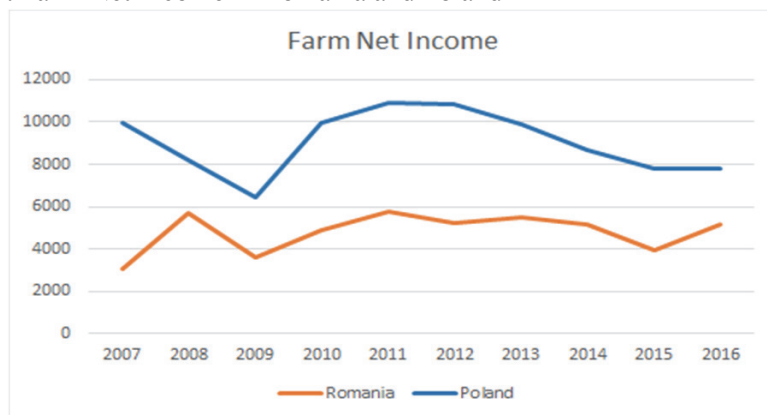*Source: Farm Accountancy Data Network.*

Whenever you talk to a Romanian farmer, they always say the same thing, such as that the selling price of agricultural products is too low, and the revenue obtained by marketing it does not cover the costs incurred. When we go into detail, however, we ask how much it costs a farmer to make, for example, a litter of milk, most of the time he does not know how to respond. Most of them have little or no record of the costs and income of their farm activity. I agree that the cost of using milk is too low, but it influences the profitability of the farm in one direction, i.e. it has an effect on farm incomes. However, gross profit (or economic efficiency) is the result of lower production revenue expenditure. So gross profits depend on production costs to the same extent as income.

Table 3. Farm Net Income

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	3027	5706	3623	4890	5763	5250	5525	5156	3961	5166
Poland	9979	8197	6445	9985	10887	10873	9867	8706	7808	7777

Source: Farm Accountancy Data Network.

Figure 3. Farm Net Income in Romania and Poland

Source: authors' elaboration with data from the Farm Accountancy Data Network.

Family farms have a key role in the development of the Romanian economy through their share in the production of food, the fuller use of the labour force, the subsistence of the population, the economic diversification and the increase of the activity of the rural areas. The family farm has a historical tradition since the time when everything was done in the house and in the household. It is then passed into the era in which family farms need to exchange as often as possible with the market, consuming goods that they no longer produce in the household, which they cannot buy unless they sell on the market some of the products that the household produces them. Market price and capital need dictate to the farmer what to do, that is, to produce what the market wants, which has a good price.

Table 4. Family farm income

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	1746.14	2306.35	2435.41	3452.04	3928.24	3846.99	4303.98	4438.8	3830.78	4561.67
Poland	6414.72	5344.72	4279.01	6529.73	6976.57	6930.71	6510.63	5804.85	5427.24	5318.78

Source: Farm Accountancy Data Network.

In the past, the household was considered to be the economic cell of production, distribution and consumption of goods in relation to the needs of the family or several persons brought together for the same purpose. While the pur-

pose of a farm is to get a net income as high as possible, the goal of a household is to obtain a total income that can meet the needs of family consumption. Therefore, the household differs from the holding by introducing the family factor. However, the peasant farms are dependent on peasant sociology, considering the agricultural household as a closed and autonomous system, the maximum income being obtained only when an optimal unit of land, labour and capital. This was also due to the fact that Romania became a country of small peasant households (74.9% of the total households) in the interwar period, with a strong mass of the average household holding 29.9% of the agricultural area and an important 12 (more than a quarter of the agricultural area was organized in households with more than 100 hectares).

Table 5. Unpaid labour

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	0.97	0.97	1.01	1.06	1.1	1.2	1.19	1.33	1.44	1.68
Poland	1.43	1.43	1.46	1.47	1.49	1.49	1.47	1.47	1.53	1.52

Source: Farm Accountancy Data Network.

Using our net farm income and family farm income, considering that only family members are working in the farmhouse, and they, through their work, devote themselves to both the market and the self-consumption, we are able to calculate the average number of people they work on the farms of the states under analysis, who do not receive remuneration for their work. This result is expressed in the Family Work Unit (FWU).

$$FWU = FNI / FFI$$

The results show that the level of unpaid work in households for Poland has been somewhat stable in the analysed years, meaning a close link between net farm income and family farm income. In contrast, in Romania, the number of people in a household who do not receive reward for the work done is steadily increasing.

Table 6. Total Agricultural trade – Romania

	2010	2011	2012	2013	2014	2015	2016
	U.M. mil. $						
Agricultural Imports	5,200	6,197	6,161	6,579	6,797	6,710	7,512
Agricultural Exports	4,122	5,581	5,193	7,042	7,371	6,572	6,823
Agricultural Trade Deficit/Surplus	-1,078	-615	-967	463	575	-132	-689

Source: Global Trade Atlas.

Due to its fertile soil and location, Romania has become a leading exporter among competing European countries. The agricultural sector contributes significantly to national economic performance due to the fact that the products are being exported worldwide. In 2016, total foreign trade in agricultural products, mainly wheat and maize, summed approximately EUR 7 billion, this is more than 9% of total Romanian exports. Thereby, Romania has taken the first place in the European Union to increase agricultural exports.

At the same time, the imports of agricultural products from Romania increased substantially. Demand for agro-food products increased due to tax incentives – reduced VAT on food from 24% to 9%, followed by a general reduction in VAT from 24% to 19%. In 2016, total imports of agricultural products, mainly food and processed food (meat, fruit and sugar), stood at around 119%, generating a trade deficit of EUR 689 million.

Table 7. Total Agricultural trade – Poland

	2014	2015	2016	2017
	U.M. mil. $			
Agricultural Imports	2,858,761	2,465,127	2,310,513	2,497,933
Agricultural Exports	738,798	889,574	916,612	949,390
Agricultural Trade Deficit/Surplus	-2,119,963	-1,575,553	-1,393,901	-1,548,543

Source: Global Trade Atlas.

According to Flanders Investment and Trade, the year 2017 was a triumphant year due to the high level of agricultural figures in regards to the production. However, in order to reduce the gap with other European countries, a greater focus on productivity and efficiency in agriculture is needed. In this respect, the diversification of economic activity in rural areas, the support of local investments through the creation of new jobs and innovation in agriculture sector are necessary.

After the fall of communism, Poland pursued a policy of liberalization of the economy, and today it is one of the examples of the successful transition from an economy led by the state to a market economy. In the field of agriculture, Poland has a large number of private farms, with a potential of becoming the most important food producer country in the European Union.

According to the Economic Complexity Observatory (OEC), Poland is ranked 22th in the world in regards to the export economy. Market liberalization favoured increased commodity exchanges with the largest countries in Central

and Eastern Europe. The most important export destinations for Poland are Germany, the United Kingdom, the Czech Republic, France and Italy. The highest imports came from Germany, China, Italy, the Netherlands and the Czech Republic. At the beginning of 2016, the total amount of goods exported abroad increased compared to the same period of the previous years (2014-2015). However, the import dynamics index was much higher than the dynamics of exports.

Following an overall analysis of the two tables above, we note that both communities face a continuing trade deficit, even though Romania recorded a slight surplus during the period 2013-2014.

21.4. Globalization impact on small farmers – foreign investment in Romania and Poland

Today, the prerequisites of a country's economic development lie in the abundance of capital. Public investments are often limited by the various national interests that tend to gain priority – payment of wages and pensions, control of the budget deficit, etc. In the absence of investment, the economy loses. If public resources are limited, then it should be encouraged private financing.

Since the free movement and free access to European markets, investors have preferred the more accessible markets.

Foreign direct investment (FDI) are a healthy source on which economic growth can be sustained, including in times when economic stability is in danger and growth is under pressure.

With a strategic geographical position, a large market and low cost of the workforce, Romania has a consistent set of attractive factors for FDI capable of doing so turns into a priority destination for foreign capital after economic opening since the early 1990s. At the same time, however, the inert legislative framework, together with the lack of some measures aimed at attracting investors, to which are added the political instability in recent years, is a good part of the causes for which Romania is not a pole of today FDI in the region (Horobeț and Popobici, 2017).

Unlike Romania, Poland has a medium-term vision to attract investments, developed through the 12-year program to support major investments for the period 2011-2023, and is the main basis for granting subsidies. The Polish government has identified seven priority sectors targeted by state aid: the automotive sector, the electronics and electronics sector, aviation, biotechnology, food processing, modern services and Research & Development. In addition, support is also given to companies that make significant productive investments in other sectors.[2]

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[2] U.S. Department of Commerce's International Trade Administration 2017, Poland - Openness to and Restriction on Foreign Investment, https://www.export.gov/article?id=Poland-Openness-to-Foreign-Investment, accesed on 6 March 2017.

In regards to the agricultural sector with reference to farmers and their income, there are several things that should be considered when globalization matter is in discuss and then the foreign investors are interested in buying agricultural land. Since this resource is the main one in regards to the production, losing the track of the property exchanges is an attempt to the national food security.

Globalization of agriculture means that every country in the world should have free access to markets and agricultural resources and products in other countries.

Globalization has eroded the cultures of the countries and made life for farmers more difficult. To cope with growing competition, farmers have begun to buy expensive seeds, chemical fertilizers of synthesis and to use large amounts of water. The difference between agriculture and industry is that in industry we can measure the profits, to end or start production, zoom in or out. But in agriculture it depends on rain and natural conditions. Culture is planted in depending on the season and must be harvested at the right time. All products come to the market at the same time, the price is determined by the market, not the farmer. In these conditions, governments around the world are forced to subsidize agricultural products.

In a global agricultural economy, large farms will continue to replace the small farms on the world market. More and more, large farms will be controlled by giant multinational corporations. Romania has one third (33.5%) of the total number of farms in the European Union in 2013, while Poland ranks second (13.2), most of the farms in both states being considered as family farms and semi-subsistence farms[3]. Considering this, a concern arises regarding the fact that this high number of farmers will not be able to maintain their only source of income and they will be bought by the large ones. One solution for them could be association and cooperation so that they can produce and sell as one large farm on order to be able to compete on the market.

The European Union created a fund, The European Globalization Adjustment Fund that provides support for people who lose their jobs due to major changes in world trade patterns with globalization or because of the crisis economic and financial. The maximum annual budget available to the EGF is EUR 150 million for the 2014-2020 period. Funds are earmarked for projects designed to help redundant people find a new job or start their own business. As a rule, the EGF can only be used if a single company has made redundant more than 500 employees or if many employees are dismissed from a specific economic sector in one or more neighbouring regions (European Union, http://ec.europa.eu/social/main.jsp?catId=326&langId=ro).

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[3] European Union report, 2017

Other measures of support can be created by the governments in the fiscal area, regarding the taxation. Measures that can support the farmers by reducing the taxation for the small producers and create facilities for them in order to be able to go out on the market.

21.5. Summary and conclusions

Considering the structure of property and households, and also other factors such as deindustrialisation, youth migration, lack of the desire to associate for production, processing and marketing products, amid the aging population and the increase in numbers of pensioners and social assistants, the peasant household is threatened as being, many villages being depopulated. At the same time, the aggressive invasion of imported food considerably reduces the marketing of small-scale agricultural products farmers. In this context, the problem of small property dichotomy arises – the large holding can only be solved by considering complementary to the two forms, according to the specific each economic area, with the historical evolution and the stage in which it was social-economic development.

However, it is obvious that the evolution of the household was totally or partially conditioned by socialist evolution and natural-economic conditions in all European countries. An essential feature of Western countries is continuity the development, merging, endowment and accumulation process capital of households and supply co-operation and production outlets, compared to eastern countries, where the repetition of agrarian reforms (in modern Romania every 25-30 years there was a new agrarian reform, the seventh, since 1991 being the most inefficient) had implications regarding the viability of agrarian structures and households which actually maintained human settlements. This is because peasant households have a great ability to resist and adapt to different economic, social, political situations. This one particularity is favoured by the triple identity of the farmer – as landowner, manager and businessman who runs the activity of the holding by investing capital and labour, increasing its dimensions as the technological process is introduced (continuing to preserve family character in the vast majority of cases).

We hope the development and consolidation of households will be assured by the farms vocation for survival, exercise taken over several generations and succeeded most of the time. Actually, the village has become a synergistic economy in which it has a field of action the principles of competition and free initiative in the effective use of resources, with the role of the farmer.

In an international scenario marked by uncertainty and anticipation after, the European Union pays particular attention to the application of a territory of effective policies in response to increased competition in markets, and repre-

sents an interesting tool for government intervention in development of rural area in a defined area of quality products. In this direction in the last years, the European Union has authorized state aid for implementation supply chain contracts, as well as the sector for the purpose promoting and modernizing agriculture, as well as technological development enterprises.

Because of the big number of young persons with no direct interest in agriculture, we suggest to create more attraction and involvement by creating more agricultural colleges.

Sometimes the household needs help in some work, as those of cultivation where they do not face the quantity of work and they do not find anyone to work with, even if they pay a good value for it. The unemployed prefers to live on social benefits and they do not need more. Also, they prefer to do the same work in agriculture in Italy or Spain, where they have a better salary and as they are used to say, a better life.

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22. Land concentration and competitiveness of agricultural enterprises in Ukraine

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Abstract

The problem of the concentration of agricultural land has now acquired a global character. Recently the problem of concentration of agricultural land has been identified as one of the major threats to European agriculture. For example, in Report Against Land Concentration recently adopted by the European Parliament „calls on the Commission to maintain, during the development of the draft CAP for the period after 2020, measures to combat the concentration of agricultural land and to develop additional measures in support of micro, small and medium-sized enterprises". As a result of research an assessment of the current state and trends of land concentration in agricultural enterprises of Ukraine was made and the effect of the level of land concentration on the competitiveness of farms was investigated. One of the directions of the agrarian policy was proposed to be directed at preventing the monopolization of the land rental market through scientifically based restriction of the level of concentration of agricultural land. At the same time it is necessary to support agricultural enterprises that meet the criteria of a village-preserving model.

Keywords: land concentration, competitiveness, development, rational agricultural land use, agricultural enterprises, agrarian policy, Ukraine

JEL codes: Q10, Q12, Q15, Q18

22.1. Introduction

The problem of the concentration of agricultural lands is among the most topical issues in Ukraine, European Union and around the globe [Andriichuk, 2015; Andriichuk and Sas, 2017; Balmann, 2014; Borodina et al., 2017; Dankevych, 2016; Deininger et al., 2013; Demyanenko, 2008; Gagalyuk, 2017; Hermans et al., 2017; Huang et al., 2017; Lupenko et al., 2013].

According to Hermans et al. [2017] during the recent years an increasing amount of large-scale farming operations have emerged all over the world: from (Eastern) Europe, to South America, China and the countries of the Former Soviet Union. These enterprises go under the name of mega-farms or agroholdings: horizontally or vertically integrated operations with farm sizes of up to 500 thsd. hectares and sometimes even more. These types of farms are not only found in crop farming, but also in animal husbandry [Hermans et al., 2017].

Recently the problem of concentration of agricultural land has been identified as one of the major threats to European agriculture. For example, in Report Against Land Concentration recently adopted by the European Parliament „calls on the Commission to maintain, during the development of the draft CAP for the period after 2020, measures to combat the concentration of agricultural land and to develop additional measures in support of micro, small and medium-sized enterprises" [European Parliament, 2017].

Based on the analysis of the trends in agricultural land use and land concentration in the EU, Borodina et al. [2017] argue that the European and national legislations fail in preventing negative consequences of agricultural land concentration and grabbing, and in ensuring the priority of family farms as a basis of the EU agrarian system. The authors confirm that increasing number of large-scale land contracts, monopolizing control over agricultural lands, and structural changes in land use decrease the viability of both agricultural sector and rural areas [Borodina et al., 2017]. In this context, a natural issue is does Ukraine need agroholdings? Answering this question in the context of agricultural policy, Balmann [2014] concludes: "(i) should acknowledge contribution of agroholdings to economic development; (ii) should neither create barriers for agroholdings nor favour them; (iii) should rather focus on improving institutional environment (fight corruption, provide stability); (iv) should focus on development of infrastructure rather than subsidies (transportation, education); (v) should strengthen interests of rural stakeholders (economic and political participation)".

The specific features of the competitive environment of enterprises in Ukraine under the global and national crisis are researched in the article by Dyadyuk [2016]. Author concluded that any enterprise must have a greater degree of flexibility than in periods of stability or economic growth for obtaining and maintaining of competitive advantages in the current period of global instability. Flexibility and adaptability of the economic system are the main prerequisite for obtaining and developing of enterprise competitive advantages and stem component of competitiveness [Dyadyuk, 2016].

In the article Dankevych et al. [2016] examined the proliferation and rapid development of integrated structures of holding type in Ukrainian agriculture. The authors analysed the impact of these entities on the overall functioning of the agricultural sector, rural development and the environment. They observed overconcentration the agricultural production and land resources, namely the formation of a new system of technological and economic relationships between agrarian producers and processors [Dankevych et al., 2016]. In the paper by Dub [2017] established stages of development, compared land bank of holding agrarian companies, and determined the geographic distribution, the levels of debt security, reputation, financial reliability, effectiveness of largest agricultural holdings of Ukraine.

Although there are some studies on the land concentration and agroholdings, there is no systematic analysis of the influence of the level of land concentration on the competitiveness of agricultural enterprises, as well as the prospects for the development of agricultural holdings.

22.2. Methodology

The purpose of the research is to evaluate the current state and trends of land concentration in agricultural enterprises of Ukraine and to investigate the effect of the level of land concentration on the competitiveness of farms.

The following methods were used in the process of research: mathematical equalization of dynamic series – to identify trends in change and forecasting the level of land concentration; system analysis and logical generalization – to determine the role of land concentration in the formation of competitiveness of agricultural enterprises; correlation and regression analysis – to evaluation the effect of the level of land concentration on the competitiveness of agricultural enterprises; induction and deduction – to generalize the research results; abstract-logic – to make conclusions and suggestions.

The study is based on source materials obtained from the database of the State Statistics Service of Ukraine and the data of public agricultural companies and latifundist.com.

22.3. Status and trends of land concentration in agricultural enterprises of Ukraine
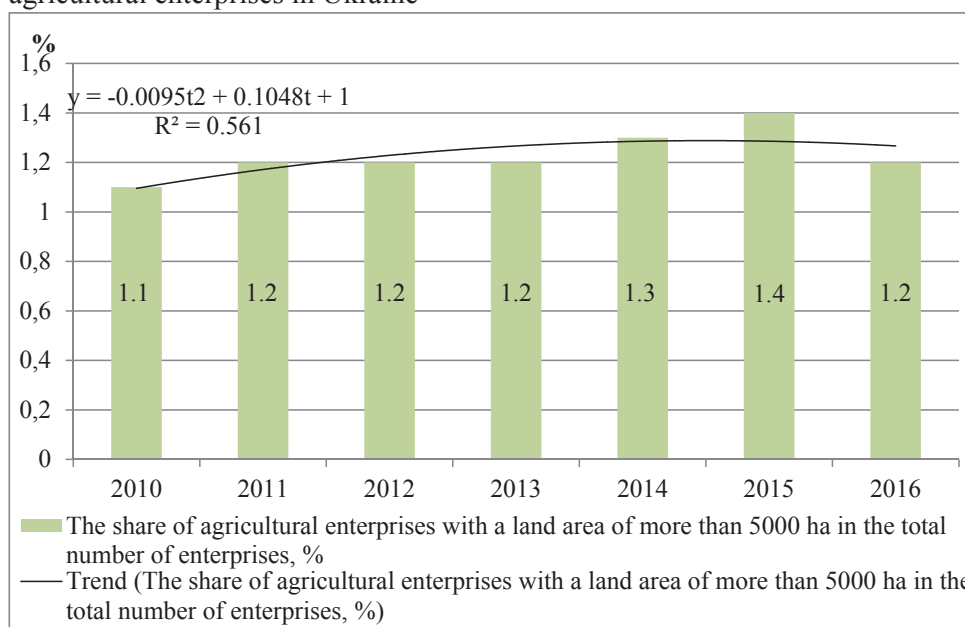
One of the trends in the development of the world economy is to increase concentration as a form of production organization and ensure its competitiveness. Now, there are two types of agricultural enterprises in Ukraine: corporate farms and family farms. There are about 14 thousand corporate farms each cultivating about 1164 ha of agricultural land on average in 2016. There are about

34 thousand much smaller family farms with an average of 132 ha of agricultural land each in 2016. In Ukraine, the dominant type of farms is large enterprises with large agricultural land.

The average land size of agricultural enterprises in Ukraine is one of the largest in Europe. For example, the average farm size in the Czech Republic was 133.0 ha in 2013; in the United Kingdom (93.1 ha/farm) and Slovakia (80.7 ha/farm). Romanian, Slovenian and Greek farms are the smallest ones in the EU, their average sizes are 3.6, 6.7 and 6.9 ha, respectively. The family farm in the European agriculture can be characterized by low farm size; it is only 16.1 ha in the EU-28 [Mizik, 2018].

The results of the analysis of dynamics of indicators of the relative level of land concentration in agricultural enterprises in Ukraine in 2010-2016 are shown in Figure 1 and Figure 2.

Figure 1. Dynamics of indicators of the relative level of land concentration in agricultural enterprises in Ukraine


The share of agricultural enterprises with a land area of more than 5000 ha in the total number of enterprises, %

Trend (The share of agricultural enterprises with a land area of more than 5000 ha in the total number of enterprises, %)

Source: own calculations and composition based on the data of State Statistics Service of Ukraine.

It should be noted that about 1% of agricultural enterprises control more than 33% of the land.

Results of the analysis of dynamics of indicators of the absolute level of land concentration (actual and forecast) in agricultural enterprises in Ukraine (Table 1) indicate an increase in the concentration of agricultural land.

Figure 2. Dynamics of indicators of the relative level of land concentration in agricultural enterprises in Ukraine
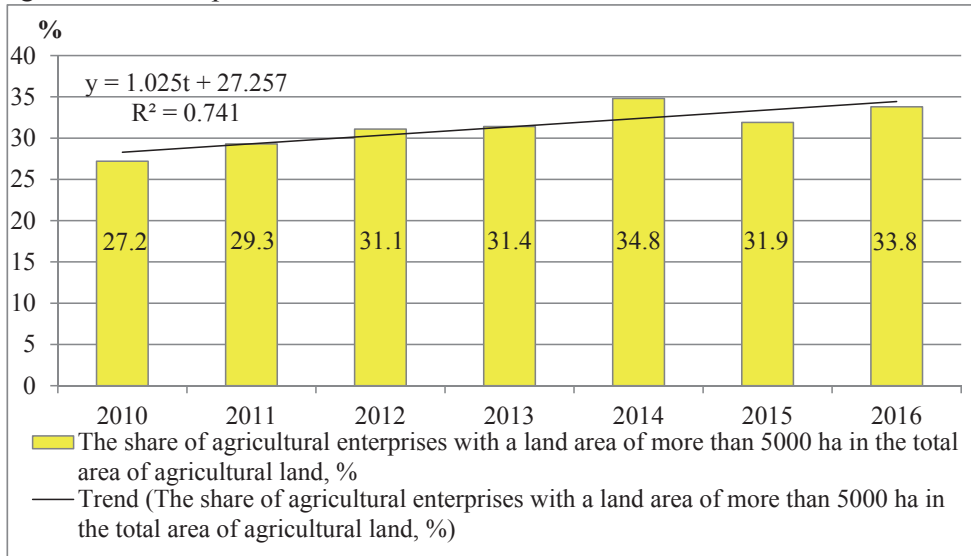
Source: own calculations and composition based on the data of State Statistics Service of Ukraine.

Table 1. Dynamics of indicators of the absolute level of land concentration (actual and forecast) in agricultural enterprises in Ukraine

Indexes	Years							
	2010	2011	2012	2013	2014	2015	2016	2020*
Agricultural land area in agricultural enterprises, thousand ha	20589.6	20499.3	20499.3	20665.5	20437.2	20548.9	20746.9	20697.0
including agricultural land area in family farms, thousand ha	4290.8	4345.9	4389.4	4451.7	4578.3	4343.7	4437.9	4561.9
Number of agricultural enterprises, units	56493	56133	49415	49046	46199	45379	47697	37274
including number of family farms, units	41524	40965	34035	34168	33084	32303	33682	25230
The average size of agricultural enterprises (including family farms), ha	364	365	415	421	442	453	435	475
including the average size of family farms, ha	103	106	129	130	138	134	132	149
The average size of agricultural enterprises (excluding family farms), ha	1089	1065	1047	1090	1209	1239	1164	1384

*Forecast.

Source: own calculations based on the data of State Statistics Service of Ukraine.

The average size of agricultural enterprises (including family farms) in 2016 was 435 hectares per enterprise (Figure 3). If the trend continues to increase, then in 2020 the average size of agricultural enterprises (including family farms) will be 475 hectares per enterprise.

Figure 3. Dynamics of indicators of the absolute level of land concentration in agricultural enterprises (including family farms) in Ukraine, ha
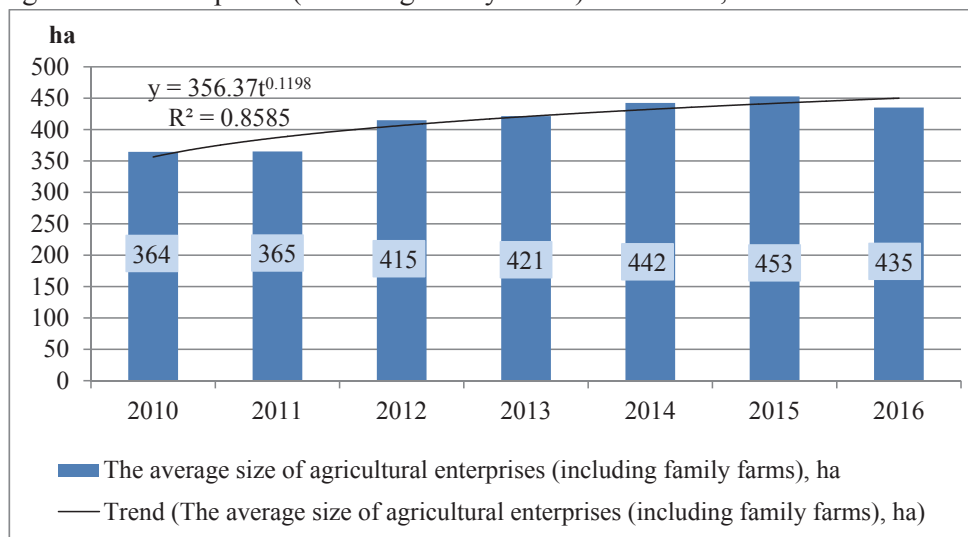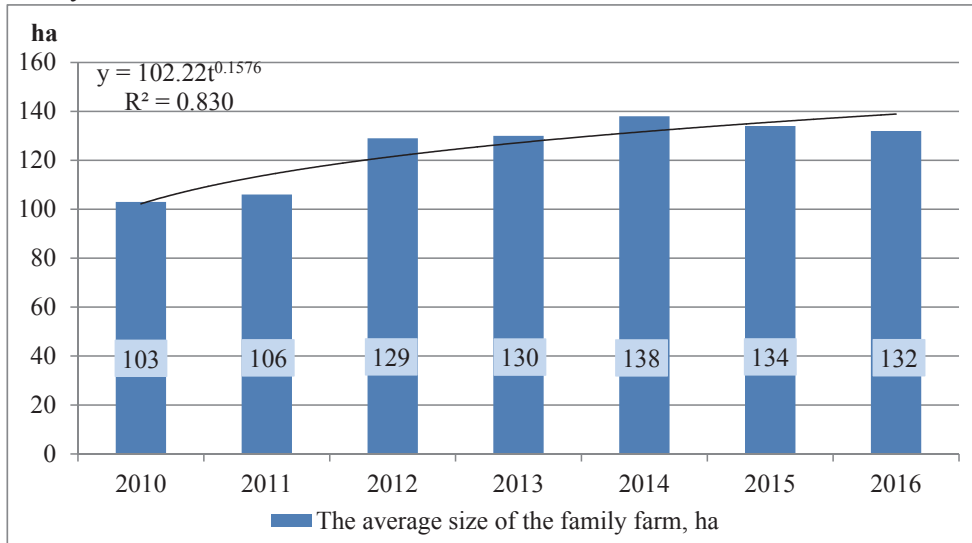

Source: own calculations and composition based on the data of State Statistics Service of Ukraine.

The average size of family farms in 2016 was 132 hectares per enterprise (Figure 4). If the trend continues to increase, then in 2020 the average size of family farms will be 149 hectares per enterprise.

We would like to draw attention to the average size of agricultural enterprises (excluding family farms) in 2016 was 1164 hectares per enterprise (Figure 5). This is significantly more than in the EU countries. If the trend continues to increase, then in 2020 the average size of agricultural enterprises (excluding family farms) will be 1384 hectares per enterprise.

Figure 4. Dynamics of indicators of the absolute level of land concentration in family farms in Ukraine, ha

$y = 102.22t^{0.1576}$
$R^2 = 0.830$

	2010	2011	2012	2013	2014	2015	2016
	103	106	129	130	138	134	132

The average size of the family farm, ha

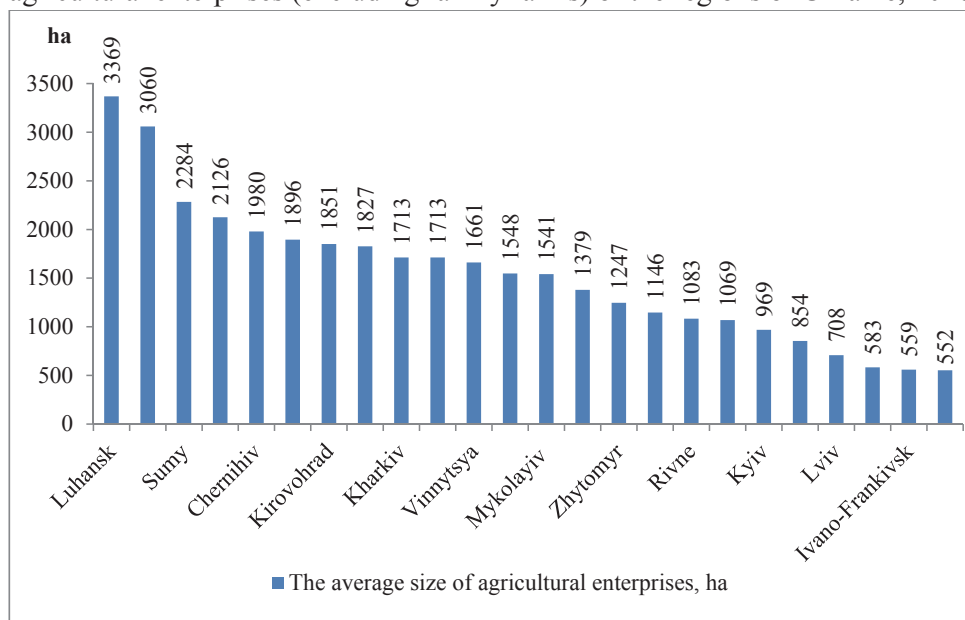*Source: own calculations and composition based on the data of State Statistics Service of Ukraine.*

Figure 5. Dynamics of indicators of the absolute level of land concentration in agricultural enterprises (excluding family farms) in Ukraine, ha

$y = 1.5885t^2 + 13.542t + 1043.1$
$R^2 = 0.578$

	2010	2011	2012	2013	2014	2015	2016
	1089	1065	1047	1090	1209	1239	1164

The average size of agricultural enterprises (excluding family farms), ha
Trend (The average size of agricultural enterprises (excluding family farms), ha)
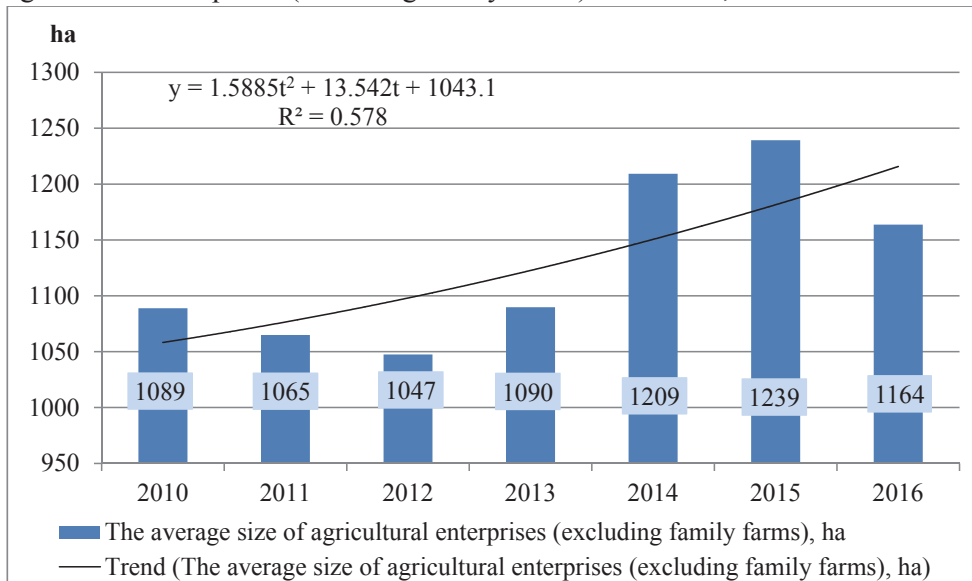
Source: own calculations and composition based on the data of State Statistics Service of Ukraine.

The next graph (Figure 6) presents the average indicators of the absolute level of land concentration in agricultural enterprises of the regions of Ukraine. As we can see the average size of agricultural enterprises varies in a wide range: from 3369 hectares in the Luhansk region to 552 hectares in the Chernivtsi region. It can be seen from Figure 6 that there are 15 regions (Luhansk, Donetsk, Sumy, Poltava, Chernihiv, Khmelnytskiy, Kirovohrad, Zaporizhya, Kharkiv, Kherson, Vinnytsya, Dnipropetrovsk, Mykolayiv, Cherkasy and Zhytomyr), where the average size of agricultural land per enterprise exceeds the average in Ukraine by 7.1–289.4%. At the same time there are 9 regions (Ternopil, Rivne, Odesa, Kyiv, Volyn, Lviv, Zakarpattya, Ivano-Frankivsk and Chernivtsi), where the average size of agricultural land per enterprise is 1.5–52.6% lower than the Ukraine average.

Figure 6. The average indicators of the absolute level of land concentration in agricultural enterprises (excluding family farms) of the regions of Ukraine, 2016

Source: own calculations and composition based on the data of State Statistics Service of Ukraine.

So, in conclusions, it should be noted, that the level of concentration of agricultural land in Ukraine is increasing in dynamics. We found a significant differentiation in the average size of agricultural enterprises at the regional level. At the microeconomic level there is even more significant differentiation.

22.4. The level of concentration and the intensity of competition in the land rental market: the case of Ukrainian agroholdings

With mega-farms cultivating tens or hundreds of thousands of hectares, Ukraine is used to demonstrate the existence of economies of scale in modern agriculture [Deininger et al., 2013]. In Ukraine, we consider companies that operate on more than 10000 ha of agricultural land to be in the category of large scale farming. The common name for such companies is agricultural holdings (or agroholdings).

Agroholdings in Ukraine, usually are large business projects (mega-farms), whose main purpose is profit and increase the capital of their founders. They are the subjects of the business, which are competing with each other on the market, including agricultural land rental market. This phenomenon is still relatively new in research.

As of today, there are about 100 agroholdings in Ukraine. The majority of them specialize in cash crop production. The prevailing business model is horizontal and vertical integration. In terms of space and location, agroholdings consist of quasi-autonomous production clusters. Also, Ukrainian agroholdings are primarily export-oriented [Lissitsa, 2018].

The main factors that drive the development of large scale farming today (formed according Lissitsa [2018]):

- Technology. Agroholdings are generally more capable of adopting and implementing new technologies into their production and management methods;
- Global consumption trends. A large companies pay attention to these trends;
- The environmental and safety standards are also something that big companies are better at dealing with, as the certification process might be very expensive and difficult.

According to the Association „Ukrainian Agribusiness Club" (UCAB), the most active participants in the agricultural land consolidation process today are medium-sized agroholdings with a land bank of 20–40 thousand hectares. By 2020, according to forecast of the UCAB, the land bank of agroholdings may increase to 6.25 million hectares [Forecast, 2016].

Today the process of concentration of agricultural land in Ukrainian agroholdings can be called „superconcentration" or „overconcentration". Two Ukrainian agroholdings (Kernel and Ukrlandfarming holding with land banks more than 600 thousands ha) are included in the TOP-20 largest companies by the volumes of land bank in the world. According to the Land Matrix project in Ukraine and Eastern Europe, the foreign capital controls 2.4 million hectares of agricultural land in Ukraine, it is almost 10% [Two Ukrainian, 2017].

To estimate the economic concentration of the land, we used a coefficient of relative concentration of one, three, five, ten, 50 and 100 of the largest agroholdings by the size land bank (Figure 7). This coefficient characterizes the aggregate share of the largest participants of the land rent market in the state and indicates the level of its monopolization, but it does not indicate the intensity of competition.

The results of study indicate that the TOP-100 agroholdings control 6.4 million hectares in total, or about 31% of the total agricultural land used by Ukrainian agricultural enterprises. Top-50 agroholdings according to the size of the land bank looks control about 27% of the total agricultural land used by Ukrainian agricultural enterprises. The first five agroholdings control about 10%, one of the largest – Ukrlandfarming Agroholding – control about 3% of rented agricultural land in Ukraine.

Figure 7. Dynamics of the index (CR) of land concentration in the agricultural enterprises of Ukraine (on the example of the largest agroholdings)
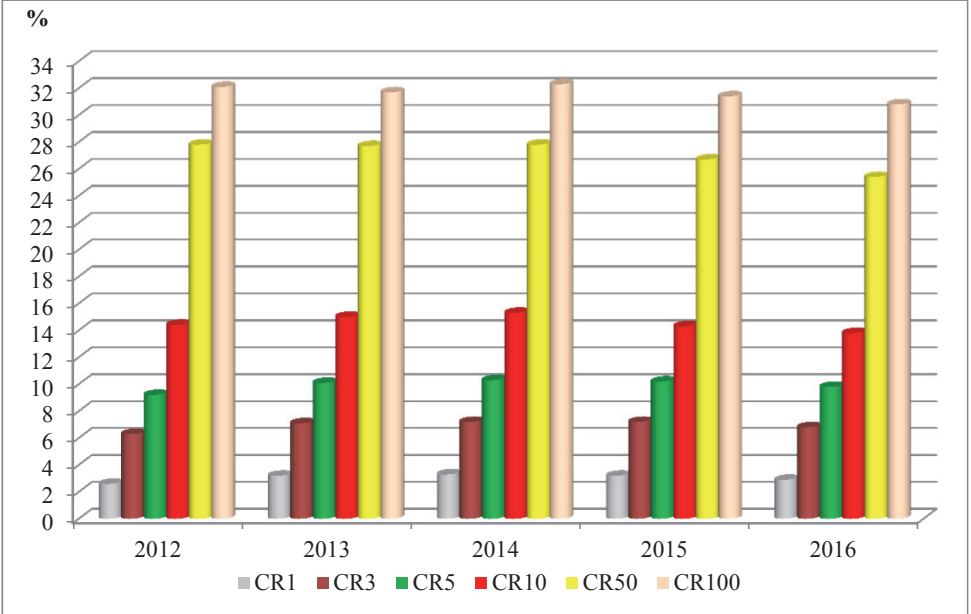
Source: own calculations and composition based on the data of public companies and latifundist.com.

To assess the level of competition in the land rental market, we used the Herfindahl-Hirschman Index (Table 2).

According to the results of the study, the value of the Herfindahl––Hirschman Index indicates a normal level of the intensity of competition and the low level of concentration of the land rent market in Ukraine.

Table 2. Calculation of the Herfindahl–Hirschman Index for the rental market of agricultural land in Ukraine (on the example of the TOP-100 largest agroholdings), 2016

Name of Company	Land bank, thousand ha	Market share, %	$(a_j)^2$
UkrLandFarming	605	2.92	8.50
Ahroprosperis	430	2.07	4.30
Kernel	385	1.86	3.44
Myronivskyi Khliboprodukt	370	1.78	3.18
Astarta-Kyiv	250	1.20	1.45
Ukrainski ahrarni investytsii	220	1.06	1.12
Mriia Ahrokholdynh	185	0.89	0.80
Ahroton	151	0.73	0.53
IMK	137	0.66	0.44
Ahrein	127	0.61	0.37
…			
Total / Herfindahl-Hirschman Index	20746.9	100.0	28.74

Source: own calculations and composition based on the data of public companies and latifundist.com.

A similar conclusion can be made on the basis of the dynamics of Herfindahl-Hirschman Index (Figure 8) for the rental market of agricultural land in Ukraine (on the example of the TOP-100 largest agroholdings).

Figure 8. Herfindahl–Hirschman Index dynamics for rental market of agricultural land in Ukraine (on the example of the TOP-100 largest agroholdings)
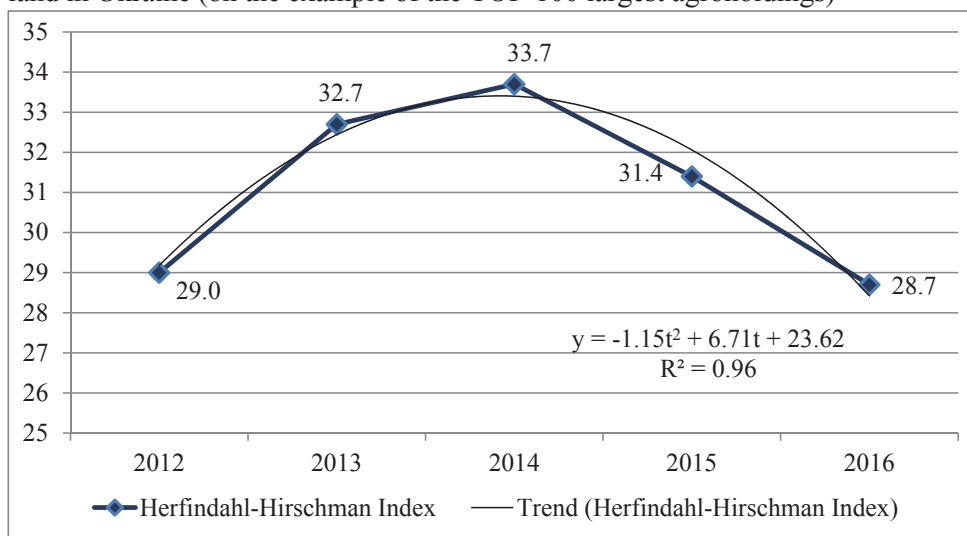
Source: own calculations and composition based on the data of public companies and latifundist.com.

It should be noted that the calculated coefficients are related to the macroeconomic level. At the regional level the indicator of monopolization of the market land rent is much higher. For example, the share of land area, which is controlled by agroholdings in some regions of Ukraine reaches 55%. The results of the analysis of the UCAB data allowed us to unite the regions of Ukraine according to the share of land area, which is controlled by agroholdings, into four groups:

- up to 15% – Zakarpattya, Zaporizhya, Dnipropetrovsk, Kirovohrad, Mykolayiv, Kherson and Odesa;
- 15-30% – Volyn, Rivne, Zhytomyr, Kyiv, Kharkiv and Luhansk;
- 30-45% – Ternopil, Vinnytsya, Cherkasy, Sumy, Poltava, Chernihiv and Donetsk;
- 45-55% – Lviv, Ivano-Frankivsk, Chernivtsi and Khmelnytskiy.

At the level of specific administrative districts and/or joint territorial communities, the level of monopolization of land leases is much higher. Therefore, one of the directions of the agrarian policy should be directed at preventing the monopolization of the land rental market through scientifically based restriction of the level of concentration of agricultural land.

22.5. Impact of the level of land concentration on the competitiveness of agricultural enterprises
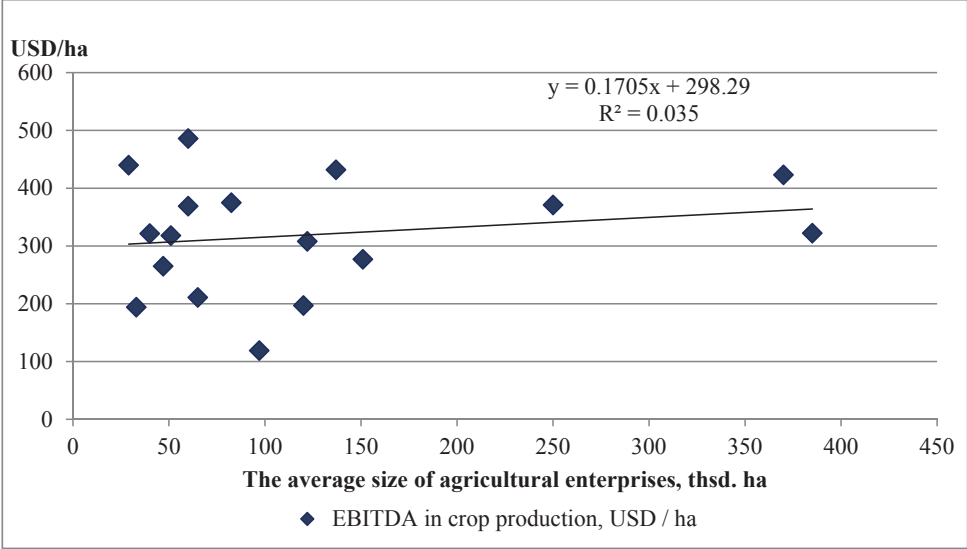
First of all, we will consider the impact of the level of land concentration on the example of the most efficient plant production agroholdings (Figure 9). On this figure, we presented a correlation field of impact of the level of land concentration in agroholdings (on the example of the most efficient plant production companies) on their competitiveness (by the EBITDA – Earnings before interest, taxes, depreciation and amortization) per hectare of land in crop production).

As we can see, the increase of concentration level has a generally positive effect on competitiveness, but the correlation coefficient is low (r = 0.187). According to parameters of the equation of a straight line, increasing of land concentration in agroholdings per unit contributes to increase of the EBITDA per hectare of land in crop production at 0,171 USD/ha. The coefficient of determination indicates that the variation of resultant variable at the 18.7% depending on the variation of factor of land concentration, and at the 81.3% – from other factors.

The next graph (Figure 10) presents the results of the study of impact of the level of land concentration in agroholdings (on the example of the most efficient plant production companies) on their competitiveness (by the income (revenue) per hectare of land in crop production).

Figure 9. Impact of the level of land concentration in agroholdings (on the example of the most efficient plant production companies) on their competitiveness (by the EBITDA per hectare of land in crop production), 2016

USD/ha

y = 0.1705x + 298.29
R² = 0.035

The average size of agricultural enterprises, thsd. ha

◆ EBITDA in crop production, USD / ha

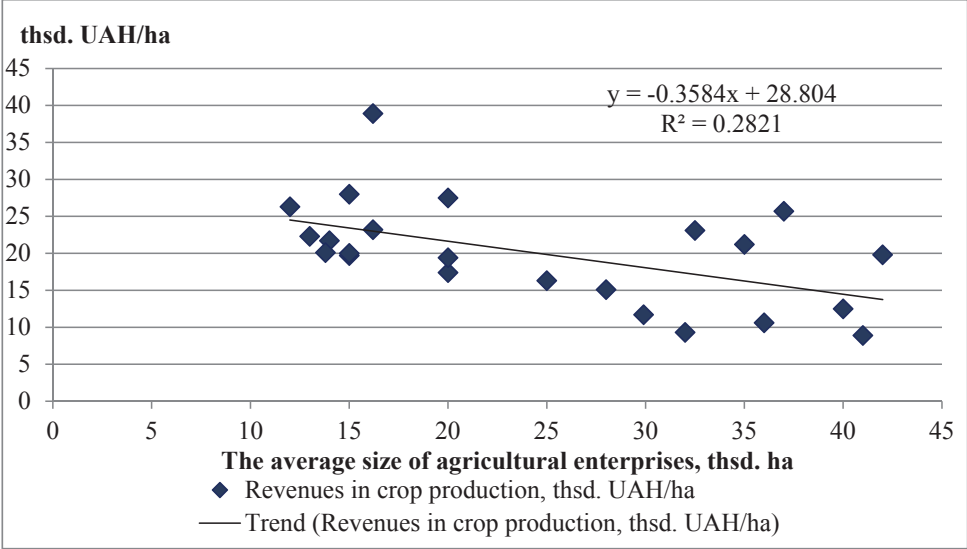*Source: own calculations and composition based on the data of public companies and latifundist.com.*

In medium agroholdings by size of land bank (10–50 thousand hectares) the increase of level concentration of agricultural land has a generally negative effect on competitiveness, the correlation coefficient (r = - 0.531) indicates a moderate inverse relationship between the studied parameters.

At the second stage, we investigated the impact of the level of land concentration in agricultural enterprises on their competitiveness (Figure 11) (by the income (revenue) per hectare of land) on the example of the data of a general set of enterprises in Ukraine – more than 7 thousand.

A graph illustration shows that small, medium and large agricultural enterprises can be competitive. The increase of level concentration of agricultural land has a generally positive influence only up to a certain limit (about 30 thousand hectares), after which competitiveness was reduced.
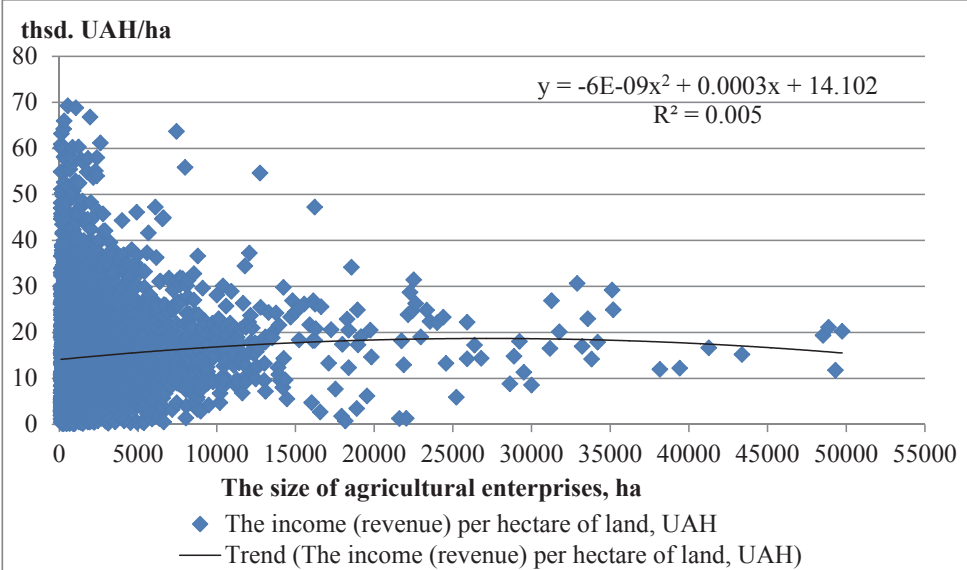
At the third stage, we investigated the impact of the level of land concentration in agricultural enterprises on their competitiveness on the example of the grouped data.

Figure 10. Impact of the level of land concentration in agroholdings (on the example of the most efficient plant production companies) on their competitiveness (by the income (revenue) per hectare of land in crop production), 2016
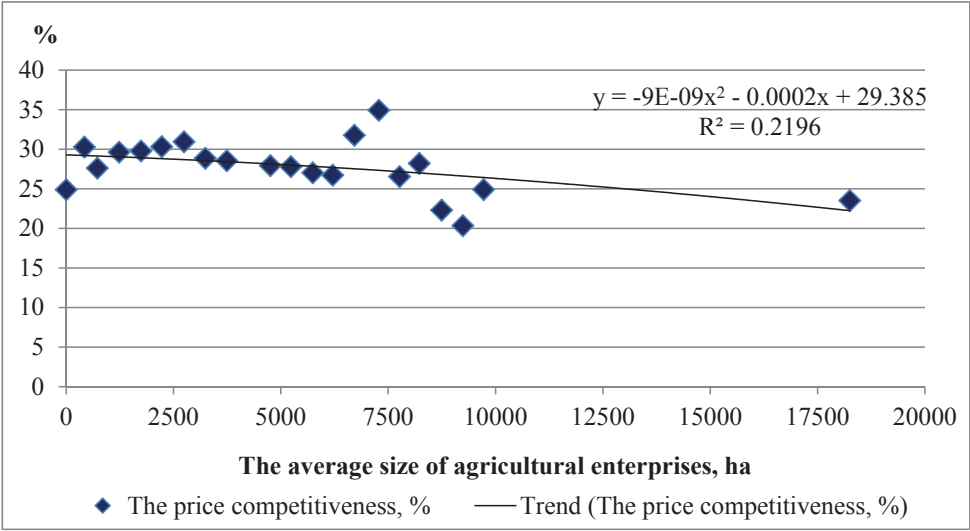

Source: own calculations and composition based on the data of public companies and latifundist.com.

Figure 11. Impact of the level of land concentration in agricultural enterprises on their competitiveness (by income (revenue) per hectare of land) in Ukraine, 2016

Source: own calculations and composition based on the data of State Statistics Service of Ukraine.

Figure 12. Impact of the level of land concentration in agricultural enterprises on their competitiveness (by price competitiveness) in Ukraine, 2016 (grouped data)
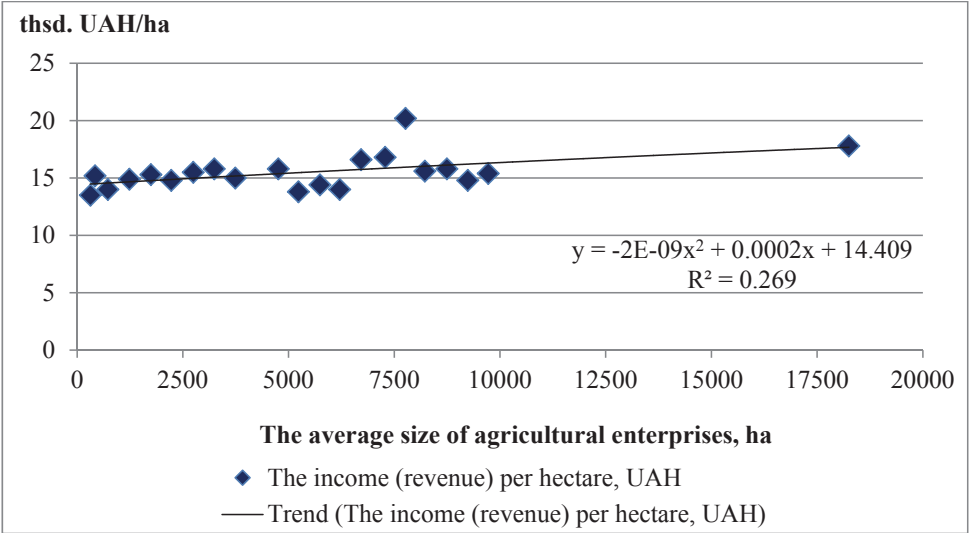

Source: own calculations and composition based on the data of State Statistics Service of Ukraine.

Figure 13. Impact of the level of land concentration in agricultural enterprises on their competitiveness (by the income (revenue) per hectare of land) in Ukraine, 2016 (grouped data)
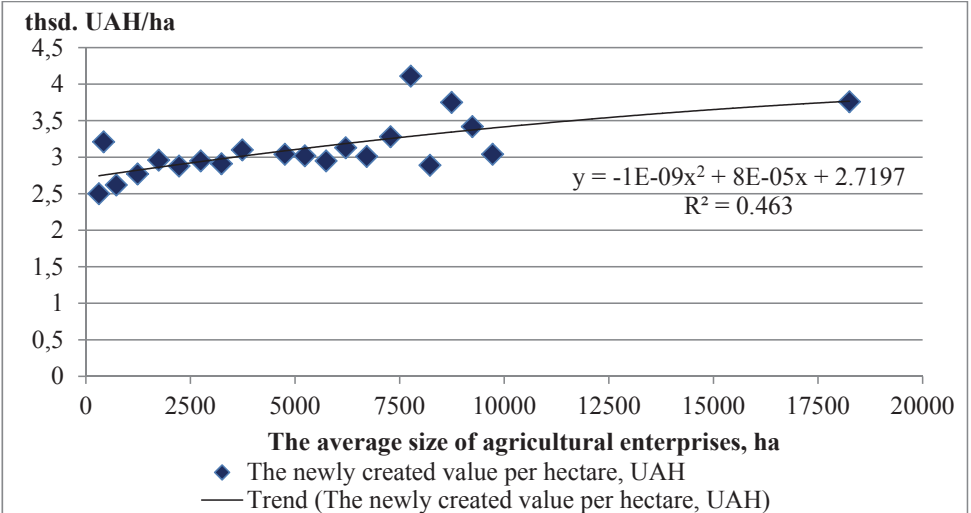

Source: own calculations and composition based on the data of State Statistics Service of Ukraine.

The increase of level concentration of agricultural land has a generally negative effect on the price competitiveness (Figure 12), the correlation coefficient (r = - 0.469) indicates a moderate inverse correlation relationship between the studied parameters.

However, the increase of level concentration of agricultural land has a generally positive effect on the competitiveness (by the income (revenue) per hectare of land) (Figure 13), the correlation coefficient (r = 0.518) indicates a moderate correlation relationship between the studied parameters.

The next graph (Figure 14) presents the results of the study of impact of the level of land concentration in agricultural enterprises on their competitiveness (by the newly created value per hectare of land) in Ukraine. The increase of level concentration of agricultural land has a positive effect on this indicator of competitiveness, the correlation coefficient (r = 0.680) indicates about the close correlation between these indicators.

Figure 14. Impact of the level of land concentration in agricultural enterprises on their competitiveness (by the newly created value per hectare of land) in Ukraine, 2016 (grouped data)

The equation shown on the chart: $y = -1E\text{-}09x^2 + 8E\text{-}05x + 2.7197$, $R^2 = 0.463$

Source: own calculations and composition based on the data of State Statistics Service of Ukraine.

We agree with the Prof. F. Chaddad from the University of Missouri, that the higher yields are provided not by cultivating large areas, but by increasing efficiency and proper management of agribusiness. Ukrainian companies should also choose for themselves such business models that will help them make the most effective use of their land banks. Agroholdings should develop not at the expense of

the growth of the land bank, but through the introduction of innovations and constantly invest in the development and modern technologies [Agroholdings, 2014]. This is to some extent confirmed by the dependence presented in Figure 15.

It can be concluded that the sustainable competitiveness index depends more on the size of production costs per 1 hectare, than level of concentration of production volume per agricultural enterprise.

Figure 15. The quadratic model of the dependence of sustainable competitiveness index (SCI) of agricultural enterprises of Ukraine on the market of winter wheat from the volume of its production per enterprise (x3, thsd. centner) and production costs per 1 hectare of the harvested area (x6, thsd. UAH), 2016

$$SCI = 0{,}5496 + 0{,}0014*x + 0{,}0505*y - 1{,}1747E\text{-}6*x*x - 1{,}1131E\text{-}7*x*y - 0{,}0006*y*y$$
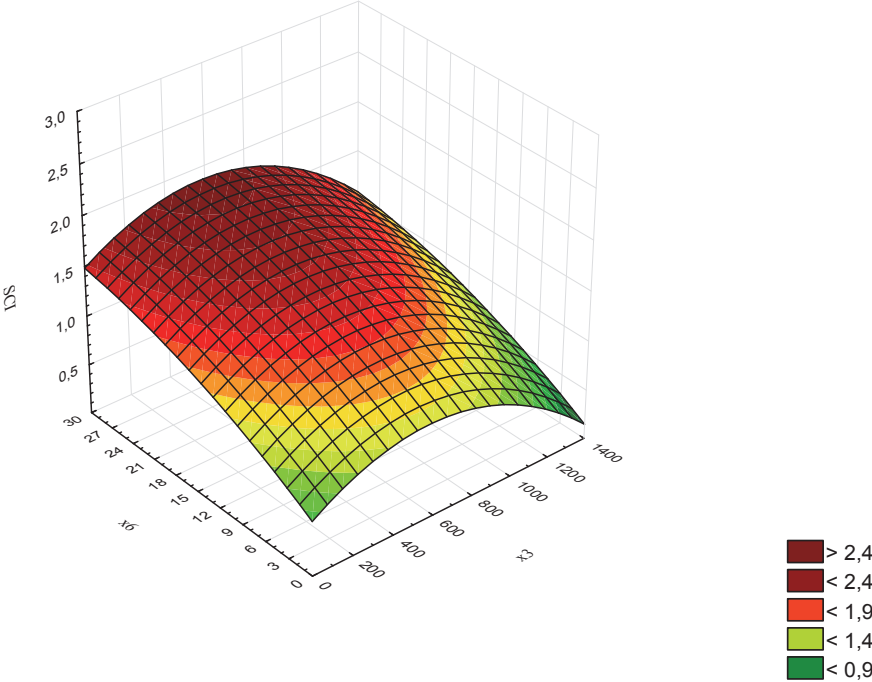
Source: own calculations and composition based on the data of State Statistics Service of Ukraine.

In the context of the future agricultural policy is an important issue about how the size of agricultural enterprises should be supported. The answers to this question can be different. For example, the necessity of simultaneous support for the development of large and small-scale agrarian business units as a trigger for the development of social and production spheres of rural areas is considered in the paper by Paskhaver [2013]. In the article by Andriichuk and Sas [2017] they pro-

posed a division of enterprises according to their size, which envisages the selection of micro, little, small, medium, large and super large enterprises on the basis of developed toolkit for mutual agreement of the proposed criteria of distribution – the land use area, the amount of cash revenues and the number of employees, that characterize the level of production concentration. According to these scientists, it is worthwhile to introduce the differentiation of economic preferences of the state on the principle: smaller enterprises receive higher rates of preferences compared to large, that will create more favorable economic conditions for the development of small and medium-sized businesses in rural areas [Andriichuk and Sas, 2017].

We agree with those scholars, who believe that it is necessary to support agricultural enterprises that meet the criteria of a village-preserving model. One of the indicators of such conformity can be offered by us the sustainable competitiveness index of agricultural enterprises.

22.6. Summary and conclusions

The paper analysed the problem of agricultural land concentration in Ukraine in context of the future agricultural policy and competitiveness of enterprises. As a result of research an assessment of the current state and trends of land concentration in agricultural enterprises of Ukraine was made and the effect of the level of land concentration on the competitiveness of farms was investigated. The average land size of agricultural enterprises in Ukraine is one of the largest in Europe. The level of concentration of agricultural land in Ukraine is increasing in dynamics. If the trend continues to increase, then in 2020 (i) the average size of agricultural enterprises (including family farms) will be 475 hectares per enterprise; (ii) the average size of family farms will be 149 hectares per farm; (iii) the average size of agricultural enterprises (excluding family farms) will be 1384 hectares per enterprise. We found a significant differentiation in the average size of agricultural enterprises at the regional level. For example, in 2016, the difference between the maximum average size of agricultural enterprises in the Luhansk region (3369 hectares) and the minimum in the Chernivtsi region (552 hectares) was 6.1 times.

The process of concentration of agricultural land in Ukrainian agroholdings can be called „superconcentration" or „overconcentration". Two Ukrainian agroholdings (Kernel and Ukrlandfarming holding with land banks more than 600 thousands ha) are included in the TOP-20 largest companies by the volumes of land bank in the world. The results of study indicate that the TOP-100 agroholdings control 6.4 million hectares in total, or about 31% of the total agricultural land used by Ukrainian agricultural enterprises. Top-50 agroholdings according to the size of the land bank looks control about 27% of the total agricultural land used by Ukrainian agricultural enterprises. The first five agroholdings

control about 10%, one of the largest – Ukrlandfarming Agroholding – control about 3% of rented agricultural land in Ukraine. At the regional level, specific administrative districts and/or joint territorial communities indicator of monopolization of the market land rent is much higher. For example, the share of land area, which is controlled by agroholdings in some regions of Ukraine reaches 55%. Therefore, one of the directions of the agrarian policy was proposed to be directed at preventing the monopolization of the land rental market through scientifically based restriction of the level of concentration of agricultural land.

The results of the study of impact of the level of land concentration in agricultural enterprises on their competitiveness in Ukraine indicate that small, medium and large enterprises can be competitive. The increase of level concentration of agricultural land has a generally positive influence only up to a certain limit, after which competitiveness was reduced. In the context of the future agricultural policy it is necessary to support agricultural enterprises that meet the criteria of a village-preserving model. An obligatory condition for obtaining any support must be to ensure at least a simple reproduction of soil fertility. This approach will contribute to the sustainable development of the agricultural sector.

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Instead of a summary

The monograph entitled "The CAP and national priorities within the EU budget after 2020", resulting from the joint scientific effort of the authors of individual chapters, as well as the work of the Scientific Committee and the Organising Committee taking part in the work related to the organisation of the scientific conference on 11-13 June 2018 in Lidzbark Warminski, does not exhaust all problems connected with the issues. It is also not possible to make a comprehensive summary of the conclusions of the conference and the monograph. However, it should be emphasised that the CAP (despite all its bureaucratic burdens and numerous criticisms regarding effectiveness, efficiency and sustainability of its activities) is a great joint European project that contributed to the unification of Europe, building the foundations of its economic and political stability, sustainable and multifunctional development, relative well-being of the society and high food safety standards, environmental protection and animal welfare, as well as preservation of cultural heritage and care for the quality of life in relation to the whole society.

In the ongoing debate on the priorities of national agricultural policies after 2020, Member States devote much attention to maintaining the greatest financial benefits. The content of some articles shows the evolution of national policies, the departure from sectoral thinking in favour of holistic instruments and policies. Subsequent reforms of the CAP have contributed to a gradual departure from sectoral programming in favour of a horizontal one. In agricultural policy, there is a gradual shift of mainstream public aid from market activities to activities supporting rural development. Public support is directed to environmental-climate activities, to rural communities and to support sustainable and multifunctional development. Thanks to this, the effects of intervention were strengthened at least partially.

The changing political, economic, social and environmental determinants place new challenges on the rural, regional and EU cohesion policy after 2020. While formulating national priorities, some governments advocate the status quo, while others strive for deeper integration. However, the view that acceptance for sectoral expenditure is declining seems to prevail. The so-called green economy, balanced territory, social cohesion and good governance are generally accepted. In some countries, there is a clear shift towards closer integration of the territory (including the EU) and a stronger basis for sustainable development. The key is transnational and cross-border cooperation, which goes beyond the administrative boundaries, and includes the area of interregional cooperation (and in the operational and decision-making dimension – interpersonal).

It is an innovative policy approach that takes into account the characteristics and individual conditions in each region. It also gives more freedom to the regions in adapting the programmes' objectives to individual needs, and even during the implementation of the programmes – adapting them to the new conditions. These activities would certainly have the potential to reduce excessively high transaction costs.

Another challenge is also to improve the mechanisms for allocating funds from the point of view of increasing their spatial concentration and achieving synergy effects. The ability to maximize benefits depends mainly on the implementation of policies in each Member State, on the appropriate mechanisms for the allocation of public funds, from decision makers in regions, and finally on people. Public support is desirable when there are discrepancies between the private and the social product. However, it is not always the best way to solve the problem of market failure. The effects of the actions taken by the state are difficult to precisely predict, including because we are dealing with the failure of public institutions (the failure of the state). Beneficiaries of public aid (regardless of whether they are administrative authorities or private persons) often submit their interests (political, private) above the general interest and in their activities often adapt to the opportunities it creates. Public aid is also not able to ensure equality and social justice, although there is a general conviction that in the name of higher social interests public funds should be provided to support the implementation of specific goals. Such a solution, though rather an attempt to treat the symptoms than the cause of the disease, is more advantageous than its lack thereof. Therefore, it is necessary to aim at such policy orientation which benefits all residents and the whole society.

As can be seen from the articles contained in this monograph, there is a wide variation in the level of development, the structure of agricultural and food economy as well as problems to be solved in the EU Member States. The EU Member States are working on the best arguments for authenticating and pushing through the budgets and instruments of the CAP of their own national priorities. Various concepts and national priorities for rural areas and agriculture were presented in the articles and at the conference. Researchers from the Institute initiated a discussion on this important topic, which – as is clear from the course of the meeting – should be continued in the widest possible group, that is why on behalf of the authors of individual chapters of the monograph and my own I encourage you to read it and freely exchange views.

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	Seria: Multi-Annual Programme 2005-2009, no 67.1
Farms in Central and Eastern Europe – today and tomorrow, 4-6 June 2008, Białowieża, Poland	Seria: 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	Seria: 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	Seria: 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	Seria: 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	Seria: 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	Seria: 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	Seria: 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	Seria: 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	Seria: 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	Seria: Multi-Annual Programme 2011-2014, no 91, 91.1
The new EU agricultural policy – continuation or revolution?, 9-11 December 2013, Jachranka, Poland	Seria: 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	Seria: 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	Seria: 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	Seria: Multi-Annual Programme 2015-2019, no 23
Competitiveness of the economy in the context of social policy measures, 22-24 June 2016, Jachranka, Poland	Seria: Multi-Annual Programme 2015-2019, no 26, 27.1
Risk in the food economy – theory and practice, 23-25 November 2016, Jachranka, Poland	Seria: 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	Seria: Multi-Annual Programme 2015-2019, no 52.1
The Common Agricultural Policy of the European Union – the present and the future, 5-7 December 2017, Stare Jabłonki, Poland	Seria: Multi-Annual Programme 2015-2019, no 73.1, 74.1
The CAP and national priorities within the EU budget, 11-13 June 2018, Lidzbark Warmiński, Poland	Seria: Multi-Annual Programme 2015-2019, no 75.1

Publications are available on the website:
https://www.ierigz.waw.pl/publikacje/publikacje-programu-wieloletniego-2015-2019