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Models for competitive and sustainable agriculture and rural development in central-eastern European countries

Editors:

Paweł Chmieliński

Michał Soliwoda

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European Rural Development Network (ERDN), www.erdn.eu
Secretariat of the ERDN: dr Paweł Chmieliński, IAFE-NRI, Świętokrzyska 20, 00-002 Warszawa, Poland; phone +48 22 50 54 774, fax +48 22 827 19 60; erdn@ierigz.waw.pl, chmielinski@ierigz.waw.pl.

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Introduction

Agriculture in Europe is under the increasing pressure of globalisation, which is moving toward production standardisation based on economic competitiveness. In this light the Europe 2020 strategy promotes the idea of sustainable, innovative agri-food sector based on resource efficiency, and rural development promoting social inclusion and job creation. This dilemma is broadly discussed by researchers, policymakers and practitioners, because the adopted development strategy will determine the future development of rural systems. Despite the decrease in the share of agriculture in the economies of all countries, this sector continues to play a crucial role in ensuring food security, feeding the population and exercising an impact on the environment, but also farms have a growing importance as a provider of public goods for both urban and rural population. There remains also the dilemma of the future of small family farms, as units being less important for the competitiveness of the whole sector, but very important for the vitality of rural areas.

Different models of agriculture and rural development in the various Central and Eastern European Countries (CEECs) are due to the specific conditions and varied structures of agriculture. This may be depicted by some interesting facts, on the example of Visegrad Group countries. In the Czech Republic and Slovakia as well as Hungary, the share of those employed in agriculture in the total number of working population is relatively low (less than 5% of total employment) compared to the Poland (over 10%). In both countries formed after the breakup of Czechoslovakia, agricultural holdings with an average area of over 100 ha of agricultural land play a dominant role. The large scale of production is indicated by the gross value added (expressed in EUR) achieved by the average holding: in the Czech Republic and Slovakia this is more than several times higher than in Poland and Hungary (based on 2013 FADN data). In all of the above-mentioned countries, well-organised food industry is perceived as the key to the competitiveness of the agri-food sector. In addition to an efficient processing industry, an important role is played by large specialised agricultural holdings, which not only have the production potential, but also the possibilities of implementation of the most modern production technologies conducive to environmental protection. Apart from support to concentration in agriculture, based on the segment of large-scale commercial farms and well-organised processing industry, countries with a relatively large share of small family farms, can build alternative models of sustainable and competitive development of agriculture relying on innovations in agricultural production and food chain organisation. One of them could be development of local food systems (i.e. shortening the way of products from the farmer/local processor to the consumer). Therefore, there is a need for strengthening the role of regional products and local systems of production, promotion and distribution of food produced in small family farms, where the value added makes high quality and whose origin can be tracked. Interestingly, the demand for food within the short

value chains is growing also in countries whose farms are much larger and often more specialised. It is thus possible, under certain conditions at the national level, to reconcile the requirements of the competitiveness of the sector and its sustainability, by cooperation not only at the formal but also at local level. This could bring multilateral benefits, because as one may expect, diverse agri-food chains will be a major factor in the development of agriculture and rural areas in the future. Such an approach, however, requires government support and significant investments not only in the organisation systems of processing of agri-food products, but also in the market organisation[1]. As for agriculture in CEECs, implementing the idea of inclusive, green growth seems to be a major challenge. Dilemmas on the type of optimal growth in agriculture are linked to the polemics between Keynesian apologetics and economists focused on environmentalism. According to Harris[2], relations between the two perspectives: Keynesianism and ecological economics are tense: Keynesian approach is growth-oriented, whereas ecological economics underlines the limits to this growth. Therefore, Harris proposes a "Green Keynesian policy mix" which targets both economic and environmental goals. This solution could be understood as an input of agriculture in the viability of rural systems, with the benefits to rural communities.

In this volume Authors discussed the effects of globalisation pressure on national economies, resulting in structural change in rural systems, but also different market chain organisation in agribusiness and strengthening the process of its internationalisation. It is also reflected in transformations of tax systems, need for more sophisticated farm financial management. Moreover, the regional differences in development conditions need to create a very flexible development policy instruments tailored to the needs of economic systems at the supranational, national and regional levels. A bipolar model of development can be the answer the contemporary challenges facing agriculture and rural areas in the CEEC in the light of increasing globalisation. The model, on the one hand would be based on competitiveness of large-area agricultural holdings, providing access to relatively cheap and safe food and, on the other, it would support diversity and sustainability of the rural economies by improving the viability of family farms, making efforts to improve the quality of rural life, supporting opportunities for diversification of livelihood strategies of the rural residents.

Paweł Chmieliński
Michał Soliwoda
European Rural Development Network

[1] Cf. Davidova, S.M., Thomson, K.J., 2014. *Family Farming in Europe: Challenges and Prospects*. European Parliament Directorate General for internal policies, Agricultural and Rural Development, Brussels.

[2] Harris, J.M., 2013. *Green Keynesianism: Beyond Standard Growth Paradigms*. Global Development And Environment Institute, Working Paper No. 13-02.

Andrew F. FIELDSEND

Research Institute of Agricultural Economics, Budapest, Hungary,
andrew.fieldsend@aki.gov.hu

Innovation in Family Farming in Eastern Europe and Central Asia

Abstract: *Family farms are part of the solution for ensuring long-term global food security, rural poverty reduction and environmental sustainability. Hence, promoting innovation in family farming is becoming a priority for politicians and policy makers. However, while family farms everywhere are facing major challenges in terms of succession planning, access to finance, land, markets and education, bargaining power, administrative burden and dealing with market volatility, farms in the (Central and Eastern) European and Central Asia (EECA) region have the additional challenges of dealing with the consequences of transition and learning to operate in a market economy. This paper, firstly, summarises the current theoretical discourse about the potential of national Agricultural Innovation Systems (AIS) to contribute to sustainable agricultural development in EECA. It then, explores the following challenges: (a) the demand for transition towards inclusive, decentralised and pluralistic AISs; (b) the need for a broad involvement and participation of family farmers in knowledge sharing and innovation; (c) the role of producer organisations and, in particular, service cooperatives to promote innovation on family farms; and (d) the roles of public and private investment in agricultural R&D and extension and advisory services. Based on this analysis, a set of recommendations for fostering agricultural innovation for family farms, both for governments and other actors in the AIS, are then made.*

Keywords: *Agricultural Innovation System, knowledge sharing, enabling environment, advisory services, producer groups*

Introduction

The State of Food and Agriculture: Innovation in family farming (FAO, 2014a) report highlights that family farms should not be considered an obstacle but, instead, are part of the solution for ensuring long-term global food security, rural poverty reduction and environmental sustainability. Hence, promoting innovation in family farming is becoming a priority for politicians and policy makers around the world, including nations in the (Central and Eastern) European and Central Asia (EECA) region. This is not a simple task. While family farms everywhere are facing major challenges in terms of succession planning, access to finance, land, markets and education, bargaining power, administrative burden and dealing with market volatility, farms in EECA have the additional challenges of dealing with the consequences of transition and learning to operate in a market economy. Family farms across the region are extremely diverse in size, market and knowledge access and other characteristics, implying diversity in the policy options for agricultural innovation systems.

The paper is structured into three sections: introduction, the challenges and recommendations. The first section summarises the current theoretical discourse about the difficulties faced by agricultural innovation and national Agricultural Innovation Systems (AISs) and their potential to leverage the livelihoods of family farmers in particular, and contribute to the sustainable development of agriculture in EECA in general. Against this background, in the second section the paper, explores the following challenges:

- the demand for transition towards inclusive, decentralised and pluralistic AISs;
- the need for a broad involvement and participation of family farmers in knowledge sharing and innovation;
- the role of producer organisations and, in particular, service cooperatives to promote innovation on family farms;
- the role of public and private investment in agricultural research and development (R&D) and extension and advisory services.

Finally, a set of recommendations for fostering agricultural innovation for family farms, both for governments and other actors in the AIS, are made.

Mapping the demand for innovation by farmers: agricultural holdings[1] in EECA

In the last twenty-five years, farming in EECA has been marked by an overall shift from collective to individual land tenure, accompanied by land restitution

[1] FAO's theoretical definition of an agricultural holding is "an economic unit of agricultural production under single management comprising all livestock kept and all land used fully or partly for agricultural production purposes, without regard to title, legal form, or size. Single management may be exercised by an individual or household, jointly by two or more individuals or households, by a clan or tribe, or by a juridical person such as a corporation, cooperative or government agency" (FAO, 2014a).

and privatisation. This has (a) created a large number of family farms with unequal access to knowledge, markets, conditions and opportunities for innovation, and (b) left governments with challenges regarding policies and institutional capacities to address innovation demands adequately. The great majority of the farms in EECA are family farms, and most are small or very small.

Table 1. Total number of agricultural holdings (thousands), and shares (in per cent) in the number of holdings (bold text) and agricultural area (italics) by land size class (ha) in nine EECA countries, and Italy and the UK[2] (various recent years as per data availability)

Country	No. holdings	<1		1-2		2-5		5-10		10-20		20-50		>50	
Albania	324	**60**	*7*	**30**	*11*	**10**	*83*	..	..	..	..	..	..	..	..
Bulgaria	370	**77**	*7*	..	..	**20**	*8*	..	..	..	..	**2**	*7*	**1**	*78*
Croatia	450	**51**	*6*	**16**	*7*	**19**	*20*	**9**	*21*	**4**	*15*	**1**	*31*	..	..
Czech Rep.	23	**29**	*0*	**15**	*0*	**17**	*1*	**11**	*1*	**9**	*2*	**8**	*4*	**10**	*92*
Georgia	730	**70**	*24*	**23**	*23*	**5**	*12*	**1**	*5*	**0**	*4*	**0**	*4*	**0**	*27*
Hungary	967	**27**	*2*	**13**	*1*	**19**	*3*	**11**	*4*	**14**	*6*	**10**	*10*	**6**	*74*
Italy	2591	**38**	*2*	**19**	*4*	**21**	*9*	**10**	*9*	**6**	*11*	**4**	*16*	**2**	*19*
Kyrgyzstan	1131	**85**	*8*	**7**	*8*	**5**	*15*	**2**	*10*	**1**	*8*	**0**	*9*	**0**	*42*
Lithuania	611	**0**	*0*	**8**	*1*	**47**	*14*	**23**	*15*	**14**	*18*	**6**	*17*	**2**	*35*
Poland	2933	**33**	*3*	**18**	*5*	**21**	*13*	**15**	*18*	**9**	*21*	**3**	*16*	**1**	*25*
Romania	4485	**50**	*5*	**20**	*8*	**23**	*20*	**6**	*11*	**1**	*4*	**0**	*2*	**0**	*50*
U. Kingdom	233	..	..	**14**	*0*	**9**	*1*	**11**	*1*	**13**	*3*	**21**	*10*	**32**	*85*

Source: FAO (2014a) and Hungarian Central Statistical Office (www.ksh.hu).

Eurostat data show that in 2007 there were 4.5 million agricultural holdings of less than 2 ha in the ten countries that joined the European Union (EU) in 2004, out of 8 million farms. Data sets for Central Asia are incomplete but in Kyrgyzstan alone, 85 per cent of the estimated 1.1 million farms are believed to be smaller than 1 ha in size (table 1). The social and economic contributions of small farms differ widely between countries across EECA. In Kyrgyzstan a small number of huge agro-holding companies account for a large share of the agricultural area. By contrast, in Georgia almost 50 per cent of land is covered by farms of 2 ha or less. In Albania the number of farms bigger than 5 ha is negligible. In Poland (which did not see collectivisation) and in Romania (which did), most of the numerous farms are 2 ha or less in size. The Czech Republic is an EU Member State where the role of small farms (in terms of land area) remains minor, although almost 45 per cent of farms are no bigger than 2 ha. While this is the only country in the sample where the area accounted for by farms of 20 ha or more is comparable to the UK, in the latter country over 50 per cent of farms are larger than 20 ha.

[2] Italy and the UK are included for comparison as examples of major northern and southern European countries.

Theoretical background

FAO has formulated the following definition of what constitutes family farming: 'Family farming includes all family-based agricultural activities, and it is linked to several areas of rural development. Family farming is a means of organising agricultural, forestry, fisheries, pastoral and aquaculture production which is managed and operated by a family and predominantly reliant on family labour, including both women's and men's' (EC, 2013).

In 2011, FAO proposed a new paradigm of intensive farm production, one that is both highly productive and environmentally sustainable (FAO, 2011). This idea of 'sustainable intensification' of agricultural production (including family farms) has now been widely adopted as a policy approach by national governments and international organisations, with 'sustainable' including the economic (e.g. profitability of farming), environmental (e.g. minimising unfavourable environmental impacts) and social (e.g. maintaining sustainable farming communities) dimensions. Sustainable intensification means 'producing more with less', and can only be achieved through innovation, which can be described as 'a new idea that proves successful in practice'[3].

Farmers can innovate in different ways. Change can involve farm products, production processes and/or farm organisation and management. In addition to facilitating sustainable intensification, innovation helps farmers to expand, change or diversify their marketable output, thereby increasing the profitability of their farms, to release resources for use in other economic activities, or enhance the provision of important ecosystem services (FAO, 2014a). On the other hand, innovations created out of immediate and urgent needs, e.g. of smallholders or family farmers without the appropriate resources to grow, usually have very limited potential to upscale and generate a development change or lead to transforming the agricultural sector. Innovations only have the potential to leverage substantially the national agricultural goals if an appropriate 'enabling environment' (see below), for the generation and adoption of innovations as policies, organisational structures and capacities, is established.

Hence, a systematic commitment to innovation has proven to yield greater benefits to more people over time (Bakalli, 2013). With systematic innovation, needs and opportunities are carefully understood, the search for ideas is open and transparent, and the culture nurtures the development and scaling of innovations resulting in a continuous pattern of agricultural innovation. In many EECA countries the agricultural sector is only just beginning to explore more systematic and system-based approaches.

[3] Numerous definitions of 'innovation' exist in the literature, see e.g. FAO (2012).

Innovations do not occur in isolation and the innovators (farmers, business, academia, NGOs, etc.) are not the sole agents of change. The innovations are related to all kinds of changes at different levels and in different systems. Hartwich (2013) suggests that three main factors (which for simplicity can be described as process, policy and people) influence the progress of innovation, namely:

- The nature of the innovation (i.e. process). Innovations can be substantial (bring radical transformations) or incremental (e.g. new product) and these require the application of different kinds of understanding, learning and resources.
- The innovation context (i.e. policy) or 'enabling environment' (Christy et al., 2009) that enables the innovation to occur and become part of the productive process.
- The innovation constituency (i.e. people). This refers to the type of intended users of the innovation and those who will be affected by it.

These three factors can interact with each other. For example, the AIS lies at the interface between policy and people. The former helps to determine its structure, but its parts are composed of individuals[4]. The history of our understanding of AIS is rather complex. The concept of Agricultural Knowledge and Information Systems (AKIS) first appeared in policy discourses in the 1970s and this acronym has since evolved to refer to Agricultural Knowledge and Innovation Systems (Rivera et al., 2006), a concept that seeks to encompass and influence the complexity of knowledge and innovation processes in the rural sphere. The AKIS was defined by Röling and Engel (1991) as "a set of agricultural organizations and/or persons, and the links and interactions between them, engaged in the generation, transformation, transmission, storage, retrieval, integration, diffusion and utilization of knowledge and information, with the purpose of working synergistically to support decision-making, problem-solving and innovation in agriculture". Traditionally, the AKIS in many countries was dominated by the public sector, its operation was characterised by a 'linear' (researcher-advisor-farmer) model of communicating innovation.

Reflecting changes in our understanding and expectations, FAO prefers the term Agricultural Innovation Systems instead of AKIS (table 2) and, referring to its operation, is using the term knowledge sharing in the AIS context instead of technology transfer. The former implies a multilateral interaction, while the latter implies a unidirectional flow and knowledge exchange suggests simply a bilateral relationship. Spielman and Kelemework (2009) note that "[h]idden within this

[4] The term 'agricultural innovation system' refers to the individuals, organizations and enterprises that bring new products, processes and forms of organization into use to achieve food security, economic development and sustainable natural resource management. Like any 'system', it encompasses the different stakeholders or actors as well as the linkages between them. It also includes the so-called 'enabling environment' which, as the name suggests, includes the factors making it all possible, such as political commitment and vision; policy, legal and economic framework; budget allocations and processes; governance and power structures; incentives and social norms (FAO, 2012).

[innovation] system are the essential processes that facilitate innovation – for example, the development of capacity among individuals and organizations to learn and change the ways in which they organize production and the iterative learning processes that occur among different actors through different forms of interaction" (p. 2). Thus, increasingly, innovations are generated in a network setting.

Table 2. Defining features of Agricultural Knowledge and Innovation Systems (AKIS) and Agricultural Innovation Systems (AIS)

Defining feature	AKIS	AIS
Actors	Farmer, research, extension and education	Wide spectrum of actors
Outcome	Technology adoption and innovation	Different types of innovation
Organising principle	Accessing agricultural knowledge	New uses of knowledge for social and economic change
Mechanism for innovation	Knowledge and information exchange	Interaction and innovation among stakeholders
Role of policy	Linking research, extension and education	Enabling innovation
Nature of capacity strengthening	Strengthening communication between actors in rural areas	Strengthening interactions between all actors; creating an enabling environment

Source: World Bank (2006).

Despite the continuing debate over terminology (AIS, AKIS, etc.), the FAO's view on the desirable features of the AIS is widely accepted. Similarly, with regard to its structure, this improved understanding implies that the scope of the traditional national knowledge system, encompassing research, advisory services and education, has to be extended in order to take into account developments in the private sector, enabling service cooperatives, financial mechanisms in agriculture, implementing information and communication technologies (ICTs) and overall policies, including interlinkages among the traditional system components (research, extension and education). SCAR (2012) has developed a new model of the AKIS, applying the AIS concept, which positions the farmer within the supply chain and includes a broader range of actors, including private sector actors (figure 1). Thus, the AIS is now promoted as a more effective and efficient instrument to reach agricultural policy goals.

The policy environment in which family farms operate varies across EECA (Davidova and Thomson, 2013). Agricultural policy in the EU has long been tailored to family farms and, following the eastern enlargement, has paid increasing attention to the needs of very small farms, including semi-subsistence farms. By contrast, in many countries of the former Soviet Union policy has often been inconsistent and progressed unevenly, with limited reforms.

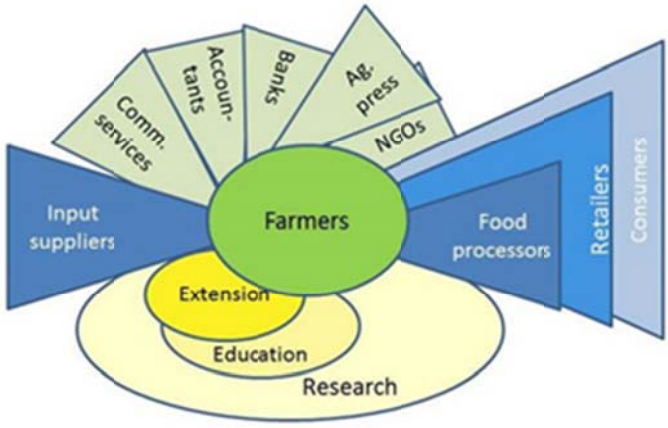

Figure 1. Actors in the AKIS directly relevant to agricultural innovation in the food chain

Source: SCAR (2012).

Christy et al. (2009) developed a framework (hierarchy) of enabling needs for agro-industrial competitiveness that is composed of 'essential enablers' (e.g. land tenure and property rights), 'important enablers' (e.g. standards and regulations) and 'useful enablers' (e.g. business development services). Agricultural advisory services are a form of business development service and a part of the AIS that is strongly influenced by policy.

The challenges

The demand for inclusive, decentralised and pluralistic AIS

Farmers can be differentiated according to several criteria: professional/part-time, old/young, men/women, conventional/organic, specialised/diversified as well as according to their main motivations (entrepreneurship, ethics, innovation etc.). Farmers in these different groups have different attitudes towards innovation. The AIS (and especially farm advisory services) tends to be biased towards professional, specialised, conventional and male farmers (Dockès et al., 2011). As a result, not all farmers have equal access to support, for various reasons, including:

- some farmers cannot afford to pay;
- AIS does not answer to the needs of all farmers;
- some farmers (for example: part time farmers) do not qualify for support.

Dockès et al. (2011) showed that the 'linear' model of communicating innovation has, in many 'western' countries, steadily been replaced by a 'participatory' network approach in which innovation is 'co-produced' through interactions between firms, researchers, intermediate actors (input providers, distributors, etc.)

and consumers. This reflects increasing awareness of the importance of people in the AIS, especially the (end) users of innovation such as farmers who are no longer seen as passive recipients of innovations generated by 'experts' but as the very drivers of innovation[5]. Coupled with this is the wider recognition of the role of tacit (as opposed to formal, codified or explicit) knowledge in innovation. Indeed, innovation often involves fresh applications of traditional knowledge (EC, 2013). The findings of Dockès et al. (2011) tell us that it is not sufficient to dwell on the organisational structure of the AIS but emphasis should be placed on mobilising the AIS actors (people), not least by improving the diversity and flows of information and knowledge between them[6].

Unfortunately, the 'linear' model of communicating innovation and public sector dominance of AIS (especially research and advisory services) persist in many EECA countries, e.g. Albania (Zhllima and Kromidha, 2013), Poland and Hungary (Floriańczyk et al., 2014), and Azerbaijan and Central Asia (FAO, 2014b). Smaller farms, those engaged in extensive farming and those below certain output thresholds (almost all of which are family farms) find it difficult to access research products and formal advisory programmes, which are largely designed for more intensive farming. Thus there is a need to develop 'research and advice products' that are tailored to the needs of family farmers.

This is the rationale that underpins the European Innovation Partnership 'Agricultural Productivity and Sustainability' (EIP-Agri) that is being implemented by the EU during the 2014-2020 programming period (EC, 2012). The EIP-Agri brings together actors from across the AIS, be they farmers, scientists, farm advisors, enterprises or others, in multi-actor partnerships or 'Operational Groups' (OGs) that are farmer-driven and are intended to carry out projects that test and apply innovative practices, technologies, processes and products. Topics can include environmental and social as well as economic innovation. In Central Asia and Azerbaijan, FAO programmes that coordinate contributions of various stakeholders have already been successful in introducing specific technological innovations (FAO, 2014b).

The EIP-Agri recognises the role of innovation brokers, which can be defined as "persons or organizations that, from a relatively impartial third-party position, purposefully catalyse innovation through bringing together actors and facilitating their interaction" (World Bank, 2012, p. 221), in facilitating innovation in agriculture. Similarly, FAO (2014b) found that in Central Asia and Azerbaijan "adequate facilitation … is more successful in driving innovation processes" (pp. 22-23) and that "what is needed is personnel with advisory and facilitation skills to take on the rather new role of brokers of information and linkages" (p. 31).

[5] Farmers would point out that they have been innovating and adapting their practices since agriculture began.

[6] In line with this, the term 'knowledge sharing', which implies multilateral flows of knowledge, has tended to replace 'knowledge transfer', a term which is associated with the linear model of communication.

The need to promote the participation of family farmers in knowledge sharing and innovation

FAO (2014b) notes that agricultural innovation takes place in Central Asia and Azerbaijan, but not at the desired pace. Many farmers and institutions are open to progressive ways but there is a legacy of a Soviet-period mindset. In the EU, insufficient innovation is occurring in farming. For example, in Hungary, rather than deal with innovation, most farmers focus on running their farms and solving daily challenges (Biró et al., 2014). A survey of 300 farmers in the South Great Plain NUTS 2 region of Hungary found that less than 5 per cent of them have an innovating attitude. In Romania, a field study revealed that the small farmers are more traditionalist, their values are specific to the empirical knowledge transfer model (from a farmer to another) and they are rather 'prisoners' of the traditional view of 'making agriculture' (Florian (coord.), 2013). Unlike small farmers, the larger Romanian farmers are more open to innovation, as these have profit increase expectations; however, at the same time, the latter are not so willing to pay for innovation.

Earlier, this paper made reference to process, i.e. the nature of the innovation. Innovations need to be attractive and convincing for farmers; in such cases they will be 'pulled' by farmer demand and not 'pushed' by government. The AIS must support small-scale farmers in finding solutions that are relevant, most likely ones that are low-cost and unsophisticated, and at the same time market-oriented and profit-enhancing. In other words, for innovation policies to be effective they must take into consideration the needs and capacity of users. Increasing the ability of knowledge producers, innovation brokers and others to understand what constitutes an attractive innovation, and how to correctly present and promote them, will assist innovations to spread quickly from early adopters to others.

Each November, AGRYA, in partnership with several private sector companies, organises three information exchange meetings in regional towns across Hungary. Farmers aged under 40 can attend the meetings free of charge and 100-200 attendees are expected at each event. Between around 10.00 and 16.00 there is a series of formal presentations from representatives of AGRYA, the Ministry of Agriculture and agri-business companies. For example, topics include direct payments and rural development support from 2015, external sources to finance investments in agriculture, land law, weather challenges in the management of arable crops, sustainable fertilisation solutions, and agro-technological innovations on family farms. In addition, the meetings use the 'long coffee break' approach; throughout the day, in parallel with the formal programme and outside the conference room, attendees can meet face-to-face with representatives of the participating organisations to discuss the topics in more detail.

Box 1. Young Farmers' Information 'Bourse' (Hungary).
Source: own research.

Novel approaches to encouraging the participation of family farmers in innovation should be promoted. This includes a shift from the 'visit and train' model of farmer education to group discussion-based approaches. If farmers are accepted as co-creators of knowledge they should be treated as such. Peer-to-peer learning in a facilitated environment allows farmers to share and discuss their own experiences and knowledge (EC, 2013). Special focus should be placed on engaging those groups (e.g. young farmers and women) with a reputation for being innovative. In Hungary, the Young Farmers' Hungarian Association (AGRYA) is proactive in promoting knowledge sharing and, by implication, innovation in farming (box 1).

The role of producer groups in promoting innovation on family farms

One of the seven key messages of FAO (2014a) is that 'effective and inclusive producers' organisations can support innovation by their members'. The document cites a number of mechanisms (e.g. helping farmers to establish links to markets and value chains and integrating them into effective innovation systems) through which they can have an impact.

Numerous studies have shown that 'friends and family' are an important source of information and knowledge for family farmers[7]. This shows that there is a basic willingness among farmers to communicate and cooperate. Many observers with a 'western' perspective then see farmers' (production) cooperatives as a logical step to farm business development, and perceive such cooperation in EECA as being held back only by the legacy of forced cooperation during the socialist period. In fact, the causes are more complex. For example, Tudor (2015) notes that attempts in Romania to establish land owners' associations failed for two reasons. The first is a lack of institutional support to help the new organisations to become economically viable, while the second has a strong social basis. Since 1989, many small farmers have returned to their farm holdings as a consequence of labour rationalisation in urban socialist industry mainly with the intention of meeting their primary consumption needs. Furthermore, managers of agricultural associations were perceived to be performing poorly and acting in their own interests rather than in the common interest of the members.

However, a distinction can be drawn between production cooperatives (where members jointly cultivate pooled resources, as during the socialist period) and service cooperatives (that provide services to their members). The latter is the largest category and includes marketing, processing, input supply and processing cooperatives. Such organisations often provide input-related technical advice as

[7] For example, in Hungary in 2014, 74 per cent of 1460 surveyed farmers regularly consulted 'friends, colleagues and consultants' for information, the highest ranked category (see http://agrostratega.blog.hu/2014/10/20/friss_kutatasi_adatok_a_mezogazdasagi_termelok_informacioszerzesi_szokasainak_valtozasairol).

well as inputs. They may carry out product related research and training and provide product-related advice (Dockès et al., 2011). Lerman and Sedik (2014) report that the development of service cooperatives in post-socialist countries of the EECA is 'many decades' behind those of the northern and southern EU Member States, both in terms of numbers of cooperatives per farm and level of farmer cooperation.

Service cooperatives undoubtedly offer a way in which small-scale farmers in EECA who are producing for the market can strengthen their bargaining power, for example with large-scale input suppliers or purchasers of their produce. Through resource (equipment) sharing, they are also a way of mitigating the problem of lack of capital. At the same time, by encouraging communication and sharing of experiences they can assist innovation. Lerman and Sedik (2014) state that policies and legislation comprise the enabling environment for the development of cooperatives but they caution against trying to transplant regulations from 'western' countries where service cooperatives are well established to those in which the main subject is start-up cooperatives. They point to Ukraine as having perhaps the best legislation in the CIS-G[8], having drawn on the experience of at least three donor advisory projects. Such projects should last longer than the typical two years, five years being more appropriate.

Farmer organisations (which include service cooperatives) can be drivers of demand-side knowledge sharing by (a) encouraging farmers to pro-actively search for information, (b) providing farmers with direct access to knowledge and information via ICTs and social media, and (c) facilitating networking which is a prerequisite to knowledge sharing (Blum, 2013). As well as being service providers, they can have a brokerage role, contribute to policy formulation and planning, and help to evaluate the relevance, efficiency, effectiveness and impact of knowledge sharing.

In Hungary, an example of a post-socialist EU Member State, Biró and Rácz (2015) showed that it is necessary to address both people and policy to stimulate the innovation process. It is very important to promote attitude changes to cooperatives with the help of training, courses, forums for the management and the membership, with the demonstration of good examples and also with incentives that increase the membership's trust and commitment. Alongside this, in order to strengthen cooperation and ensure contractual discipline, a legal and fiscal environment (including reorganisation of the VAT system, controlled market channels, effective supervisory bodies) that supports wider sectorial cooperation is needed.

[8] Commonwealth of Independent States and Georgia.

The role of public and private investment in agricultural R&D and advisory services

Davidova and Thomson (2013) note that there are compelling arguments in favour of government intervention in agricultural research, development, extension and education (RDEE), both in terms of the economic rates of return to be expected from such investment and in terms of future food security and environmental protection.

However, FAO (2014a) notes that, in many countries (especially low and middle income countries), public investments in agricultural R&D remain far too low relative to the sector's economic significance and importance for poverty alleviation. The private sector has taken an increasingly big role, often focusing on advanced production technology such as new crop (including GM) cultivars and field machinery. There are conflicting views among actors in the AKS in Hungary and Romania, where several companies have established research and extension programmes, about the role of the private sector (especially multinational input manufacturers and suppliers) in RDEE. Some actors have the view that such companies "always advertise their own products", but others believe that (a) such farm advisors (company representatives) must be seen to be giving correct advice if they are to be trusted and (b) that farmers (customers) can "see through" the "sales talk" and obtain useful advice. Without doubt, such companies are significant sources of 'packaged' innovation and knowledge for farmers in the two countries.

Several sources (e.g. Davidova and Thomson, 2013; FAO, 2014a) point to the risk of 'market failure' resulting from inadequate public sector involvement in RDEE, for at least two reasons. Firstly, the focus of agricultural RDEE has broadened from simple land productivity to societal concerns, e.g. environmental sustainability and capacity to adapt to climate change, which may not be financially attractive topics for the private sector. Secondly, the high costs of serving small, remote farms or developing cultivars or crop protection products for 'minor' crops is also a disincentive. Lack of access to knowledge, insufficient information flow, weak exchange of research results and too little responsiveness to the needs of farmers are major barriers to the uptake of innovation on family farms (EC, 2013).

FAO (2014a) makes several important points concerning the effectiveness of public sector RDEE. Firstly, adequate salaries and conditions of service are necessary to attract young, competent researchers and farm advisors. Secondly, women are underrepresented, meaning that the specific needs of women farmers may not be sufficiently addressed, and the level of engagement with them is likely to be inadequate. It also calls for stable institutional funding rather than a reliance on project-based funding that has higher transaction costs. FAO (2014a) also emphasises the need for partnerships. These may include public-private partner-

ships and collaborations between national, regional and international organisations. However, it emphasises the benefits of partnerships between researchers and family farmers. These may be formally or farmer-led. Communication and collaboration between farmers and researchers often involves challenges, such as reaching agreement on the research agenda, but the impacts of such approaches, such as participatory plant breeding, have been shown to be positive.

Conclusions and recommendations

Family farms are part of the solution for ensuring long-term global food security, rural poverty reduction and environmental sustainability. However, in many EECA countries the state of innovation on family farms is weak and the AIS is not 'fit for purpose' in several respects. To address these issues the following recommendations, grouped according to the structure of this paper, are made.

1. Address the demand for transition towards inclusive, decentralised and pluralistic AISs:
- Greater knowledge sharing between government, research institutions, advisors and farmers is needed. Emphasis should be placed on communicating with family farmers (male and female) running commercially viable farms who want to develop their businesses through innovation. The EIP-Agri should be recognised as an example of a policy measure that has the potential to promote farmer-focused innovation.
- New ways of bringing innovative farmers (especially better educated and younger farmers) into farming should be supported, such as by promoting joint ventures either between farmer and land owner, or older and younger generations of a farming family.
- The innovation capacity of small family farms should be developed through investment in education and training and creation of networks that enable different actors in the AIS to share information, experiences and good practices. Different types of personal contact, such as facilitated group learning and farmer-to-farmer communication, should be encouraged.

2. Meet the need for a broad involvement and participation of family farmers in knowledge sharing and innovation:
- Public sector efforts to promote innovation on small, family farms which, although numerous, are not integrated into AIS (due to the low innovative capabilities and lack of incentives for innovation), should be increased. These efforts should focus on inclusive research for small farms, the consolidation of their integration on the market, providing advisory services and infrastructure development.
- Family farmers should be involved in defining research agendas and engaged in participatory research efforts to help improve the relevance of research for them. Better integration of small family farms into AIS can be achieved by

combining the traditional practices and direct innovations of small farms with formal research.
- To encourage innovation, both top performing farmers who develop their own innovations and middle performers who adopt existing technology and good practice to develop their businesses should be targeted. However, it should be accepted that many farmers prefer to adopt innovations and are not interested in acquiring knowledge to innovate.

3. Enhance the role of producer organisations and, in particular, service cooperatives to promote innovation on family farms:
- Farmers and their organisations must accept that they, too, have an obligation to encourage innovation. By artificially contributing to profitability, direct subsidies to low performing farmers discourage structural change and encourage the use of outdated practices. Payments should be more strongly linked to innovation.
- There is a high reliance among farmers on free advice. Subsidised advisory services can engage farmers who are not accustomed to paying for advice. However, to ensure confidence in the system, the advisors employed should have good professional knowledge and good communication skills.
- Producers' organisations can assist their members in accessing markets and linking with other actors in the innovation system. Policies and regulations, tailored to local needs, to promote the development of producer organisations (including service cooperatives) should be strengthened. These organisations should be encouraged to more actively share knowledge among their members.

4. Strengthen the role of public and private investment in agricultural R&D and extension and advisory services:
- Research should be re-oriented towards meeting the needs of family farms, taking into consideration their agro-ecological and social diversity. In the public sector, more resources should be allocated to well targeted, near-market research and development, and its translation into practice.
- More openness at all levels (researchers, advisors and farmers) to adopting and adapting research and innovative ideas from other countries must be encouraged, as this can be faster and cheaper than starting from basic research.
- A variety and combinations of financial mechanisms allowing agricultural innovations for smallholder family farms should be explored.

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Aldona MRÓWCZYŃSKA-KAMIŃSKA, Agnieszka BAER-NAWROCKA

Poznań University of Life Sciences, Poznań, Poland,
mrowczynska-kaminska@up.poznan.pl, baer-nawrocka@up.poznan.pl

The Significance of Agribusiness in the National Economy in the EU Countries

Abstract: *The objective of the article is to determine the significance of agribusiness in the national economy in the European Union countries. The article compares the internal structure and share of agribusiness in the national economy in relation to gross value added. It also presents the relations between the share of agriculture, food economy and gross value added per capita. The main research method was input-output analysis, which is based on the intersectoral flow balance. The research shows that in the less developed countries the share of agriculture and agribusiness in the national incomes is much higher than in the highly developed countries. Moreover, the results of the correlation between the gross value added per capita and the share of agribusiness in the national income indicate that the process of secular decrease in the importance of this sector in the national income is inhibited if the economic development is high.*

Keywords: *agribusiness, gross value added, internal structure, share of agribusiness in the national economy, gross value added per capita.*

Introduction

Agribusiness, also known as the food economy, agri-food complex or agri-food sector, is a subsystem of the national economy, which has developed its own internal connections and which is simultaneously strongly integrated with other sectors of the national economy. The dynamism of development of agribusiness considerably depends on its internal structure and relations with the other sectors of the national economy. The theory investigating the share and importance of individual sectors of the national economy in food production is the agribusiness theory, which was developed by J.H. Davis and R.A. Goldberg[1]. J.H. Davis understood agribusiness as the total of all operations of agricultural production, including the production and distribution of the entire supply stream providing farms with means of production and production services as well as all operations related with the turnover, storage, processing and distribution of agricultural products. According to the classic formula, agribusiness is a part of the economic system which produces food and provides raw materials from the farm to consumers. Agribusiness as a national economy sector consists of three main economic aggregates, which are used in this analysis. The first aggregate includes the industries manufacturing means of production and services for agriculture and the food industry, the second aggregate – agriculture, the third aggregate – the food industry (Davis, Goldberg, 1957).

The concept of the development of agribusiness comprises changes in the system structure and the degree of integration of the elements of the food complex. The economic growth causes changes in the significance of individual components of the food production chain, which have different levels of development, economic efficiency and in consequence, different bargaining power. The general tendency, which is a synthesis of the development of global agriculture, points to the increasing importance of non-agricultural links at the expense of agriculture itself (Kowalczyk, 1998). The essence of the mechanism of development of the agri-food sector (agribusiness) can be seen in changes in the proportion between the national economy and food economy and between individual components of agribusiness. Showing these proportions significantly influences assessment of the degree of modernity of agribusiness structures in given countries. According to global tendencies the agribusiness structure changes so that the share of agriculture decreases, whereas the share of the food industry, turnover and services increases (Wilkin, 2001). This means that along its evolution the leading component of agribusiness changes, from agriculture to the food industry and consumer (Zalewski, 1989). Agriculture and the entire agri-food sector constantly affect the development of the national economy, but they are more and more dependent on the situation in the other sectors of the national economy.

[1] The essential study on the theory of agribusiness, its internal structure and connections with the national economy is *A Concept of Agribusiness* by Davis J.H. and Goldberg R.A., Boston 1957.

The objective of the article is to determine the significance of agribusiness in the national economy in the European Union countries[2]. The study uses the latest available data on 'Intersectoral flow balance' for individual countries. The outline of the paper is as follows. First, we describe the method of research. Second, we present the internal structure of gross value added in agribusiness and the share of agribusiness in the national economy. Third, we analyse the correlation between the level of gross value added per capita and the share of agriculture and total agribusiness in generation of the national income in the EU countries. Finally we draw some conclusions.

The research method

According to Woś (1979), in order to assess the degree of development and modernity of agribusiness and to illustrate its importance in the national economy it is possible to use the group of five indexes. These are the values illustrating the production potential (employment, gross value of fixed assets and investment outlay), production output (global production) and income output (gross value added). Only the gross value added of agribusiness was used for comparative analysis to show the importance of the agri-food sector in the national economy in the EU countries. The values were calculated by means of the formula suggested by Woś (1979):

$$X_A = x_r + x_p + \sum_{i=1}^{n} x_i b_{ir} + \sum_{i=1}^{n} x_i b_{ip}$$

where:

X_A – gross value added of agribusiness;
x_r – gross value added of agriculture;
x_p – gross value added of the food industry,
x_i – gross value added of i-th sectors (branches) related with agriculture and the food industry ($i + 1,2, ..., n, n \neq r,p$), which indirectly participate in food production;
b_{ir} – the coefficient specifying the flow of products and services of the *i-th* sector (branch) to agriculture, expressed with the percentage of indirect demand of the *i-th* sector (branch);
b_{ip} – the coefficient specifying the flow of products and services of the *i-th* sector (branch) to the food industry, expressed with the percentage of indirect demand of the *i-th* sector (branch).

According to the definition of agribusiness, the gross value added of this sector includes the gross value added of agriculture (x_r) and the food industry (x_p). These are the components (branches) which directly produce food. The procedu-

[2] Due to the insufficient data the analysis does not include Cyprus, Malta and Luxembourg.

re applied to determine the input of the branches, which indirectly participate in food production, is slightly more complicated. Only parts of their products and services can be found in the value of food produced. These values are proportional to the volume of the flow of tangible goods and services of the *i-th* sector from other sectors of the national economy to agriculture and the food industry, which are calculated on the basis of intersectoral flow balances, i.e. input-output analysis. By means of the supplier-recipient analysis (input-output) the monetary model of intersectoral flow specifies the ideas of the economic (market and budget) mechanism functioning, its internal connections, dependencies and the effects which are decisive to reproduction processes (Leontief, 1949; Czyżewski, 2008). The model is a useful illustration of economy functioning (Tomaszewicz, 1994). Intersectoral flow balances are also the only available statistics which enable determination of the significance of the entire agri-food sector in the national economy.

The analysis of the importance of food economy (agribusiness) in the national economy is subjective and we can attempt to make it objective by international comparisons. Although international analogies are not an argument and usually cause a large number of justified reservations, they undoubtedly have the value of certain points of reference, which enable relativisation of processes and phenomena (Woś, 1979; Tomczak, 2000). For this reason, the article uses the method of analogies and comparisons, which enables us to obtain prognostic information by transferring the regularities of one phenomenon to another. The comparison of the internal structure of agribusiness, its share in the national economy and calculation of the dependence between the level of gross value added per capita and the share of agriculture and total agribusiness in generation of the national income is a spatiotemporal analogy in individual countries of the European Union. Such investigations also enable determination of the influence of the macroeconomic environment on the agri-food sector and its effect on the entire national economy (Schiff, Valdes, 1998).

The internal structure of agribusiness

The internal structure of agribusiness is presented in table 1. The results concerning the share of three aggregates in gross value added of agribusiness in the EU generally point to low importance of agriculture and high importance of the food industry. However, some differences between the EU countries could be seen. In the highly developed countries the share of the second aggregate (agriculture) in generation of the gross value added in agribusiness is much lower than the average in the EU. This group of countries includes: Belgium, Denmark, Ireland, Sweden, Germany and the United Kingdom, where in 2010 the share of agriculture in gross value added ranged between 16.0% and 21.0%. At the same time, the industries generating means of production and production services for agriculture and the food industry had a significant share. In those countries there was also

an increase in the share of the first aggregate in material flow to agriculture and the food industry during last years (Mrówczyńska-Kamińska, 2010a). It proves a modern agribusiness structures in those countries. On the other hand, there is still a group of countries in the European Union where the share of agriculture in gross value added of agribusiness is extremely high (about 30-40.0%), whereas the significance of the first or third aggregate is relatively low. This group of countries includes: Bulgaria, Romania, Poland, Slovakia, Latvia, Greece, Slovenia and Lithuania. Although significant changes could be observed since 1995, the agriculture still plays the main role in creating the income output of agribusiness in these countries (Mrówczyńska-Kamińska, 2013; Baer-Nawrocka, Mrówczyńska-Kamińska, 2015).

Table 1. The internal structure of gross value added in agribusiness in the EU countries, 2010 (%)

Countries	Gross value added		
	1st aggregate	2nd aggregate	3rd aggregate
Austria	30.5	22.6	46.9
Belgium	41.6	16.1	42.2
Bulgaria	33.1	39.5	27.4
Czech Republic	23.8	26.1	50.1
Denmark	34.0	18.3	47.7
Estonia	33.7	31.5	34.8
Finland	29.2	28.6	42.2
France	30.0	30.1	39.9
Germany	34.6	18.8	46.6
Greece	13.1	35.3	51.6
Hungary	29.4	41.1	29.5
Italy	26.8	35.9	37.3
Ireland	27.7	20.6	51.7
Latvia	9.7	55.9	34.4
Lithuania	38.1	25.0	36.9
Netherlands	30.7	27.8	41.5
Poland	16.2	39.6	44.2
Portugal	22.8	30.4	46.8
Romania	13.4	42.5	44.1
Slovakia	30.9	33.1	36.0
Slovenia	28.1	38.7	33.2
Spain	21.4	37.3	41.3
Sweden	34.9	16.1	49.0
United Kingdom	28.1	19.8	52.1
EU-12	19.9	38.0	42.0
EU-15	28.9	27.5	43.6
EU-27	27.9	28.7	43.4

Source: own calculations based on *'Intersectoral flow balances in the EU countries in 2010* www.epp.eurostat.ec.europa.eu.

The share of agribusiness in the national economy

The analysis of the share and role of individual sectors of economy (industry, agriculture and services) is an important problem in the theory of economic development (Fiedor, Kociszewski, 2010). By means of gross value added, it is possible to determine the direct input of agribusiness in the national income. It is also possible to determine multilateral indirect influences, which agri-food production exerts on the process of generation of value added in other sectors and branches of tangible production in consequence of intersectoral flows (this can be regarded as the indirect influence of the agri-food sector on the national economy). Intersectoral flow channels produce feedback effects in agribusiness. An increase in gross value added in the agri-food sector causes positive series feedback in other sectors of tangible production and thanks to the connections with other sectors of the national economy it accelerates the production growth in the entire national economy (Mrówczyńska-Kamińska, 2013).

In the European Union there are some countries where the share of the agri--food sector in the national economy is relatively the lowest, e.g. Germany, Sweden, the United Kingdom, Italy and Belgium, and ranges between 2.5% and 4.0% in 2010 (table 2). On the other hand, there are countries, mainly among the EU-12, where the share of agribusiness in the national income is still high, e.g. Lithuania, Bulgaria and Romania, and amounts to about 10-14.0%. Similar share was also observed in Poland, Ireland, Estonia and Hungary (about 7-8.0%). The low share of agribusiness in generation of the national income is the consequence of structural transformations and faster rate of growth of non-agricultural sectors in the national economy. It also proves that food production is being modernised in the given country.

As results from the analysis, the share of agriculture and total agribusiness in the national income is lower in "richer" countries and higher in "poorer" countries. It confirms the principle of the secular decrease in the importance of the food production sector in the national economy. There are two groups of theories which account for the phenomenon. Some of them are related to the demand, the others to production and supply. Schultz (1952), and Mellor and Ahmed (1961) were the supporters of the former theory. The theory relates the tendency of secular shrinkage of the share of agriculture in the national economy to low income and price elasticity of demand for agricultural products. Because of the fact that these elasticities are lower than one, the possibilities of market expansion of agriculture are slowly coming to an end. The authors of this theory think that if there is no demand, there are no natural stimuli to increase production. The supporters of the other theory (e.g. Kuznets, 1966) say that the shrinkage of the share of agriculture in the national economy is caused by differences in labour productivity in the agricultural sector and non-agricultural sectors and by constant changes in employment proportions in both sectors. What underlies these theories is the assumption that both the low elasticity of demand for food (lower than one; based on well-known Engel's law) and relatively lower workforce produc-

tivity in the agricultural sector autonomously trigger adaptive processes, which result in relative shrinkage of the agricultural sector. For obvious reasons, the statement about the secular decrease in the significance of agriculture in the national economy may be transferred to the entire agri-food sector, because the process of reduction of agriculture is largely the consequence of social division of labour. New branches of productive activity and various productive processes stem from agriculture. It is transformed from a fully autarchic food-providing sector to the sector generating raw materials for food production. A considerable part of the activities traditionally done in an agricultural enterprise, is taken over by non-agricultural sectors and branches of production, as a result of which the field of purely agricultural activity is reduced. It is more and more difficult to define the division line between agriculture and industry (Woś, 1979).

Table 2. The share of gross value added of agribusiness in the national economy in the EU countries, 2010 (%)

Countries	Gross value added			
	1st aggregate	2nd aggregate	3rd aggregate	Agribusiness
Austria	1.2	0.9	1.8	3.8
Belgium	1.9	0.7	1.9	4.5
Bulgaria	3.7	4.5	3.1	11.3
Czech Republic	1.0	1.1	2.1	4.3
Denmark	1.4	0.8	2.0	4.2
Estonia	1.9	1.7	1.9	5.5
Finland	1.1	1.1	1.6	3.8
France	1.5	1.5	1.9	4.9
Germany	1.2	0.6	1.6	3.4
Greece	0.9	2.4	3.5	6.8
Hungary	2.4	3.3	2.4	8.1
Italy	1.3	1.8	1.8	4.9
Ireland	2.0	1.5	3.8	7.3
Latvia	0.4	3.5	2.2	6.1
Lithuania	4.0	2.6	3.8	10.4
Netherlands	1.9	1.7	2.6	6.3
Poland	1.4	3.4	3.8	8.6
Portugal	1.0	1.4	2.1	4.5
Romania	1.9	5.9	6.1	13.9
Slovakia	1.6	1.8	1.9	5.3
Slovenia	1.4	1.9	1.7	5.0
Spain	1.2	2.2	2.4	5.8
Sweden	0.9	0.4	1.2	2.5
United Kingdom	0.8	0.6	1.6	3.0
EU-12	1.4	2.6	2.9	6.8
EU-15	1.3	1.2	1.9	4.4
EU-27	1.3	1.3	2.0	4.5

Source: own calculations based on '*Intersectoral flow balances in the EU countries in 2010*, www.epp.eurostat.ec.europa.eu and data from the '*National accounts*' for the EU countries in 2010, www.epp.eurostat.ec.europa.eu.

The correlation between the gross value added per capita and the share of agriculture and total agribusiness in generation of the national income

Figure 1 illustrates the correlation between the level of gross value added per capita and the share of agriculture in generation of national income in the EU countries. An analysis of these results shows that in 2010 this correlation is best shown with a logarithmic curve expressed with the following formula:

$$y = -1.677\ln(x) + 18.225^{3}$$

The equations shown above prove that as the economic growth progresses, there is an increasingly weaker correlation between the total gross value added per capita and the share of agriculture in the national income.

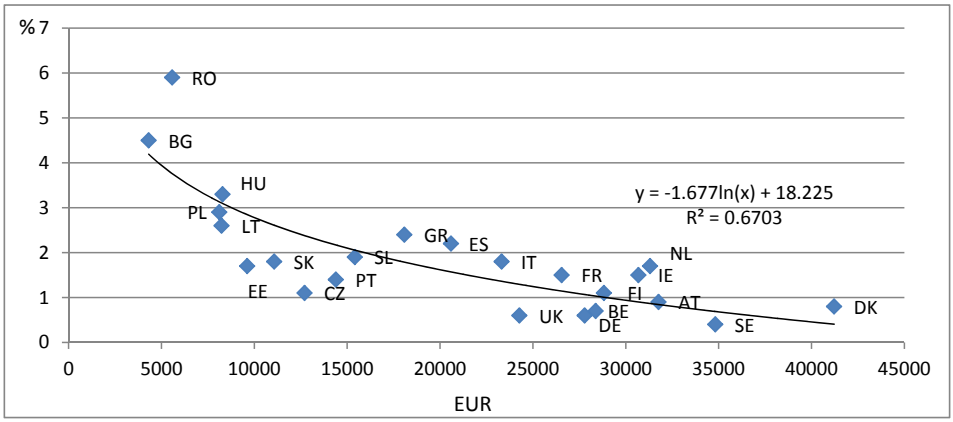

Figure 1. The correlation between the share of agriculture in gross value added of the national economy (%) (y) and the gross value added per capita (EUR) (x) in the EU countries, 2010

Source: own calculations based on the data from Table 2 and the data concerning gross value added per capita in the EU countries, www.epp.eurostat.ec.europa.eu.

The economic growth is usually accompanied by a drop in the share of agriculture in the national income, but when the national income per capita is high, the drop is relatively low. The rate of economic growth is the function of autonomous factors triggered by earlier structural changes in economy. In highly, developed countries we can observe stabilisation of the share of agriculture by itself in the national income at a low level of 3-8%. The big differences in the role of agriculture occurred between the EU-12 and EU-15 countries. As Baer-Nawrocka and Poczta (2014) emphasise, in most of EU-15 countries the transformation of agri-

[3] The coefficient of determination is 0.67 and the significance level is α=0.05.

cultural sector started earlier. The transformation was carried out in agricultural structures, labour and capital resources and was supported by the dynamically developing economy. In the majority of countries, which joined the Community in 2004, these processes were implemented in the form of a socialist model of agriculture within the framework of centrally planned economy. The development and modernisation of the agricultural sector in most of the EU-12 countries started with the change of the socio-economic system and the EU accession, so much later than in the EU-15 countries (Baer-Nawrocka, Poczta, 2014).

In view of the fact that in consequence of the social division of labour new branches of productive activity and different productive processes are separated from agriculture, where most of them result in food production, the problems of the food production sector cannot be viewed only from the perspective of agriculture. In practice, at present, it is more important to investigate the significance of the entire agri-food complex in generation of the national income. Figure 2 shows the correlations between the share of agribusiness in the national income and the level of gross value added per capita in the European Union countries. In 2010, the distribution of points referring to the EU countries is best described with the parabolic curve and the following formula[4]:

$$y = 1E\text{-}08x^2 - 0.0006x + 12.474^{5}$$

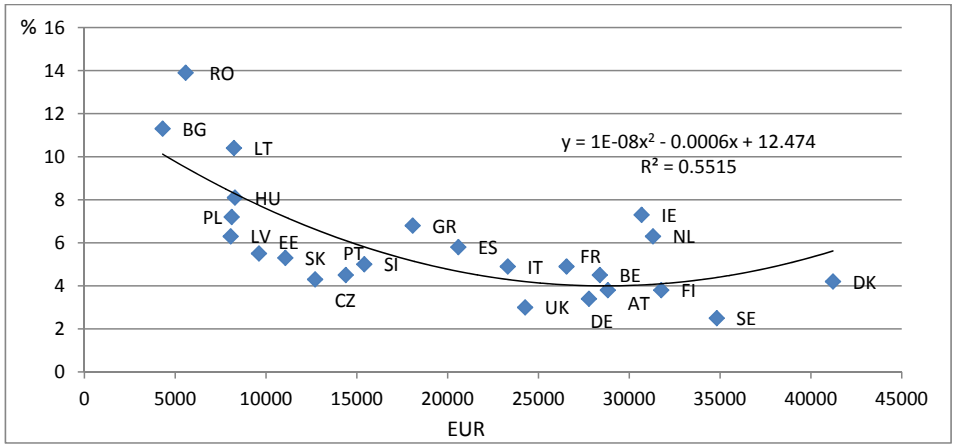

Figure 2. The correlation between the share of agribusiness in the national economy (%) (y) and the gross value added per capita (EUR) (x) in the EU countries, 2010

Source: own calculations based on the data from Table 2 and the data concerning gross value added per capita in the EU countries, www.epp.eurostat.ec.europa.eu.

[4] The simple correlation between the variables was 0.66, whereas the coefficient of determination was as high as 0.76, which indicates the high value of explanation of the model.

[5] The coefficient of determination is 0.55 and the significance level is α=0.05.

The data shown above indicate that in the countries where the values of the national income per capita are high the share of total agribusiness in the national income is low, e.g. Germany, Ireland, Denmark, Sweden, Finland and the Netherlands. It may be related with the fact that in rich countries the share of expenses on consumption in total income is usually low. However, between 2000 and 2010 in the United Kingdom, the Netherlands and Sweden both the increasing rate of expenses on food in absolute terms and the increasing share of expenses on food in total expenses could be observed (Rembisz et al., 2011). This situation is caused by the increasing share of more expensive food, which is highly processed and refined. As the income grows, consumers do not physically consume larger amounts of food products, nor do they buy more kilograms of food, but they consume other forms of food, which is better packaged, easier to prepare and eat (Heady, 1962). As a result of this situation, the increase in the production in agriculture and the entire agri-food sector becomes dependent on the consumer's choice and thus, on the final market of food products. In consequence, the food economy and food production is more and more subordinated to the factors related with consumption rather than agricultural production. More and more factors that are decisive to evolution move from the area of production to those of consumption, distribution and trade (Senauer, 1989). This fact is significant to the agricultural sector in a particular country. The consequence of diversion towards the consumer is the increasing role of trade, services, innovations introduced in the category of food products, full availability of various products, creation of new needs and enrichment of the utility value of agri-food products. It also involves higher expenses on the services provided by processors of agricultural products. This fact is proved by empirical research. For example, Mellor and Ahmed (1988) indicated that the increase in expenses on food in developed countries is chiefly related with higher expenses on the services related with the processing of agricultural products in the non-agricultural sector. Mrówczyńska-Kamińska (2010 a, b) proved that in such countries as Germany, Belgium, Ireland, Sweden and the United Kingdom, in 1995-2000 the role of the first aggregate of agribusiness in the flow to agriculture increased significantly.

As mentioned above, usually along with economic development the demand for luxurious food grows. At the same time, it is possible to conclude that the process of polarisation of the market of food products takes place. This means that there is an increasing share of the highest quality products and the cheapest products, whereas the market importance of average quality products is decreasing[6]. The main determinant of changes in the structure of demand on the food market is the level of consumers' income and their living standard. The triangle, onion and sandglass theory describes the variation in the proportions between high quality

[6] For example, in West Germany the market share of the highest quality products increased from 28.0% in 1973 to 36.0% in 1990, whereas the share of the cheapest products grew from 23.0% in 1973 to 34.0% in 1990. At the same time, the share of average quality products decreased considerably from 49.0% to 30.0%. The process of market polarisation is a phenomenon that came to be seen in the 1980s (Poczta, 1994).

(brand-name) products, average quality and cheap, mass-made products on the food market, depending on the income level (Poczta, 1994). People's low income causes the highest demand for cheap, mass-made products. It is notably lower as the quality (price) of products increases – the triangle. When income grows, there is a shift in the demand for average quality products, but the demand for cheap products remains relatively high and there is a slight increase in the demand for the most valuable (the most expensive) products – the onion. If there is high income, the demand for food products begins to assume the form of a sandglass. There is the greatest increase in the demand for high quality, expensive products, whereas the demand for cheap products remains at the same level or increases slightly. On the other hand, the demand for average quality products, with average prices, decreases significantly.

Conclusions

A comparison of the importance of agribusiness in individual countries of the European Union in terms of the income output shows that in less developed countries agribusiness is at an early stage of its way to modernity. In the countries, which joined the European Union after 2004, the agribusiness structure is mostly dominated by the sectors of direct food production, i.e. agriculture and the food industry. On the other hand, in the other, more developed countries it is the food industry and the first aggregate (the industries manufacturing means of production and services for agriculture and the food industry) that play the main role in the generation of the gross value added in agribusiness. The results of the correlation between the gross value added per capita and the share of agribusiness in the national income indicate that the process of secular decrease in the importance of this sector in the national income is inhibited if the economic development in a particular country is at a very high level. This confirms the occurrence of the situation where in families with high income the share of expenses on consumption in total expenses begins to grow rather than fall. This situation is caused by rapid growth in the share of expensive and very expensive, highly processed and refined food in the consumption structure. This points to the final stage of development of food economy, where the consumer makes decisions about the situation in agriculture and the entire agri-food sector, whereas the entire food economy and food production is subordinated to the factors related with consumption, distribution and trade. The results of the analysis show that the level of socioeconomic development measured with gross value added per capita is the most important factor influencing the degree of development in agribusiness, its internal structure and the share of this subsystem in the national economy.

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Ondřej Chaloupka, Ivan Foltýn

Institute of agricultural economics and information, Praha, Czech Republic,
chaloupka.ondrej@uzei.cz, foltyn.ivan@uzei.cz

Modelling of Impacts of the Agricultural Sector on the National Economy of the Czech Republic

Abstract: *Continuous efforts to predict what is the most likely development and importance of the agricultural sector are being made in the long-term perspective. To this end, EAA prediction models (SZU-P1 and SZU-P2) were constructed, and coupled with a model that describes the importance and linkages of the agricultural sector to other sectors within the national economy of the Czech Republic (HDP-1 model). The models described below can be used for measuring and simulation of impacts of the agricultural sector with downstream and upstream industries on the Czech GDP, but also monitoring flows and linkages of the total agri-food industry complex on the national economy.*

Keywords: *Economic Accounts for Agriculture (EAA), national economy, inter-sectional balances, GDP, HDP-1 model, Leontieff's matrix, Input-Output matrix, predictions*

Introduction

Economic Accounts for Agriculture (EAA) are compiled on the basis of the Regulation (EC) no. 138/2004 of the European Parliament and Council in all the EU countries. It is an essential instrument to measure the size and economic effectiveness of the agricultural sector. EAA are used to compare effectiveness of agriculture of Member States. In the Czech Republic, EAA are compiled annually by the Czech Statistical Office (CZSO) and published on its website (EAA-CZSO).

EAA can be divided into 4 parts: production account, income account, entrepreneurial income account and capital account. The last account is created only in the final EAA version (see further).

The following terms for sending EAA to Eurostat are obligatory for all the EU Member States:
– the first EAA estimate for year n in November of the n year;
– the second EAA estimate for year n in January of the n+1 year;
– the semi-final EAA version for year n in September of the n+1 year;
– the final EAA version for year n in September of the n+2 year.

From these regulations, it is clear that the delivery date of EEA (the final EAA version has a two-year delay) is very late from the point of view of using the results of agriculture in the form of EAA-CZSO by decision-makers (Ministry of Agriculture of the Czech Republic) and it can be considered rather as conceptual work for the future of the branch (following year and longer period).

For these reasons, the IAEI implemented into its research activities development of mathematical forecasting models of EAA (SZU-P1, SZU-P2), which enable to obtain EAA estimates in advance during the actual year.

Moreover, a new model of national economy balances (HDP-1 model) was created, which draws results for the SZU-P1 and SZU-P2 models and allows to simulate impacts of the agricultural sector on the Czech national economy, including upstream and downstream sectors.

Modelling of EAA

EAA models are mathematical tools for predicting the results of EAA for a given year in advance of the official results of the EAA presented by the CZSO (see above). It is the best and most reliable quantification method of the EAA which will be shown for the needs of decision-makers (during the current year, for a certain time horizon in the context of processing concepts and strategies for the development of the resort, etc.). Modelling of EAA is, therefore, used for projections

of the probable agricultural branch development and it is usually based on alternative assumptions (possible scenarios). Development scenarios are usually formulated in the form of a framework by the Ministry of Agriculture and clarified for modelling needs by the IAEI management in collaboration with the model authors.

Two mathematical models were proposed in the IAEI for predicting the EAA (SZU-P1 and SZU-P2 models), which are based on FADN-CZ data, on the RENT-4 model (see below) and on a combination of empirical and mathematic--statistic procedures.

SZU-P1 and SZU-P2 models

The SZU-P1 model (prediction for the current year) consists of accounts of individual agricultural commodities and draws on data from an existing RENT-4 model and part of STR-1 sub-model (SZU-P2).

The SZU-P2 model (for 3 years in advance) is formed by the regression calculation of seasonal trends based on the IAEI Baseline database.

These models have their own apparatus for predicting prices (CEN-1 and CEN-2 models) based on the CZSO database (Foltýn et al., 2015). Both models were created in Microsoft Excel and use the following sources:
- Mathematical RENT-4 model for economic predictions of profitability of 37 major commodities of the Czech agriculture (Foltýn, Zedníčková, 2012).
- CZSO time series of prices (month periodicity) of agricultural producers (CZV), and yearly price averages.
- CZSO time series of selected indicators of EAA.
- Internal IAEI Baseline database (time series of natural and economic indicators of agriculture).

EAA predictions for the current year

The SZU-P1 model described in the previous sections can be used to predict future EAA for the current year. For this prediction the following input information are needed:
- Anticipated revenues and expenses for each commodity: prediction RENT-4 model.
- Projections of CZV: for this purpose there was created a predictive CEN-1 model, on the basis of monthly time series from 2000 to 2014, which predicts average annual prices of agricultural commodities for 2014.
- Projections of areas and head numbers of individual agricultural commodities: for this purpose there was developed a predictive STR-1 model (which is based on annual time series for all commodities of the RENT-4 model) which provides forecasts for the current year.

– Projections of agricultural subsidies: The prediction of the expected support of individual agricultural commodities under the rules and objectives of the Common Agricultural Policy for the period after 2013.

Model projections of EAA for 2015 by the SZU-P1 model is presented in table 1.

Table 1. The SZU-P1 model – Prediction of Economic Account for Agriculture for 2015

EAA Code	Indicator	Model SZU-P1: S-Reality, P-Prediction				EAA by CZSO - reality		
		2012-S	2013-S	2014-S	2015-P	2012	2013	2014
01	CEREALS INCLUDING SEEDS	35 645	33 827	38 764	31 770	32 362	32 549	33 857
02	INDUSTRIAL CROPS	18 491	19 966	22 024	21 092	19 039	20 628	21 482
03	FODDER CROPS	11 348	12 591	13 079	13 449	10 291	11 751	12 853
04	VEGETABLES AND HORTICULTURAL PRODUCTS	5 331	5 647	5 868	5 723	5 170	5 383	5 670
05	POTATOES INCLUDING SEEDS	3 251	4 450	4 908	2 025	1 924	2 562	2 723
06	FRUIT	1 351	1 560	1 485	1 449	1 281	1 373	1 293
07	WINE	774	935	935	935	774	935	804
08	OLIVE OIL	0	0	0	0	0	0	0
09	OTHER VEGETABLE PRODUCTS	830	777	777	777	830	777	861
10	VEGETABLE PRODUCTION (01….09)	77 021	79 754	87 840	77 220	71 671	75 957	79 544
11	ANIMALS	21 017	22 207	20 702	20 755	21 901	22 284	22 612
12	ANIMAL PRODUCTS	23 831	25 453	29 284	24 035	23 117	24 612	28 957
13	ANIMAL PRODUCTION (11+12)	44 848	47 661	49 985	44 790	45 017	46 895	51 569
14	AGRICULTURAL PRODUCTS OUTPUT (10+13)	121 868	127 415	137 825	122 010	116 688	122 853	131 113
15	AGRICULTURAL PRODUCTS SERVICES	3 082	2 774	2 832	2 832	3 082	2 774	2 832
16	AGRICULTURAL PRODUCTION (14+15)	124 951	130 189	140 658	124 842	119 770	125 627	133 945
17	NON-AGRICULTURAL SECONDARY ACTIVITIES (INSEPARABLE)	2 468	2 597	2 630	2 630	2 468	2 597	2 630
18	AGRICULTURAL SECTOR PRODUCTION (16+17)	121 868	127 415	137 825	122 010	122 239	128 223	136 575
19	INTERMEDIATE CONSUMPTION	79 162	87 769	91 129	95 224	88 247	90 767	94 776
20	GROSS VALUE ADDED IN BASIC PRICES (18-19)	37 426	34 147	41 163	21 312	33 991	37 456	41 799
21	FIXED ASSETS CONSUMPTION	17 076	16 096	15 081	15 267	15 023	15 584	16 051
22	NET VALUE ADDED IN BASIC PRICES (20-21)	20 350	18 051	26 083	6 045	18 968	21 872	25 748
23	RENUMERATIONS TO EMPLOYEES	25 297	24 125	25 064	25 695	24 828	25 550	26 163
24	OTHER TAXES ON PRODUCTION	0	0	0	0	1 219	1 146	1 197
25	OTHER SUBSIDIES ON PRODUCTION	26 030	26 390	26 791	25 223	29 283	27 504	30 896
26	INCOME FACTOR (22-24+25)	46 380	44 441	52 874	31 269	47 032	48 230	55 447
27	NET OPERATING SURPLUS/MIXED INCOME (26-23)	21 083	20 315	27 810	5 574	22 204	22 680	29 284
28	OBLIGATORY RENT AND OTHER REAL ESTATE RENTS	0	0	0	0	4 511	5 037	5 541
29	INTEREST PAYABLE	0	0	0	0	1 787	1 816	1 366
30	INTEREST RECEIVABLE	0	0	0	0	423	420	494
31	BUSINESS INCOME (26-23-28-29+30)	21 083	20 315	27 810	5 573	16 329	16 248	22 871

Source: own calculations.

EAA predictions for a longer period

While the SZU-P1 model is based on commodity accounts, the SZU-P2 model is based on projections of all 31 indicators of EAA-CZSO. The RV and ZV accounts of the SZU-P2 model use the commodity structure from the RENT-4 model. The intermediate consumption and final account indicators (19-31) in the SZU-P2 model are based on the time series (table 2).

The SZU-P2 model is based on the regression of seasonal trends (see below) in prices, crop areas hectare yields, animal intensity and animal units from which the values of the total output indicators for agriculture are calculated. Furthermore, with the help of seasonal trends cost items and other indicators of EAA are calculated. Predictions of subsidies are taken from the rules of Agrarian Policy of the EU CAP for the period up to 2020.

The basic input source into the SZU-P2 model is the IAEI Baseline database that collects long-time series of natural and economic data for all important agricultural commodities.

Table 2. The SZU-P2 model – Prediction of Economic Account for Agriculture for 2015-2017

EAA Code	Indicator	Model SZU-P2: S-reality, P-prediction						EAA by CZSO - reality		
		2012-S	2013-S	2014-S	2015-P	2016-P	2017-P	2012	2013	2014
01	CEREALS INCLUDING SEEDS	35 505	33 738	32 202	36 519	39 186	39 475	32 362	32 549	33 857
02	INDUSTRIAL CROPS	19 722	21 548	20 554	22 326	23 041	25 586	19 039	20 628	21 482
03	FODDER CROPS	10 291	11 751	10 498	10 960	11 340	11 719	10 291	11 751	12 853
04	VEGETABLES AND HORTICULTURAL PRODUCTS	5 170	5 383	6 152	6 395	6 600	6 797	5 170	5 383	5 670
05	POTATOES INCLUDING SEEDS	4 054	3 333	3 245	3 008	2 505	2 395	1 924	2 562	2 723
06	FRUIT	1 291	1 330	1 392	1 434	1 396	1 363	1 281	1 373	1 293
07	WINE	774	935	1 081	1 158	1 173	1 257	774	935	804
08	OLIVE OIL	0	0	0	0	0	0	0	0	0
09	OTHER VEGETABLE PRODUCTS	830	777	782	746	682	629	830	777	861
10	VEGETABLE PRODUCTION (01….09)	77 637	78 795	75 905	82 546	85 924	89 221	71 671	75 957	79 544
11	ANIMALS	23 704	23 708	25 526	22 545	22 385	22 071	21 901	22 284	22 612
12	ANIMAL PRODUCTS	26 443	27 682	28 486	24 938	24 836	24 780	23 117	24 612	28 957
13	ANIMAL PRODUCTION (11+12)	50 147	51 391	54 012	47 483	47 221	46 850	45 017	46 895	51 569
14	AGRICULTURAL PRODUCTS OUTPUT (10+13)	127 784	130 185	129 917	130 029	133 144	136 071	116 688	122 853	131 113
15	AGRICULTURAL PRODUCTS SERVICES	3 082	2 774	2 787	2 589	2 310	2 048	3 082	2 774	2 832
16	AGRICULTURAL PRODUCTION (14+15)	121 749	123 843	132 704	132 617	135 454	138 120	119 770	125 627	133 945
17	NON-AGRICULTURAL SECONDARY ACTIVITIES (INSEPARABLE)	0	0	0	0	0	0	2 468	2 597	2 630
18	AGRICULTURAL SECTOR PRODUCTION (16+17)	121 749	123 843	121 216	121 137	123 728	126 163	122 239	128 223	136 575
19	INTERMEDIATE CONSUMPTION	88 247	90 767	88 168	86 757	88 032	89 477	88 247	90 767	94 776
20	GROSS VALUE ADDED IN BASIC PRICES (18-19)	33 502	33 075	33 048	34 380	35 696	36 685	33 991	37 456	41 799
21	FIXED ASSETS CONSUMPTION	15 023	15 584	15 584	15 861	16 128	16 312	15 023	15 584	16 051
22	NET VALUE ADDED IN BASIC PRICES (20-21)	18 479	17 492	17 463	18 519	19 568	20 373	18 968	21 872	25 748
23	RENUMERATIONS TO EMPLOYEES	24 828	25 550	25 797	25 846	25 964	26 163	24 828	25 550	26 163
24	OTHER TAXES ON PRODUCTION	1 219	1 146	1 121	1 106	1 063	1 013	1 219	1 146	1 197
25	OTHER SUBSIDIES ON PRODUCTION	29 283	27 504	31 354	32 520	33 085	33 449	29 283	27 504	30 896
26	INCOME FACTOR (22-24+25)	46 543	43 850	47 696	49 933	51 591	52 809	47 032	48 230	55 447
27	NET OPERATING SURPLUS/MIXED INCOME (26-23)	28 064	26 358	30 233	31 414	32 023	32 436	22 204	22 680	29 284
28	OBLIGATORY RENT AND OTHER REAL ESTATE RENTS	4 511	5 037	4 927	5 118	5 363	5 509	4 511	5 037	5 541
29	INTEREST PAYABLE	1 787	1 816	1 313	1 358	1 296	1 259	1 787	1 816	1 366
30	INTEREST RECEIVABLE	423	420	461	412	396	371	423	420	494
31	BUSINESS INCOME (26-23-28-29+30)	15 839	11 867	16 120	18 024	19 364	20 250	16 329	16 248	22 871

Source: own calculations.

The aim of the SZU-P2 model is to create a complex predictive model of EAA. This model consists of sub-models that predict separately harvest area and the animal units (STR-1), yields and animal intensities (INT-1), producer prices (CEN-2) and the cost and other items of EAA (NAK-1).

Projections take place in each sub-model individually for the monitored commodities (RENT-4 model) and for the cost and other items of EAA, for which the time series since 2000 are used.

Modelling of the national economy balances (HDP-1 model)

Based on the requirements of the Ministry of Agriculture, Agrarian and Food Chamber this year the question appeared of how to measure the size of agriculture, including the upstream and downstream sector, in the whole range and how to measure impact on the national economy (NE). To this end, the HDP-1 model was designed based on the Input-Output method (I/O method) inter-sectoral and interdisciplinary relations in the NE (Leontieff 1941, 1986; Korda, 1967).

Agriculture sector on a large-scale can be defined by the sectors of the national economy, such as the agricultural sector, which is 01 (agriculture), 02 (forestry and logging) and 03 (fisheries and aquaculture). For full expression of linkages between agriculture affecting food production the paper uses the term agro complex, which is defined by sectors of the agrarian sector (01, 02, 03) and sector 10 (manufacture of food products) and sector 11 (beverages).

The size of agriculture can be measured by two approaches in the national economy. In the first approach, the size of agriculture is measured by production of all enterprises, which have predominant agricultural activity. In the second approach, the size of agriculture is measured by the sum of all agricultural activities of all enterprises in the Czech Republic (which is contained in the EAA). It is an agricultural activity in both businesses, dominated by agricultural activity, as well as in other companies, which have agricultural activity within their production activities.

The Czech Statistical Office monitors the national economy (NE), divided into sectors (sum for all companies of the sector with predominant activities in this sector). The agricultural sector is thus defined in the NE-balances of the CZSO as the sum of companies with predominant agricultural activities.

For this reason, the HDP-1 model uses the clean agricultural production of the EAA results. Due to the results of the SZU-P1 and SZU-P2 models it is possible to simulate the impact of the agrarian sector in the NE for several years ahead, or perform pre-defined simulation.

Leontieff's matrix of Inter-sectoral relationships (Input-Output matrix)

The basic economic instrument for measuring the importance of agriculture on the scale of the national economy is the Leontieff's matrix of inter-sectoral relations. The matrix model has the following structure:

Let us denote 1, 2, ..., n sectors of the national economy and Xi total output of the sector in terms of value. Thereafter, for the sector i = 1, 2, ..., n there can be formulated an equation system (I/O matrix):

$$D_1 + X_1 = Z_{1,1} + Z_{1,2} + ... + Z_{1,n} + Y_1$$

$$D_2 + X_2 = Z_{2,1} + Z_{2,2} + ... + Z_{2,n} + Y_2$$

. . . . . .

$$D_n + X_n = Z_{n,1} + Z_{n,2} + ... + Z_{n,n} + Y_n,$$

where:

D_i is the value of imports and production of the sector i,

$Z_{i,j}$ is intermediate consumption, i.e. the part of sector i and production (taking into account imports), which delivers the sector i and the manufacturing industry j = 1,2, ..., n,

Y_i is the final production, i.e. the total volume of production in the sector which leaves the production sector (accounting for exports).

Rows of the matrix represent deliveries of the production of one sector (line) to all branches (columns) the matrix columns. Columns of the matrix represent deliveries of supplies from all sectors (lines) to one sector (column). I/O matrix is a square matrix (nxn) and includes the so-called inter-sectoral deliveries (diagonal elements Zi,i), where production of the industry was partially consumed in the same industry.

I/O matrix – static approach

The CZSO monitors the national economy annually using the Leontieff's matrix.

The individual sectors include production of all enterprises with predominant activity, which is given the name of the sector. For example, the sector 01 includes all production activities of farms in the CR (including hunting), which represent both a purely agricultural activities (crop and livestock production) and non-agricultural activities (construction production, transport, etc.). In a broader definition of agriculture it contains agriculture (01), forestry (02) and fisheries (03) which usually occur in the statistical sources of the Czech Statistical Office.

Supply sources include the most important items of domestic production, imports and other items (fig. 3). Final consumption includes expenditure of households, government and non-profit organisations and export.

For the purpose of measuring the significance of the agricultural sector, the study used the latest available data from the CZSO I/O matrix for 2012.

CZ-NACE	X	D						Interdisciplinary matrix of consumption for manufacturing Z						Y								Y+Z
	SOURCES OF SUPPLY							CZ-NACE sector						Final consumption expenditure			Gross fixed capital formation, incl. Valuable	Changes in inventories	Export (FOB)	Final uses in total	Used sources total
	Production of basic commodities prices	Import	VAT	Taxes on products without VAT	Subsidies on products	Trading range	Transport margins	Total supply purchase price						Household	Government	Non-profit inst.					
	P.1	P.7	D.211	D.212+D.214	D.319				01	02	.	.	.	99	P.3			P.51+P.53	P.52	P.6		
01 Agriculture	*x1*	*d1,1*	*d1,2*	.	.	.	*d1,6*	*x1+∑d1,j*	*z1,1*	*z1,2*	.	.	.	*z1,99*	*y1,1*	*y1,2*	.	.	.	*y1,6*	*∑y1,j*	*∑z1,+∑y1,j*
02 Forestery	*x2*	*d1,2*	*d2,2*	.	.	.	*d2,6*	*x2+∑d2,j*	*z2,1*	*z2,2*	.	.	.	*z2,99*	*y2,1*	*y2,2*	.	.	.	*y2,6*	*∑y2,j*	*∑z2,+∑y2,j*
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99 Services	*x99*	*d1,99*	*d2,99*	.	.	.	*d99,6*	*x99+∑d99,j*	*z99,1*	*z99,2*	.	.	.	*z99,99*	*y99,1*	*y99,2*	.	.	.	*y99,6*	*∑y99,j*	*∑z99,+∑y99,j*

Figure 1. Scheme of I/O matrix by the Czech Statistical Office

Source: own calculations.

Table 3 shows how to participate in the agriculture and forestry production use in other sectors of the NE. In the rows 01-03 of I/O matrix it selects only significant flows into other sectors. Table 4 shows other sectors of production through the NE industries involved in the production of agricultural and forestry sectors and selects significant flows of I/O matrix from different sectors in columns from 1 to 3.

Table 3. Matrix of supply and use – Agricultural sector – customer relationships in 2012 (CZK million)

Commodity production[1]	Import	CZ-NACE	Commodity name	CZ-NACE Sectors																
				Agriculture	Forestery and logging	Fishing and aquaculture	Food products	Beverages	Tobacco products	Textiles products	Wood and corc products	Paper products	Chemicals products	Electricity, gas and heat productsts	Wholesale trade, except of motor vehicles	Retail, except of motor vehicles	Accommodations	Catering	Activities related to construction.
				01	02	03	10	11	12	13	16	17	20	35	46	47	55	56	81
182 149	50 024	01	Agricultural and hunting products	20 778	899	0	77 968	13 741	4 786	4 218	12	3	1 476	1 019	4 524	1 311	1 737	13 254	1 860
42 438	4 454	02	Forestry and logging products	28	8 892	0	6	83	0	20	19 689	2 553	0	148	2	0	0	0	0
1 951	904	03	Fish, aquaculture	0	3	15	850	0	0	0	0	0	0	0	0	0	0	0	5
184 100	50 928	01+03	Agriculture [2]	20 778	902	15	78 818	13 741	4 786	4 218	12	3	1 476	1 019	4 524	1 311	1 737	13 254	1 865
226 538	55 382	01+02+03	Agrarian sector[3]	20 806	9 794	15	78 824	13 824	4 786	4 238	19 701	2 556	1 476	1 167	4 526	1 311	1 737	13 254	1 865

1) In basic prices.

2) Agriculture – specific term = 01 agricultural +03 fish, aquaculture.

3) Agricultural sector = 01 agricultural and hunting products +03 fish, aquaculture +02 forest products, timber production.

Source: ČSÚ (http://apl.czso.cz/pll/rocenka/rocenkaout.dod_uziti?mylang=CZ); own calculations.

When limited to agricultural production, tables 3 and 4 show that the focus should be only on the sectors 01 and 03. This demonstrates the I/O matrix in the column 10 (manufacture of food products), which shows production delivered from the sector 01 in total value of CZK 78.0 billion, then it shows production

from the sector 03 in the value of CZK 0.9 billion and, finally – production from the sector 02 in value of only CZK 0.006 billion.

Table 4. Matrix of supply and use – Agricultural sector – supply relationships in 2012 (CZK million)

Commodity production 1)	Import	CZ-NACE	Commodity name	Agriculture	Forestery and logging	Fishing and aquaculture	Agriculture 2)	Agrarian sector
				01	02	03	01+03	01+02+03
182 149	50 024	01	Agricultural and hunting products	20 778	899	0	20 778	21 677
42 438	4 454	02	Forestry and logging products	28	8 892	0	28	8 920
1 951	904	03	Fish, aquaculture	0	3	15	15	18
249 114	121 223	10	Food products	40 895	21	2	40 897	40 918
26 186	41 747	14	Clothing	1 025	1 301	10	1 035	2 336
82 703	15 757	16	Wood and cork products	247	1 505	1	248	1 753
147 529	64 810	19	Coke and refined oil products	10 252	2 317	23	10 275	12 592
153 316	215 696	20	Chemicals and chemical products	14 849	199	53	14 902	15 101
298 883	127 542	28	Machines and equipment	2 777	693	207	2 984	3 677
121 833	4 650	33	Repair, maintenance and installation of mach. Equipment	3 274	501	60	3 334	3 835
439 068	31 129	35	Electricity, gas, heat and air conditioning	2 598	145	15	2 613	2 758
4 386	20 640	43	Specialised construction works	555	1 336	12	567	1 903
306	4 725	45	Wholesale and retail with motor vehicles	943	1 198	2	945	2 143
208 698	17 666	52	Storage and supporting sevices in transport	1 276	1 092	1	1 277	2 369
209 496	4 240	64	Financial services	2 586	631	10	2 596	3 227
3 694	0	75	Veterinary services	2 362	1	0	2 362	2 363

1) In basic prices.
2) Agriculture – specific term = 01 agricultural +03 fish, aquaculture.
3) Agricultural sector = 01 agricultural and hunting products +03 fish, aquaculture +02 forest products, timber production.

Source: ČSÚ (http://apl.czso.cz/pll/rocenka/rocenkaout.dod_uziti?mylang=CZ); own calculations.

The I/O matrix – dynamic approach

The I/O matrix shows a list of all sectors in rows and columns and relations between them determine production to other sectors. From the intersection of the row and column of the I/O matrix it can be seen how much of the sector A enters into an intermediate consumption of sector B, and vice versa. It can be calculated what volume of agricultural production goes not only to food, but also to the whole economy (rows of the I/O matrix). In the opposite direction, it can be calculated how much production goes into agriculture economy, and it is so "invoked" (column of the I/O matrix).

Leontieff's table should only be based on inter-sectoral flows of production, regardless of who is the producer in the domestic economy. Unfortunately, this is not available, and there are only data on the production of enterprises of the sector. This may in some cases lead to distorted results. For this reason, all countries construct the Economic Accounts for Agriculture (Economic Account of Agriculture, EAA), whose structure is defined by Eurostat annually. For the Czech Republic, for the past year, it was compiled by the CZSO and, therefore, it is the best available source of the data on agricultural production in the Czech Republic.

Cleaning of imports

Particular attention should be paid to imports. Leontieff's table allocates overall "source of supply" to individual sectors for their use, i.e. for intermediate consumption. Among these, in addition to domestic production (which we are interested in and we will have decrease variants), are counted as imports (and other small sources have a rather accounting character). Recognized production of agriculture is entering into other sectors and includes the imports of agricultural products, and these need to be deducted, because of our varieties dynamic effect. We will consider only the decrease in domestic agricultural production, not humiliation category "production + imports" (in fact, on the contrary, increased imports decline in domestic production). Here, it was necessary to apply a presumption of proportionality. In each sector we know each other share of imports and its own production, so the impact of agriculture on other sectors (and the whole economy) has been adjusted for imputed volume of imports under the "sources of supply" of the sector.

Simulations of importance and size of agriculture in the national economy

Assumptions of model simulations
Initial state: data for 2012.
Variants of simulations: decrease in production by 5, 10 and 30%.

Data Sources:
- CZSO 2012;
- Report on the State of Agriculture 2013;
- IAEI Baseline Database.

Used modelling tools:
- HDP-1 model based on the I/O matrix of the CZSO for 2012 and its implementation in Excel,
- SZU-P2 model in GAMS optimization system,
- Statistical regression functions.

In table 5, there are interpreted results of impact simulations of size of the agricultural sector in the Czech Republic, by HDP-1 model. Significant agricultural GDP was measured as a share of GDP of individual sectors (01, 02, 03, 10 and 11), which consists of agribusiness in the Czech Republic in the Czech GDP.

The ratio of agro complex to GDP (last column) does not match the simple sum of shares of individual sectors in the GDP due to the fact that there are very strong links between sectors of the agro complex (between agriculture and food production of the sectors and vendors). These ties were considered and eliminated in the calculations.

Table 5. Model simulations – share of agriculture in specific term on GDP of the Czech Republic

CZ-NACE	Agriculture 01	Forestry and logging 02	Fisheries and aquaculture 03	Food products 10	Beverages 11	Agrarian sector 01+02+03	Agrocomplex 01+02+03+10+11
	Status of year 2012						
The share of industry in GDP in National Economy (incl. taxes and grants)	2,26%	0,80%	0,02%	1,52%	0,76%	3,09%	
The share of domestic suppliers inputs to industry	0,91%	0,22%	0,01%	1,56%	0,20%	1,13%	
The share of GDP generated by other industries by delivering industry	1,57%	0,33%	0,01%	1,56%	0,10%	1,91%	
The share of exports in the production sector in the national economy	0,37%	0,08%	0,01%	0,97%	0,16%	0,47%	
TOTAL industry share in GDP sectors, including upstream and downstream sectors	**5,11%**	**1,43%**	**0,05%**	**5,61%**	**1,22%**	**6,60%**	**12,20%**
	Reduced production by 5 %						
The share of industry in GDP in National Economy (incl. taxes and grants)	2,15%	0,80%	0,02%	1,52%	0,76%	**2,97%**	
The share of domestic suppliers inputs to industry	0,90%	0,21%	0,01%	1,56%	0,20%	**1,13%**	
The share of GDP generated by other industries by delivering industry	1,52%	0,32%	0,01%	1,56%	0,10%	**1,85%**	
The share of exports in the production sector in the national economy	0,38%	0,08%	0,01%	0,97%	0,16%	**0,47%**	
TOTAL industry share in GDP sectors, including upstream and downstream sectors	**4,95%**	**1,42%**	**0,05%**	5,61%	1,22%	**6,42%**	**12,04%**
	Reduced production by 10 %						
The share of industry in GDP in National Economy (incl. taxes and grants)	2,04%	0,80%	0,02%	1,52%	0,76%	**2,86%**	
The share of domestic suppliers inputs to industry	0,90%	0,21%	0,01%	1,56%	0,20%	**1,12%**	
The share of GDP generated by other industries by delivering industry	1,49%	0,30%	0,01%	1,56%	0,10%	**1,80%**	
The share of exports in the production sector in the national economy	0,38%	0,08%	0,01%	0,97%	0,16%	**0,47%**	
TOTAL industry share in GDP sectors, including upstream and downstream sectors	**4,80%**	**1,40%**	**0,05%**	5,61%	1,22%	**6,25%**	**11,89%**
	Reduced production by 30 %						
The share of industry in GDP in National Economy (incl. taxes and grants)	1,58%	0,80%	0,02%	1,52%	0,76%	**2,41%**	
The share of domestic suppliers inputs to industry	0,88%	0,20%	0,01%	1,56%	0,20%	**1,09%**	
The share of GDP generated by other industries by delivering industry	1,34%	0,24%	0,01%	1,56%	0,10%	**1,59%**	
The share of exports in the production sector in the national economy	0,38%	0,08%	0,01%	0,97%	0,16%	**0,47%**	
TOTAL industry share in GDP sectors, including upstream and downstream sectors	**4,18%**	**1,33%**	**0,05%**	5,61%	1,22%	**5,56%**	**11,27%**

Source: own calculations.

1) From the static modelling approach (reality 2012) the following values of GDP were obtained:
- share of agriculture (sector 01) = 2.26% of GDP,
- share of the agricultural sector (sectors 01, 02, 03) = 3.09% of GDP,
- share of agro complex (sectors 01, 02, 03, 10, 11) = 12.19% of GDP,

2) From the dynamic modelling approach (simulation of decreasing agricultural production by 5, 10 and 30%) the following GDP value changes were obtained:
- share of agriculture (sector 01) = GDP decrease to 2.15%, 2.04%, 1.58%, respectively;
- share of the agricultural sector (sectors 01, 02, 03) = GDP decrease to 2.97%, 2.86%, 2.41%, respectively.
- share of agro complex (sectors 01 to 03, 10, 11) = GDP decrease to 12.04%, 11.89%, 11.27%, respectively.

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Marcela TUZOVÁ, Martina TOULOVÁ, Lea KUBÍČKOVÁ

Faculty of Business and Economics, Mendel University in Brno, The Czech Republic,
marcela.tuzova@mendelu.cz, martina.toulova@mendelu.cz,
lea.kubickova@mendelu.cz

Selected Aspects of the Internationalisation Process of the Czech Agricultural SMEs with Focus on the Success Factors

Abstract: *Enterprises from all over the world face the pressure of strengthening international competition because of the globalisation of markets. Therefore, enterprises should react promptly to all these changes. One of the ways how enterprises can sustain their competitiveness or achieve further growth is their involvement in internationalisation, which means their foreign expansion. This paper deals with agricultural enterprises which also try to look for new ways how to sell their production even beyond the national borders, it means that they try to internationalise. There are a lot of factors which can influence the success of enterprises in foreign markets. What factors can contribute to the success of agricultural enterprises in foreign trade operations? It is the main question addressed in this paper.*

Keywords: *internationalisation, small- and medium-sized enterprises, agriculture, success factors, networks*

Introduction

Nowadays, the globalisation of markets causes the increasing pressure of international competition which enterprises should face. Enterprises (in particular the small- and medium-sized ones) should react promptly to all the changes of business environment and they should try to look for new ways how to sustain their competitiveness or achieve further growth. Some authors (see for example Paunovič, Prebežac, 2010; Svetličič et al., 2007) claim that the engagement of an enterprise in the internationalisation process could be the way how small- and medium-sized enterprises (abbreviated as SMEs) can strengthen their competitiveness. On the other hand, some researches (Korsakiene, Tvaronaviciene, 2012; Paunovič, Prebežac, 2010) pointed out that SMEs have limited financial and human resources and lack the specific capabilities and, therefore, their involvement in internationalisation can be much more difficult for them compared to large enterprises. Hollenstein (2005) highlighted the existence of a relationship between the size of an enterprise and its propensity to internationalisation. He suggested that the larger an enterprise is the higher is the probability of its involvement in international activities.

The paper deals with Czech SMEs which operate in agricultural sector. Agriculture represents an important, irreplaceable and also strategic part of national economy. It has many crucial roles, such as securing the physical existence of the population, ensuring the basic food, and it affects also the formation of our landscape and influences rural areas and people living there. Even though the share of the Czech agricultural exports in total exports of the Czech Republic is not so high (it reached 5% in 2013 and 2014), the agricultural foreign trade is still important for national economy and for agricultural enterprises as well. With regard to the above-mentioned, enterprises operating in agriculture try to search for business opportunities even beyond the national borders, it means that they consider their internationalisation. How can they compete in international environment? Which factors should they focus on? Regarding their limited resources SMEs should firstly concentrate on factors which could determine their success in foreign markets with respect to their effective use.

The aim of this paper is to identify the factors which influence the success of agricultural SMEs in foreign markets. The identification of key factors contributing to the success is based on the subjective evaluation of factors by the agricultural SMEs already involved in foreign trade operations. These SMEs provide their own experience which can thus broaden the insight into some aspects of internationalisation process of agricultural SMEs, also for enterprises that are just considering their international expansion.

According to the literature, there are many factors which could determine the success in foreign markets. Küster and Vila (2011) stated that enterprises invol-

ved in internationalisation can be more successful than those operating only in the domestic market. Furthermore, as important determinants of success they considered the proactive behaviour of an enterprise and its focus on innovation. Pangarkar (2008) indicated that among factors influencing the success in international operations there are specific skills or capabilities of an enterprise, such as skilled management, financial resources, focus on research and development, performing market research for the purpose of finding international opportunities, but also a strong brand name. Bonaccorsi (1992) introduced the measurable indicator of international success called export intensity, which can be expressed as the proportion of foreign sales to total sales. Similarly, Majocchi et al. (2005) and Camison and Villar-Lopez (2010) used this indicator in their studies and, at the same time, they emphasised the role of previous experience with foreign trade operations as a factor determining the success. Also Child and Hsieh (2014) stressed the important role of previous international experience in internationalisation process which can be gained not only via direct involvement of enterprises into the foreign market but also via network relationship. Moreover, Dichtl et al. (1990) and Rutihinda (2008) stressed that internationally oriented management is quite a significant factor for business success abroad. A comprehensive view on studies dealing with the factors influencing the success in international markets was also provided by Leonidou et al. (2002) or Hötzinger (2014). Leonidou et al. (2002) concluded that export marketing strategy plays a significant role in successful international operations (namely market segmentation, product quality, pricing strategy, dealer support and advertising). Hötzinger (2014) summarised that the preconditions of internationalisation success can be divided into five categories, such as strategic planning skills, cultural integration, staff and knowledge management, communication and networking, and leadership quality, which is essential to formation of other of the above-mentioned skills determining the successful internationalisation. According to him those factors are interconnected and they intensify each other. Furthermore, Ensari and Karabay (2014) stated that factors influencing the business success of enterprises can vary from one country to another because of economic, geographical or cultural differences (see also Wijewardena and De Zoysa, 2005). Based on the review of the studies dealing with this topic Ensari and Karabay (2014) classified the factors contributing to the business success of enterprises into some categories, such as the entrepreneur characteristics and the characteristics of SMEs, management and know-how, products and services, markets and customers, the way of doing business and cooperation of enterprises, finance and resources of an enterprise, strategy, external environment, and the use of the Internet.

Many researchers also stressed the role of networks in internationalisation. Two basic forms of networks can be distinguished, i.e. horizontal and vertical network. Horizontal networks involve cooperation among companies, which are primarily competitors in the same sector, and the vertical networks represent the cooperation within the same chain, while they include entities, such as suppliers, customers and others who are involved in a two-way flow of products, services, finance

or information (Gellynck, Kühne, 2010). Burandt et al. (2013) highlighted that the networks are also important with regard to their role in social, cultural and ecological development of rural areas. Johanson and Vahlne (2009), Hutchinson et al. (2006) and Rutihinda (2008) considered the involvement of an enterprise in the network of relationships with other enterprises to be quite an important factor for successful internationalisation process. Korsakiene and Tvaronaviciene (2012) claim that success in internationalisation depends on the position of an enterprise in networks of relationships. Johanson and Vahlne (2009) add that SMEs can strengthen their competitive position and diversify into foreign markets via getting relevant information from networks. Musteen et al. (2014) studied the network in the Czech conditions and they found out that for SMEs from transition economies, such as the Czech Republic, the network is quite important because of the possibility to gain knowledge about foreign market via established network ties. Salvador et al. (2014) claimed that networks are essential especially for small- and medium-sized enterprises. According to Burandt et al. (2013) small- and medium-sized enterprises interconnected in networks gain the access to further markets, they can use marketing tools effectively as well as they can profit from the synergic use of knowledge and skills of particular network's partner. In this context, Musteen et al. (2010) added that small enterprises rely more often on their involvement in networks, which can help them overcome obstacles in their internationalisation process. Also Dana (2001) emphasized the role of networks, particularly in the field of facilitating internationalisation and exploring new opportunities. According to that author, small enterprises can increase their competitiveness via cooperative ties with larger companies. Shahadan and Abdullah (2011) argued that agricultural enterprises should innovate in order to be competitive and successful, while the innovation potential is considerably influenced by the involvement of an enterprise in networks. Regarding the above-mentioned there are many various factors influencing the success of an enterprise in foreign business operations. Which factors influencing the success of an enterprise in foreign markets are perceived as the most important by the Czech SMEs operating in agriculture? This question will be addressed in this paper.

Objective and methodology

The aim of this paper is to identify the factors which can contribute to the success of agricultural SMEs in foreign trade operations. Furthermore, we wanted to find out whether there are some differences between the perception of particular factors determining the success in foreign markets, and some selected characteristics of an enterprise, namely the size of an enterprise, the current position of an enterprise in internationalisation and the level of objectively measured success, the so-called export intensity.

In case of the size of an enterprise we distinguish three main categories of size according to number of employees. We differentiate the microenterprises with

less than 10 employees, small-sized enterprises with more than 10 employees but less than 50 employees, and medium-sized enterprises which have more than 50 employees but less than 250 employees. This division is in line with the new definition of SMEs introduced by the European Commission (2003). In the second perspective, we take into account the current position of an enterprise in internationalisation while we distinguish two groups of enterprises – the first group, includes enterprises already involved in internationalisation, and their point of view is confronted with the other group of SMEs, which operate in home markets but currently consider their foreign expansion. The last considered perspective, is based on the level of objectively measured success. Firstly, the objectively successful enterprises were defined. To be objectively successful in foreign operations the enterprise has to meet three criteria. It has to fulfil its set objectives, its foreign business operations have to be profitable and the enterprise has to reach the set level of export intensity, which is expressed as the proportion of foreign sales to total sales. Based on evaluation of those three criteria different categories of an enterprise were defined. The less successful enterprises with their export intensity lower than 25%, successful enterprises reach 25-50% of foreign sales to total sales, and the most successful enterprises have export intensity higher than 50%.

Additionally, the paper also deals with the role of a network in internationalisation of agricultural SMEs.

This paper is based on the primary data obtained via electronic questionnaire surveys conducted in 2014 and 2015 among the Czech agricultural SMEs. Two types of questionnaires were constructed and then sent to enterprises via e-mail. The first questionnaire was aimed at agricultural SMEs already involved in internationalisation, while the second one was focused on SMEs operating only in domestic market. The links to the surveys were distributed via e-mails and the firms' contact details were gained from the Amadeus database which collects information about European entities, and also Czech database called Firmy.cz.

In the survey, 347 respondents were involved and this sample of respondents comprises from 45 SMEs already involved in internationalisation (further they will be called internationalised SMEs) and 302 SMEs, which operate in domestic market (they will be called non-internationalised SMEs). Further details about respondents are shown in table 1.

The data were processed by descriptive statistic, and in order to identify the differences in perception of particular factors determining the success in foreign market by various groups of respondents, the Kruskal-Wallis test was performed. The null hypothesis about lack of any differences in means between the groups of respondents we wanted to compare, was rejected when the calculated p-value was lower than the significance level (Dodge, 2010). The level of significance

was set at 5%, or 10% in some cases. Moreover, to identify which groups of respondents differ, multiple p-values were used.

Table 1. The main characteristics of agricultural internationalised and non-internationalised SMEs

Characteristic of an enterprise	Categories	% of internationalised SMEs	% of non--internationalised SMEs
Company size according to number of employees	micro	33%	59%
	small	49%	30%
	medium	18%	11%
Export intensity	0-25%	51%	-
	26-50%	22%	-
	51-100%	27%	-
Size of farmland (1ha = 10,000 m^2)	1-100 ha	24.4%	42.4%
	100-500 ha	15.6%	17.9%
	500-1,000 ha	22.1%	18.9%
	1,000-1,500 ha	15.6%	9.3%
	1,500- 2,000 ha	6.7%	4%
	more than 2,000 ha	15.6%	7.5%
Enterprise's main field of activity	crop production	51%	45%
	animal production	24.5%	24.6%
	mixed farming	24.5%	26.8%
	support activities in agriculture	0%	3.6%
Total		100% (45 enterprises)	100% (302 enterprises)

Source: author's results.

Results and discussion

The primary data processing revealed that the Czech agricultural SMEs access the foreign markets via export (they use direct as well as indirect form of export) as it is the simplest and quickest mode of entry into foreign markets, which is also often used by SMEs regardless of the industry in which they operate (see for example Majocchi et al., 2005). The most important foreign markets, to which agricultural SMEs export, are the neighbouring countries of the Czech Republic, i.e. Germany as 73% of respondents operate there, Austria as nearly 49% of respondents operate there, Slovakia (47%), and Poland (42%). Those results correspond to the territorial structure of agricultural foreign trade reported in official statistics.

In order to fulfil the aim of this paper, the factors, which can contribute to the success of an enterprise in foreign trade operations, were identified. Firstly, the factors which can influence the success of an enterprise in foreign markets were selected based on the literature review and also consultations with some agricultural enterprises. Then the respondents (agricultural SMEs) were asked to evaluate their perception of those 24 factors on a ten-point scale, where '1' meant not important factor for the success in foreign trade operations and '10' meant the most important factor for their success. Based on the primary data processing,

specific factors, which can contribute to the success of the Czech agricultural SMEs in their internationalisation process, were identified. Moreover, as the key factors determining the success, those which were evaluated in average by seven and more points, were chosen. These key success factors are shown in table 2 and they are ordered from the most important to the least important ones.

According to the subjective perception of agricultural SMEs, quite important factors influencing their success in foreign markets are 'the quality' and 'the price of products', 'the reputation and tradition of an enterprise', 'the ability to provide sufficient amount of products for export', 'skills and knowledge of management', 'flexibility of an enterprise' and 'proper selection of suitable products for export'. These are mainly factors connected with the characteristics of products, management of an enterprise, or an enterprise as the whole.

Table 2. The most important factors influencing the success of an enterprise in foreign markets

The most important factors contributing to the success in internationalisation	Average rating of a particular factor
The quality of products	7.53
The price of products	7.16
The reputation and tradition of an enterprise	7.09
The ability to provide sufficient amount of products for export	7.00
Skills and knowledge of management	7.00
Flexibility of an enterprise	7.00
Proper selection of suitable products for export	7.00

Source: author's results.

The factor 'sufficient amount of products for export' is quite a specific factor for agricultural sector, and its importance is even stronger in case of microenterprises or small-sized enterprises. The reason may lie in the fact that smaller enterprises do not farm on large area of farmland and they do not breed so many animals to fit the sufficient amount of product for export, compared to the possibilities of medium-sized enterprises. Moreover, the inability to provide sufficient amount of products for export is perceived as one of major obstacles to initiation of exporting activities (as was revealed by the previous research conducted by authors). In connection with this fact, the involvement of an enterprise in the networks and their cooperation in the field of arranging the joint sale of their production becomes more important. Bečvářová (2005) pointed out that quite an important factor for success of agricultural enterprises are the skills and knowledge of management of an enterprise and especially their ability to react promptly to changes in markets and modification of the concept of agribusiness. These results indicate that agricultural SMEs are aware of the importance of such factors as they consider 'the flexibility of an enterprise' as well as 'the skills and knowledge of management' as significant factors contributing to the success in foreign markets.

In the next step, the factors, which can influence the success of enterprises in foreign markets, were scrutinized in relation to the selected characteristics. The first perspective on the factors was the size of an enterprise. It was revealed that there are some differences concerning the size of an enterprise (see table 3). According to the Kruskal-Wallis test the significant differences appeared in the factors 'qualified employees', 'cooperation with other entities' (i.e. networking) and 'the price of products'. These three factors are less important for microenterprises compared to their higher importance perceived by the small- or medium-sized enterprises.

Table 3. Kruskal-Wallis test: differences in perception of factors influencing the success in foreign markets regarding the size of an enterprise

Factors influencing success in foreign markets	p-value	Groups of enterprises in which the differences appeared	Multiple p-value
The qualified employees	0.0598*	Micro- x small-sized enterprises	0.0798*
Cooperation with other entities (networking)	0.0745*	No statistically significant results	
The price of products	0.0239**	Micro- x small-sized enterprises	0.0233**

notes: * significant at = 0.10, ** significant at = 0.05

Source: author's results.

Furthermore, the paper also deals with other perspectives on factors determining the success, namely the perception of already internationalised SMEs and SMEs which intend their foreign expansion. Some differences were also identified. Table 4 compares perception of these main factors influencing the success of an enterprise in foreign markets perceived by those two groups of enterprises shown (only factors whose average evaluation was seven and more points were considered).

Table 4. Factors influencing the success of an enterprise in foreign markets regarding the position of an enterprise in internationalisation

Factors influencing success in foreign markets according to the position of SMEs in internationalisation	
Already internationalised SMEs	**SMEs considering foreign expansion**
The quality of products	The qualified employees
The price of products	The price of products
The reputation and tradition of an enterprise	The proper selection of exporting market
The ability to provide sufficient amount of products for export	The language skills of key employees
Skills and knowledge of management	Previous experience with foreign trade operations
Flexibility of an enterprise	The quality of products
Proper selection of suitable products for export	Proper selection of suitable products for export

Source: author's results.

Table 4 shows that the order of factors according to their perceived significance differs. The Kruskal-Wallis test revealed (see table 5) that there are statistically significant differences in the factor 'language skills of key employees', 'previous

experience with foreign trade operations', 'knowledge of marketing principles and principles of product promotion', and 'conducting survey of foreign markets'. Those factors are perceived as quite important by SMEs, which are currently considering their foreign expansion, compared to the perception of those factors by already internationalised SMEs. For example, the factor 'language skills of key employees' is on the 20th position for already internationalised SMEs, and for SMEs intending their internationalisation it is on the 4th position. These findings are quite surprising because of the fact that the language barrier is perceived as quite an important obstacle to internationalisation process as was stated by SMEs, regardless of their position in internationalisation process (this was revealed by the previous research conducted by authors). Thus, we supposed that this factor would be considered as an important factor determining the success in internationalisation by both groups of enterprises. The explanation may lie in the fact that already internationalised SMEs know that this barrier can be overcome by improving language skills of key employees dealing with export or cooperation with translator, etc., and, therefore, they do not perceive it as crucial for their success. Furthermore, the factor 'previous experience with foreign trade operations' is on the 17th position for internationalised SMEs, and on the 5th position for SMEs intending their internationalisation. It can be caused by the fact, that internationalised SMEs have already gained some international experience and hence they do not attach such an importance to that factor. The other mentioned factors 'knowledge of marketing principles and principles of product promotion' is on the 22nd position for internationalised SMEs and for SMEs intending their internationalisation it is on the 14th position; the factor 'conducting survey of foreign markets' is perceived as less important factor influencing the success in foreign markets by both groups of enterprises.

Table 5. Kruskal-Wallis test: differences in perception of factors influencing the success in foreign markets regarding the position of an enterprise in internationalisation

Factors influencing success in foreign markets	p-value
The language skills of key employees	0.0665*
Previous experience with foreign trade operations	0.0968*
Knowledge of marketing principles and principles of product promotion	0.0284**
Conducting survey of foreign markets	0.0973*

notes: * significant at = 0.10, ** significant at = 0.05
Source: author's results.

The last perspective we took into consideration was the perspective on factors determining the success in internationalisation by enterprises according to their level of objectively measured success. Based on the Kruskal-Wallis test, the main differences, which appeared by particular factors, are shown in table 6.

Table 6. Kruskal-Wallis test: differences in perception of factors influencing the success in foreign markets regarding the objectively measured success

Factors influencing success in foreign markets	p-value	Groups in which the differences appeared	Multiple p-value
Thorough analysis and risk treatment	0.0311**	Less successful x the most successful enterprises	0.0282**
Knowledge of marketing principles and principles of product promotion	0.0955*	Less successful x the most successful enterprises	0.0960*
Sufficient amount of capital	0.0503**	Less successful x the most successful enterprises	0.0462**
Competitive advantage	0.0878*	Less successful x the most successful enterprises	0.0887*
Conducting survey of foreign markets	0.0852*	Not statistically significance	

notes: * significant at = 0.10, ** significant at = 0.05

Source: author's results.

The factors by which the statistically significant difference was proved were also shown in figure 1. There is an interesting aspect of the factors being mainly connected with resource-demanding activities, such as analysis and treatment of risks, conducting survey of foreign markets, having knowledge of marketing principles and principles of product promotion, etc. The figure also highlights the fact that the more successful the agricultural enterprises are (the bigger their export intensity is), the more important are those factors according to their perception.

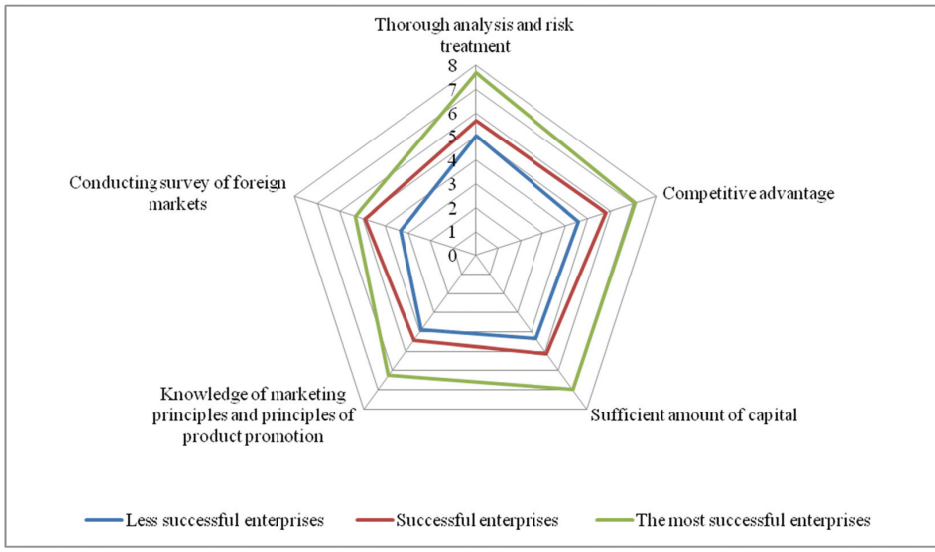

Figure 1. Factors influencing the success of an enterprise in foreign markets regarding the objectively measured success

Source: author's results.

The role of network in internationalisation

The second part of the paper deals with the role of networks in internationalisation. We focused on that topic because networks might be regarded as quite important factor determining the success of an enterprise in internationalisation and also the source of knowledge or experience, which can also contribute to the success in foreign trade operations (see for example Johanson, Vahlne, 2009; Hutchinson et al., 2006; Rutihinda, 2008; Musteen et al., 2014 or Hötzinger, 2014). Hence, in this context we wanted to verify the role of networks in internationalisation.

Although the results revealed that the Czech agricultural SMEs do not perceive networking as a very important factor in determining the success in foreign markets (23rd position from all 24 considered factors), two thirds of already internationalised agricultural SMEs are involved in closer cooperation with other entities. Those agricultural SMEs cooperate with other enterprises in activities, such as joint selling of their products, joint ensuring of production for foreign market or domestic market or joint purchase of inputs. Main reasons for their cooperation are enhancing their bargaining power, strengthening their competitive position or gaining access to know-how. Agricultural SMEs cooperate with various business entities, such as other agricultural enterprises in their business environment (i.e. their competitors), entities within the commodity verticals or enterprises from other supporting industries. These results indicate that agricultural enterprises are interconnected in horizontal as well as vertical networks.

On the other hand, almost 70% of non-internationalised agricultural enterprises cooperate closely with other enterprises. Those agricultural SMEs cooperate in purchasing of their inputs, they sell their products together or they ensure production together for domestic market. Moreover, they share these activities because of enhancing their bargaining power, saving time or strengthening their competitiveness.

It can be concluded that the involvement of an enterprise in networks is quite important for the Czech agricultural SMEs because of various reasons, which were mentioned above. Despite the fact that the Czech agricultural SMEs do not perceive the cooperation with other entities (networking) as a very important factor in determining their success in foreign markets, still the majority of enterprises are interconnected in networks. We suppose that the involvement of an enterprise in networks can facilitate the internationalisation process of agricultural enterprises especially due to the information about foreign business opportunities and contacts on foreign business partners acquired via those networks. We assume that there is a quite significant potential for strengthening the cooperation linkages among agricultural SMEs with positive effect on their competitiveness and enhancing their bargaining power toward other entities in the distribution channel.

Conclusion

According to the experience of agricultural enterprises the success of foreign operations is determined mainly by factors connected with the product's aspects (right product for export, its quality, quantity and price), characteristics of enterprise's management (their skills and knowledge) and company's aspects (reputation of enterprise and its flexibility).

The results also showed that the most successful enterprises pay more attention (than the less successful ones) to activities which are resource-demanding, such as risk analysis and risk treatment, conducting of foreign market survey, knowledge of marketing principles and principles of product promotion, etc.

Moreover, it can be summarised that the overwhelming majority of enterprises are interconnected in networks. However, the role of this factor for the successful internationalisation is not clear as agricultural enterprises do not perceive networks as a factor directly determining their success in internationalisation process. It can be assumed that closer cooperation among enterprises can facilitate their involvement in internationalisation in a view of gaining the information about foreign business opportunities or contacts on foreign business partners. We also suppose that there is a quite significant potential for strengthening the cooperation among agricultural SMEs with positive effect on encouraging their competitiveness and sustainable development.

Findings presented in this paper are based on empirical data obtained from a sample of agricultural SMEs. Due to a rather small sample of respondents the conclusions cannot be generalised and these findings rather reflect the situation among agricultural SMEs involved in the survey. Nevertheless, this study can serve as a basis for further research. Regarding the direction for further research we suggest to perform more comprehensive research on the importance of cooperation among agricultural enterprises with focus on its form and scope.

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Ivan FOLTÝN, Olga ŠTIKOVÁ, Ida ZEDNÍČKOVÁ, Ilona MRHÁLKOVÁ

Institute of Agriculture Economics and Information (IAEI), Praha, Czech Republic,
foltyn.ivan@uzei.cz

Modelling of Economic Equilibrium in the Agrarian Sector (The AGRO-2014 Model)

Abstract: *The article contains research results of the Institute of Agricultural Economics and Information (IAEI), Praha, for 2015, which focused on the development and use of the AGRO-2014 model. The model contains sections of agriculture, food processing, food retail (including catering without self-sufficiency), total food consumption (including catering and self-sufficiency) and food consumption per capita (in the detailed structure permitting nutritional evaluation). AGRO-2014 is a Leontieff's matrix-type model with a range of about 1,200 commodities. The model was used to calculate the total income and expenditure in the agrarian sector, to estimate the significance of imports and exports in this sector and to calculate an estimate of the trade margins on domestic and imported foods in the Czech Republic. Six variants of model simulations were calculated to calculate the coverage of the food consumption by the population in different sizes of the food exports and imports. Further on, the range of the trade margins on domestic and imported foods were analysed for 2007-2013. Model calculations did not confirm a hypothesis that market chains discriminate the Czech food against foreign competition.*

Keywords: *agrarian sector, mathematical modelling, AGRO-2014 model, economic equilibrium, Leontieff's matrix, agriculture, food production, retail, food consumption, trade margins*

Introduction

Agriculture is an important part of the national economy and food industry finalises and represents the agricultural production on the food market. For this reason, a macroeconomic model of production of agricultural products and their flows to food consumption by the population was created (AGRO-2014 model).

The AGRO-2014 model is a partial model of market equilibrium in the sector of food production and consumption, which consists of the following sections:
ZEM – section of agriculture;
POTR – section of food industry;
OBCH – section of retail;
SPOT – section of total food consumption, including self-sufficiency of the population;
SPOB – section of food consumption per capita (enables nutritional evaluation of population nutrition).

This model was used to calculate the equilibrium in the Czech agrarian sector, calculate financial sources which go through the agrarian sector, simulate dependency of the agrarian sector on exports and imports, and derive profit margins on domestic and foreign food products.

The AGRO-2014 model – structure of the model

ZEM section

Domestic production of the agricultural branch is in the AGRO-2014 model represented by commodities included in the Economic Accounts for Agriculture (EAA) of the Czech Republic.

The ZEM section contains dual model formulation for fruit and vegetables:
– aggregated form of "fruit total" and "vegetables total";
– disaggregated form for a detailed commodity structure of fruit (OVO section) and vegetables (ZEL section).

The second form is of particular importance in terms of food consumption and its nutritional evaluation.

POTR section

This section covers processing of domestic and foreign agricultural production in the Czech food industry which is based on data from the Czech Statistical Office (CZSO) "Production of selected food products" (CZ-NACE 10 and 11).

The choice of commodities was based on the following criteria:
Criterion 1: A limit was defined for a range of selected commodities >= 1000 tonnes.
Criterion 2: Every commodity must be traceable to the sale and consumption of food in the SPOB and OBCH sections.
Criterion 3: Selected commodities should cover that part of food production, which has originated in the ZEM section.

The choice of commodities according to criteria 1, 2 and 3 is contained in the model POTR10 (food production) and POTR11 (beverages) sections.

OBCH, SPOT and SPOB sections

Retail section (OBCH) and food consumption section (SPOT) represent the sale and consumption of food commodities by the population. These sections differ only by self-sufficiency.

The most important block of this section is food consumption per capita (SPOB1), which is published by the Czech Statistical Office.

Transformation of the SPOB1 block to the block of food sale in retail (OBCH1) is created by using indicators of the total population figures in the Czech Republic (excluding self-sufficiency). The SPOB1 block illustrates the overall quantity of food products provided by the retail network, catering (restaurants, schools, etc.) and self-sufficiency.

The next block is SPOB2 – food consumption per capita for nutritional evaluation, whose structure is different from the SPOB1 block, which follows the model calculation of the qualitative (nutritional) evaluation of nutrition. The SPOB2 block is connected with the OBCH2 block (just like the OBCH1).

Both SPOB1 and SPOB2 blocks have a common SPOB3 block of aggregate indicators of food consumption, which is connected in the model with the ZEM and POTR sections by the OBCH1 and OBCH2 blocks.

The AGRO-2014 model – mathematical description

Let $i = 1, 2, \ldots, n$ ($n = 1200$) be the commodity of the model, $A = A(i, j)$ a square matrix of $n*n$ type.

Element $A(i,j)$ represents the amount of a commodity i, which is consumed for the production of commodity j. Then the model can be described in the following equation system:

$$X(i) + IMP(i) + SELF(i) = sum\ (j = 1, \ldots, n, A(i,j) * X(j)) + EXP(i)$$

$$+ NEP(i)\ i = 1, \ldots, n,$$

where: IMP = import, SELF = self-sufficiency, EXP = export and NEP = non--food production (e.g. technical and other use of the commodity).

Solving the model system in EXCEL proceeds in the following iterative manner:
Let us denote:
X(i,0) – the initial state of solution X(i) as the input to the model, and
X(i,k) – the k-th approximation of the solution X(i) for k = 1, 2, etc.

Then the solution of the model is carried out according to the following algorithm (using symbols of the programming language ALGOL):

***Step 1**. Calls on the initial state solution X(i, 0) for i = 1 to n, other model parameters, i.e. the matrix A and vectors IMP, SELF, EXP and NEP are already entered.*

***Let** k := 0.*

***Step 2**. Take X(i, k) for i = 1 to n as a starting input in the step k (k = 0, 1, 2, etc.)*

***Step 3**. The equation system is solved by the assignment X(i, k) for i = 1 to n:*

*X(i, k+1) + IMP(i) + SELF(i) = sum (j, j = 1 to n, A (i, j) * X (j, k)) + EXP(i) + NEP(i) for i = 1 to n).*

***Step 4**. Solution X(i, k+1) is taken as a basis for the solution in the subsequent steps.*

***Step 5**. Criterion for the solution of the model:*

Let us calculate the difference between X(i, k) and X(i, k + 1)

*DIF(k) = **sum** (i, i = 1 to n, abs (X (i, k + 1) - X (i, k))).*

If** DIF(k) = 0, **then** X (i, k) is the solution of the model. **End

***If** DIF(k) > 0, **then** k : = k + 1; **go to Step 2**.*

Prices in the model

The ZEM section uses agricultural producer prices (CZV), the POTR section – food producer prices (CPV), and finally the OBCH and SPOT sections – consumer prices (SC). All prices are taken from monitoring of the CZSO.

CPV are officially monitored only for a small part of the food commodities. For this reason, they are included in the model prices derived from the monitoring of

selected food products, which indicate for each commodity the physical quantity and production values and sales. Then CPV are defined as share of the value and quantity.

For SC there is no reported assortment of food products that would exactly match the foods contained in the SPOB1 and SPOB2 sections. Consumer prices for all commodities were derived by analytical procedures and aggregations come from the official CZSO data.

The model is supplemented by import prices of agricultural and food commodities (DC) and export prices of agricultural and food commodities (VC), which are derived from the Czech custom statistics.

Margins in the model

An important part of the analysis and research of model prices are trade margins for food. Margins in foods can be defined by the following equations:

$SC(i) = CPV(j) + MAR(i)$ *for* $i \in SPOB2, i \in OBCH2, j(i) \in POTR,$

if the food product *i* from the monitoring of food consumption SPOB2 it is made in the food industry POTR, where it corresponds to the food product *j(i)* and it is delivered to OBCH2;

$SC(i) = CPV(j) + MAR(i)$ *for* $i \in SPOB2, i \in OBCH2, j(i) \in ZEM,$

if the food product *i* has its origin in the agriculture ZEM section and it is delivered directly to OBCH2;

$SC(i) = DC(j) + MAR(i)$ *for* $i \in SPOB2, i \in OBCH2, j(i) \in IMP,$

if the food product *i* is imported to the retail OBCH2.

Trade margins are not usually available (business secrets), and must be, therefore, estimated by various analytical and statistical methods.

Using of the AGRO-2014 model

The AGRO-2014 model enables to go from the standard statistical monitoring of food consumption or from the food consumption to the nutritional evaluation.

The AGRO-2014 model was calibrated in the course of 2015 on the real input data for 2013 (table 1).

Table 1. Food consumption (kg/capita/year) and its security in agricultural raw material; consumption of food and non-alcoholic beverages (annual per capita averages)

Food group	Consumption of food 2013	Agricultural raw materials	Reality 2013				Model calculations var. 0	
			heads / area	production	EXP	IMP	heads / area	production
	kg/capita		1000 hds / 1000 ha	1000 t	1000 t	1000 t	1000 hds / 1000 ha	1000 t
Beef in carcass weight	7.4	status of cows and cow suckler – slaughter production HM*)	564	164	93	42	508	196
Pork in carcass weight	40.4	total pigs – slaughter production VM*)	1,618	311	86	321	1,585	311
Poultry	24.2	poultry – slaughter production DM*)	21,464	235	90	152	25,478	277
Milk and dairy products in terms of milk	234.9	numbers of dairy cows – milk production	373	2,775	1,042	880	342	2,633
Eggs	13.5	hen – egg production	7,242	2,160	390	586	7,620	2,272
Vegetable edible fats and oils	16.8	total oilseeds – surface and production	460	1,504	603	158	472	1,528
Sugar	33.4	sugar beat – surface and production	62	3,308	475	376	47	2,354
Cereals total worth of free rice	106.8	total cereals – area and production	1,413	7,513	2,737	227	1,480	7,856
Potatoes	68.0	potatoes - area and production	23	536	130	413	32	721
Pulses	2.5	legumes total – area and production	18	38	0	0	18	38
Vegetables in terms of fresh	82.9	vegetables in total – area and production	13	177	95	581	9	168
Fruit in terms of fresh	76.8	fruit total - area and production	23	311	84	183	18	246
Total security		**main cash crops**	2,012				2,076	
		forage crops	451				464	
		permanent grassland, total	959				898	
		total agricultural land	3,548				3,449	

*** HM = beef, VM = pigmeat, DM = poultry meat**

Source: own calculations.

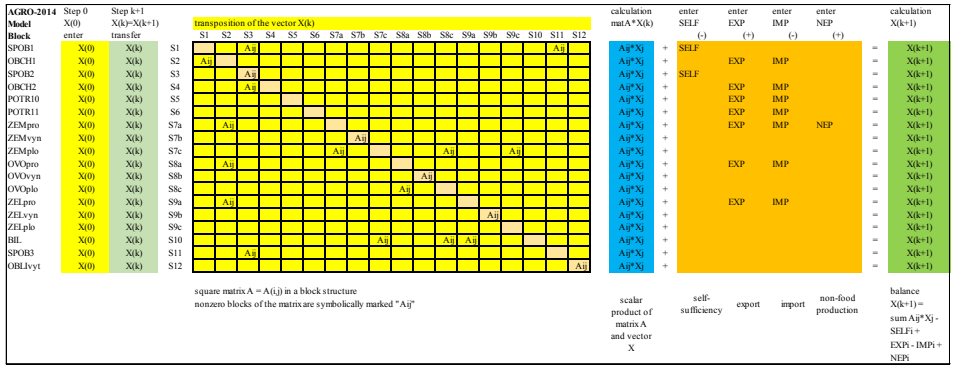

Figure 1. AGRO-2014 model – scheme of model links

The AGRO-2014 model was developed in block structure, which includes links between different sections and subsections of the agrarian sector, as illustrated in figure 1.

Estimate of total sales in the agrarian sector

With the help of the above-defined prices (CZV, CPV and SC) estimates of total sales in the agrarian sector and total expenditure of the Czech population for food products were calculated. These indicators can be described by the following equations (in ALGOL):

Revenues of agriculture (TRZzem), food industry (TRZpotr) and retail (TRZobch):
Let *TRZzem :=* ***sum*** *(i ∈ ZEM, CZV(i) * X(i)),*
Let *TRZpotr :=* ***sum*** *(i ∈ POTR10 + POTR11, CPV(i) * X(i)),*
Let *TRZobch :=* ***sum*** *(i ∈ OBCH2, SC(i) * X(i)),*
where X(i) is the solution of the AGRO-2014 model.

Revenues of the agrarian sector (TRZagro):
Let *TRZagro := TRZzem + TRZpotr + TRZobch,*
Let *VYDobyv :=* ***sum*** *(i ∈ SPOB2, SC(i) * X(i)),*
Let *VYDcel := VYDobyv * POCobyv,*
where VYDobyv is the average expenditure per capita for food products, POCobyv is the number of inhabitants.

In these equations the equality VYDcel = TRZobch holds true.

Results of the AGRO-2014 model calculations for 2013 have shown the following estimates:
TRZzem = CZK 122.7 billion (EAA of the CZSO show value 128.1),
TRZpotr = CZK 175.7 billion (in the official food industry monitoring is the value 282.9),
TRZobch = CZK 352.3 billion,
TRZagro = CZK 650.7 billion,
VYDobyv = CZK 33,521 per capita and year (official value is 27,367),
VYDcel = CZK 352.3 billion (official value is 287.7).

Estimate of the importance of exports and imports in the Czech agrarian sector

Exports (EXP) and imports (IMP) of commodities in the agrarian sector were implemented into the AGRO-2014 model in order to assess the relationship

between per capita consumption and a corresponding dimension of agriculture, depending on the extent of export and import.

Results of the model simulations (variants 0, 1, 2, …, 6) are based on the assumption that the standard food consumption per capita will be secured. Variant 0 (table 1) shows the real situation of 2013 (exports and imports on the level of 100%), other variants (tables 2 and 3) show impacts of percentage changes in volume of exports and imports on the size of the ZEM sector.

Table 2. Model calculations of security of food consumption of agricultural commodities

Agricultural raw materials	Reality 2013		Var. 1		Var. 2		Var. 3	
			EXP = 0	IMP = 100%	EXP = 0	IMP = 0	EXP = 100%	IMP = 0
	heads / area	production	heads / area	production	heads / area	production	heads / area	production
	1000 hds / 1000 ha	1000 t	1000 hds / 1000 ha	1000 t	1000 hds / 1000 ha	1000 t	1000 hds / 1000 ha	1000 t
Total numbers of cows – slaughter production HM*)	564	164	287	103	427	145	648	238
Total numbers of pigs – slaughter production VM*)	1,618	311	1,145	225	2,782	546	3,221	632
Poultry – slaughter production DM*)	21,464	235	17,205	187	31,201	339	39,474	429
Numbers of dairy cows – milk production	373	2,775	206	1,591	321	2,470	456	3,512
Hens – egg production	7,242	2,160	6,313	1,883	8,279	2,469	9,586	2,859
Total oilseeds – land and production	460	1,504	270	925	335	1,083	536	1,686
Sugar beat – land and production	62	3,308	40	1,879	46	2,255	53	2,730
Cereals total – land and production	1,413	7,513	821	4,231	1,307	6,890	1,966	10,515
Potatoes – land and production	23	536	26	592	44	1,004	50	1,134
Legumes total – land and production	18	38	18	38	18	38	18	38
Vegetables total – land and production	13	177	4	73	34	654	39	749
Fruit total – land and production	23	311	12	162	25	345	31	429
Total security								
main market crops	2,012		1,191		1,808		2,693	
forage crops	451		280		435		619	
permanent grassland, total	959		436		574		1,037	
total agricultural land	3,548		1,918		2,829		4,360	

*** HM = beef, VM = pigmeat, DM = poultry meat**

Source: own calculations.

Table 3. Model calculations of security of food consumption of agricultural commodities

Agricultural raw materials	Reality 2013		Var. 4		Var. 5		Var. 6	
			EXP = 0	IMP = 80%	EXP = 0	IMP = 60%	EXP = 100%	IMP = 40%
	heads / area	production	heads / area	production	heads / area	production	heads / area	production
	1000 hds / 1000 ha	1000 t	1000 hds / 1000 ha	1000 t	1000 hds / 1000 ha	1000 t	1000 hds / 1000 ha	1000 t
Total numbers of cows – slaughter production HM*)	564	164	315	111	343	120	371	128
Total numbers of pigs – slaughter production VM*)	1,618	311	1,473	289	1,800	353	2,127	417
Poultry – slaughter production DM*)	21,464	235	20,004	218	22,803	248	25,603	279
Numbers of dairy cows – milk production	373	2,775	229	1,767	252	1,943	275	2,119
Hens – egg production	7,242	2,160	6,706	2,000	7,100	2,117	7,493	2,234
Total oilseeds – land and production	460	1,504	283	956	296	988	309	1,020
Sugar beat – land and production	62	3,308	41	1,954	42	2,029	43	2,104
Cereals total – land and production	1,413	7,513	918	4,763	1,016	5,295	1,113	5,826
Potatoes – land and	23	536	29	674	33	757	37	839
Legumes total – land and production	18	38	18	38	18	38	18	38
Vegetables total – land and production	13	177	10	189	16	306	22	422
Fruit total – land and production	23	311	14	199	17	236	20	272
Total security								
main market crops	2,012		1,314		1,438		1,561	
forage crops	451	0	311	0	342	0	373	0
permanent grassland, total	959	0	463	0	491	0	519	0
total agricultural land	3,548	0	2,100	0	2,282	0	2,464	0

*** HM = beef, VM = pigmeat, DM = poultry meat**

Source: own calculations.

Variant 0 (EXP = 100% and IMP = 100%): The model results are very similar to reality in 2013. A certain difference is apparent in the head numbers of poultry, the total size of agricultural land, etc. These differences will be further considered as an approximation of the reality when analysing further variants.

Variant 1 (EXP = 0 and IMP = 100%): The results show that the Czech agrarian sector consumes almost 1.5 million ha for export production (about 43% of agricultural land). At the same time, it would be possible to reduce the size of animal production by about 150,000 dairy cows, 80,000 suckler cows, 4 million heads of pigs and 8 million heads of poultry.

Variant 2 (EXP = 0 and IMP = 0): This variant shows the high dependence of the Czech agrarian sector on imports. Very strong deficit shows the calculation of the requirements for the production of pork and poultry. On the other hand, beef consumption is fully covered by the domestic production. Total need of agricultural land is 2.8 million ha.

Variant 3 (EXP = 100% and IMP = 0): This variant shows a catastrophic and, therefore, unreal situation, if the Czech agrarian sector would maintain exports and all imports would be cancelled. In this case, all considered indicators would significantly exceed the reality. It is logical that these disproportionate demands on the ZEM sector would ultimately lead to the need for expansion of agricultural land by nearly 1 million ha, which is not available.

Variants 4-6 (EXP = 0 and IMP = 80%, 60% and 40%): These three variants simulate an effort to minimise the dependence of the Czech agrarian sector on imports. The critical factor is pork consumption, where it would be possible to consider a reduction to 70% import level (average of variants 4 and 5), while for the other indicators it could be considered 40% reduction of import level.

In strategic thinking about reduction of dependence of the Czech Republic on agricultural imports it would be alternatively possible to consider reduction in pork consumption from the actual level of about 40 kg per capita and year, eventually by substitution of pork meat by other types of meat, especially by poultry meat.

Estimation of margins for domestic and imported food products

Monitoring and calculations of margins methodically follow up research in 2014 (Foltýn et al., 2015). In 2015, the research was focused on model calculations (by the AGRO-2014 model) of margin development from 2007 (the average year), over 2009 (economy crisis period) to 2013 (the latest available year and beginning of economic growth).

Calculations were based on actual food consumption, which was considered as a "weight" for calculation of the average margins in the consumer basket.

Each food volume entering into the model was set to correspond to the actual total consumption in the monitored years. On this basis, the "real" consumption basket (in kg) and its total value (in CZK) were calculated according to the various types of prices in 2007, 2009 and 2013.

For SC model calculations VAT was deducted from the "consumer basket" value appropriate to the given year.

CPV are monitored only in a very narrow range of foods. Therefore, CPV from the AGRO-2014 model were used. For fruit, vegetables and potatoes producer prices from the ZEM sector were used, because these products are not processed in the food industry.

The source for DC data was the Czech foreign trade database (volume of imports and prices of imports).

All price types are not available for all monitored foods (CPV, SC and DC). Therefore, it was necessary to choose such food assortment for which it was possible to find CPV, SC and DC prices.

According to this rule, monitoring covered 3 variants, calculated and modelled, corresponding to different food product groups and individual products for which these prices were obtained and calculated. All variants were calculated for 2007, 2009 and 2013.

Table 4. Development of margins for domestic (CPV[1)]) and imported (DC[2)]) products for selected market basket of food (%) – variant 1

Food group	Margins 2007		Margins 2009		Margins 2013		CPV	DC
	CPV	DC	CPV	DC	CPV	DC	2013/07	2013/07
Beef	26.8	27.8	28.7	27.9	28.2	23.8	5.1	-14.2
Pigmeat	29.7	42.1	32.6	41.1	34.6	37.9	16.4	-10.1
Poultrymeat	25.8	17.9	14.7	33.3	21.6	27.4	-16.1	52.8
Meat products	37.0	27.0	37.1	30.8	39.7	26.8	7.1	-0.7
Fish	34.1	59.5	39.6	58.8	37.3	46.2	9.4	-22.3
Drinking milk	28.8	36.2	29.7	37.8	27.3	27.0	-5.2	-25.5
Processed cheeses	37.0	50.4	35.9	55.1	39.8	55.7	7.4	10.6
Other cheeses	24.4	41.1	33.8	42.0	37.9	37.8	55.4	-8.0
Milk powder	24.4	49.8	56.1	72.1	40.3	37.1	65.2	-25.5
Condensed milk	45.5	56.0	66.1	67.5	61.0	51.7	34.2	-7.6
Other dairy products	24.5	58.0	37.5	55.8	41.5	44.7	69.7	-22.9
Eggs	29.0	30.5	24.7	24.6	26.3	37.4	-9.3	22.7
Butter	23.9	33.3	16.8	17.8	22.7	19.8	-4.9	-40.5
Vegetable edible fats	28.0	23.6	33.8	42.2	26.3	32.0	-6.1	35.7
Sugar	21.3	14.7	22.4	22.4	30.9	19.3	45.3	30.9
Cocoa products	32.4	65.8	38.3	62.0	40.5	65.2	25.1	-0.9
Sugar confectionery	42.1	44.0	37.7	50.8	43.1	50.1	2.4	13.8
Wheat flour	23.1	20.6	34.4	34.9	30.6	22.3	32.4	8.2
Preserved bakery products	46.0	26.9	51.6	34.2	66.0	44.3	43.5	64.5
Pasta	47.6	26.3	47.0	19.8	40.7	24.4	-14.6	-7.1
Total	**30.8**	**38.9**	**34.0**	**41.6**	**37.1**	**38.5**	**20.4**	**-1.0**

1) Calculated according to the formula (SC-CPV)/SC.
2) Calculated according to the formula (SC-DC)/SC.
Source: own calculations of data from the Czech Statistical Office.

The first case (var. 1) includes food for which there exist all kinds of prices. For thus assembled "market basket" the total "fictitious" sum of expenditures was calculated in CPV, DC and SC for 2007, 2009 and 2013.

Based on the total value of the "consumer basket" margins were calculated according to the formula used by the CZSO (table 4). The results show what would be the total trade margin if the entire "market basket" would be filled with either only domestic products or only imported products.

Similar calculations were made in the fulfilment of the "consumer basket" by the food products of the Czech food producers only (var. 2) and by the imported products only (var. 3). These variants could use much broader "market basket" (more foods and food groups were comparable).

The model calculations imply that the trade margins for CPV and DC have been permanently closing. Margins calculated for the products of domestic origin increased (by 20.3%), while imported products stagnated (by minus 1%).

The difference between these two types of margins for the selected (relatively comparable) assortment represented in 2007, 2009 and 2013 the following values: 8.1, 7.6 and 1.4 percentage points, respectively.

It is clear that retailers have been trying to equate trade margins for the domestic (CPV) and imported (DC) food products so that the final consumer prices (SC) would be similar and appropriate to food demand.

Model calculations have further shown that the Czech producers are not discriminated against foreign competition.

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Jiří SÁLUS, Tomáš PILAŘ, Věra MAJEROVÁ

Czech University of Life Sciences, Praha, Czech Republic
salusj@pef.czu.cz; pilar@pef.czu.cz; majerova@pef.czu.cz

Threats to Rural Society in the Czech Republic and its Future in the Context of Global Risks

Abstract: *The aim of the article is to capture the current and future risks of development of the Czech countryside and the rural population. Through socio-economic analysis and study of technical documents, the authors try to determine the consequences and causes of the problems in the Czech countryside and describe the negative effects of their resolution, regardless of whether it is a factor of global or local character.*

Keywords: *Czech Republic, rural society, global risks, farmland, CLLD*

Introduction

The changes in short and long term translate into shaping the character of contemporary Czech countryside. The current social structure in rural areas replicates economic changes related to the country's accession to the EU as well as changed patterns of social behaviour of the rural population that shape contemporary Czech countryside.

Models of social behaviour that characterise the developed Western countries are gradually spreading in the post-socialist countries – increasing the level of education of the population (including rural) as the result of organisation of life careers (both men and women), abandoning the model of marriage and increased share of children born out of wedlock, moving care for seniors outside the family, delayed readiness for taking up a job and long-term persistence in it or faster retirement. The consequence of these changes is the increasing average age of single men and women. It was, on average, 24.6 years (men) and 21.8 years (women) in 1989, while in 2014 it was already, respectively, 32.3 and 29.8 years. The average number of marriages during this period decreased from 7.8 to 4.3 per 1,000 marriage mid-year population (Czech Statistical Office, 2015). Significant changes have occurred in the expansion of cohabitation between unmarried couples, which is no longer seen as an expression of lower social status. This is evidenced by the fact that the number of births outside marriage has increased significantly, from 7.9% in 1989 to 46.7% in 2014. These and other changes in the family environment have inevitably affected the behaviour of patterns in value orientation of new generations, whose contribution to the stability of the Czech countryside is not only positive.

Rural population in figures

According to the methodology of the Czech Statistical Office (CZSO), as "rural" are considered municipalities with no more than 2,000 inhabitants and the village of 3,000 inhabitants with a population density of less than 150 inhabitants / km^2 (CZSO, 2009). The hallmark of the settlement structure of the Czech Republic is its fragmentation and the high density of settlements. The total number of municipalities in 2013 amounted to 6,253. Even for direct simplification the distinguishing criteria for defining rural areas at NUTS level 5, the proportion of rural communities in the total number ranges between 89 and 90%. On the other hand, less than 27% of the Czech population lives in these communities, although this share slightly increased in the observed period.

Table 1. Population in rural communities in the Czech Republic

Population in villages	2001		2007		2012		2013	
	Villages	Population	Villages	Population	Villages	Population	Villages	Population
To 99	548	38,881	529	37,230	471	33,639	464	33,140
100-199	1,113	166,214	1,062	157,333	997	148,212	997	148,389
200-499	2,041	663,416	2,019	656,020	2 017	658,207	2,012	657,282
500-999	1,280	893,592	1,307	913,985	1 366	962,918	1,356	953,571
1,000-1,999	652	903,757	685	950,291	727	1,017,529	742	1,031,212
Total rural	5,634	2,665,860	5,602	2,714,859	5 578	2,820,505	5,571	2,823 594
Total CR	6,258	10,230,060	6,249	10,287,189	6 251	10,505,445	6,253	10,516,125
Share [%]	90	26.1	89.6	26.4	89,2	26.8	89.1	26.9

Source: CZSO, 2014.

The number of people living in rural areas has increased since 2000 (especially in municipalities with more than 500 inhabitants); but urban population did not grow so quickly. This trend may be caused by migration and natality. Migration flows into the rural communities of over 500 inhabitants come from two directions.

The first direction is related to the long-term decline in population of municipalities under 500 inhabitants. The reason for their migration is the lack of job opportunities and poor basic civic services (health care, schools, public offices, etc.). Many residents have to decide whether to stay there and commute to cities (with increasing household expenses and worse possibility of development of social capital there) or to emigrate. The negative migration balance was subsequently manifested by, e.g. faster aging of the population of such villages, poor educational structure and deterioration in the quality of life of residents (Pělucha et al., 2006).

The second direction of migration is from larger cities to the countryside. This is caused mainly by searching for a new lifestyle and elimination of negative phenomena of living in the cities (anonymity, polluted environment and hectic linear perception of time among the urban population).

If we observe the rural natality from different perspectives, significant differences between rural and urban population are evident. The number of births outside marriage is generally lower in rural areas (the only exception are Karlovy Vary and Plzen regions). Rural areas are also characterised by lower divorce rate (and fewer marriages), higher number of births per woman, higher average number of household members, etc. The authors suggest that these differences (and not only these) are the reason for the higher growth in the rural population in the country.

Socio-economic characteristics of rural areas

The situation of agriculture in the Czech Republic is not different from other post-socialist countries in many ways. The reason for this is the transformation of the entire economic system and reduction of its economic importance. Even though there was a reduction in employment rate in the primary sector from 11.4% in 2001 to 6.5% in 2011, for rural areas in the Czech Republic the rate of employment in agriculture is still typically higher than the national average.

Lack of jobs is reflected in a higher level of commuting into the cities, which partially eliminates the deficiency. The proportion of economically active persons commuting to work outside their area of residence represents 70.7%, while for the population of urban areas it is just 25.3% (Pělucha et al., 2006). Improvement of this situation may contribute to the diversification of economic activities in rural areas, so that agricultural production does not represent the dominant source of job opportunities.

Table 2. Employment in sectors – rural / urban areas

Sector	2001			2011		
	Rural	Cities	Total	Rural	Cities	Total
Agriculture, forestry, fishing [%]	11.4	2.2	4.5	6.5	1.4	2.7
Industry, building [%]	43.8	36.9	38.7	37.4	30.4	32.2
Services [%]	40.6	56.6	52.6	44.4	57.3	53.9
Not found [%]	4.2	4.3	4.2	11.7	11.0	11.2

Source: Czech Statistical Office, 2011.

When we compare the income disparity between rural and urban areas we can identify other economic problems. For example, the monthly wage in rural areas reached levels of 86% of the national average in 2000. On the contrary, the average was exceeded by 15.2% in urban areas (Pělucha et al., 2006). This combined with the fact that rural households have more members (in particular they have more children with no income) also follows from differences in the average of expenditures per individual in the household – it is on average CZK 2,519 lower (CZSO, 2013). One explanation of the income disparity is evident under sizing of the tertiary sector and unfavourable age and educational structure of rural population, characterised by a higher proportion of economically inactive persons. In case of looking at the educational structure in rural regions, there is a higher proportion of people without education or with primary education and a lower proportion of tertiary educated inhabitants. A decline in the purchasing power of the population in the rural areas or the lack of investor interest is also reflected in the quality of transport services and amenities. The above-mentioned problems pose a potential

threat to the stability of settlements in general (Gajdos, Pašiak, 2008). The most vulnerable groups (and also the most affected by unemployment) are people over 50 years of age and women.

Income and expenditure structure of rural households

Different lifestyle of rural population (in comparison to urban), is also obvious in differences in the structure of household income and expenditures. The fact that residents of rural communities are forced to commute to work causes spending more on transportation (up to 14% of total expenditures) than people living in urban areas (9%).

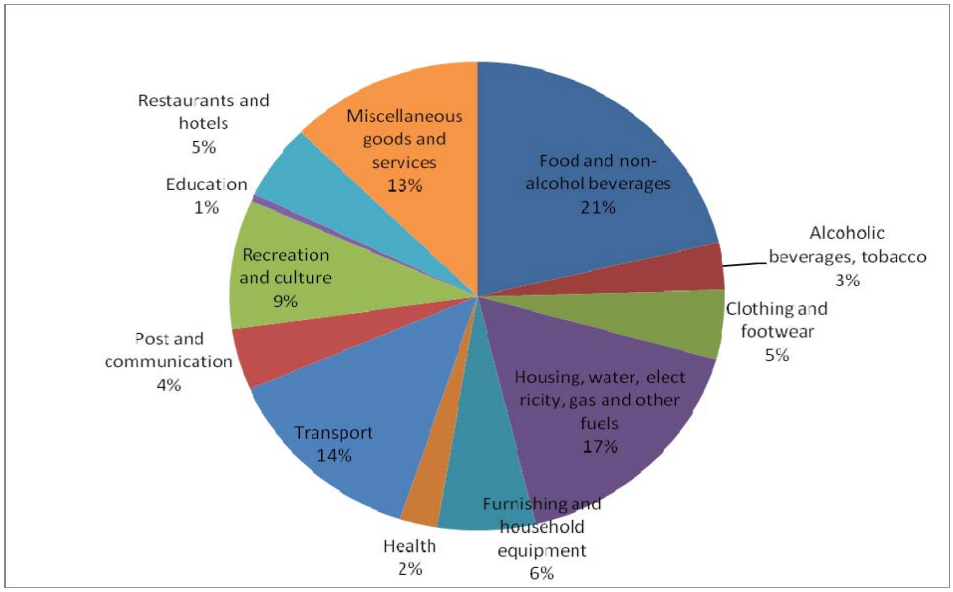

Figure 1. Structure of expenditures – a village of 1,999 inhabitants (2014)

Source: CZSO, 2015. *Vydání a spotřeba domácností statistiky rodinných účtů*. Retrieved from: https://www.czso.cz/csu/czso/vydani-a-spotreba-domacnosti-statistiky-rodinnych-uctu-za-rok-2014-domacnosti-podle-postaveni-osoby-v-cele-podle-velikosti-obce-prijmova-pasma-regiony-soudrznosti.

In general, people living in urban areas spend more on housing (24% of total amount of expenditures in comparison to 17% in the municipalities up to 1,999 inhabitants). However, there is also one important fact – the structure of expenditure on housing is also different between urban/rural households (CZSO, 2011a). In the countryside there is a higher proportion of the population living in own home. There is also a higher proportion of consumption of electricity (70.8%) in rural areas, while in urban areas it is only 45.8 % of total spending on housing. The share of expenditure on rent forms in cities 37.7% (CZSO, 2011a).

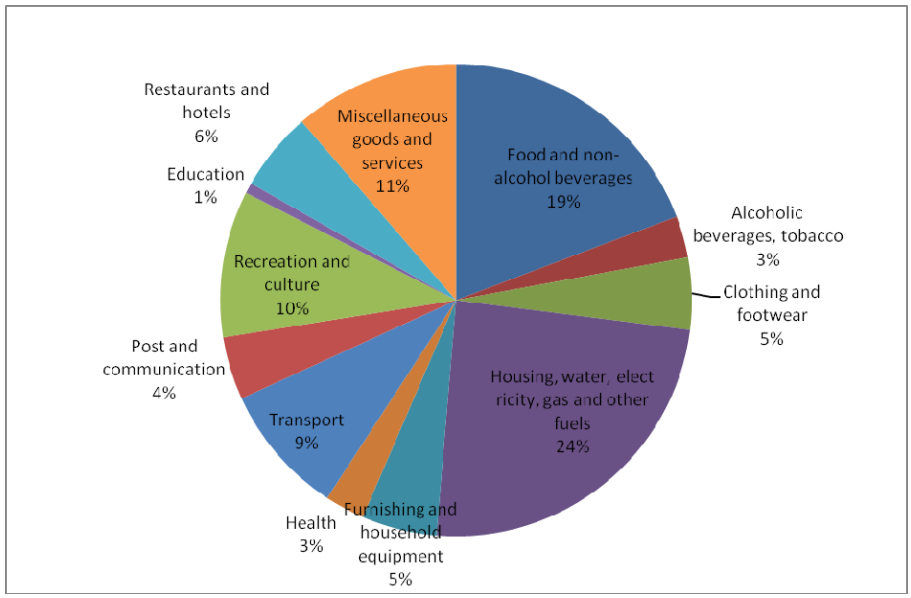

Figure 2. Structure of expenditures – a village of 50,000 inhabitants (2014)

Source: CZSO, 2015. *Vydání a spotřeba domácností statistiky rodinných účtů*. Retrieved from: https://www.czso.cz/csu/czso/vydani-a-spotreba-domacnosti-statistiky-rodinnych-uctu-za-rok-2014-domacnosti-podle-postaveni-osoby-v-cele-podle-velikosti-obce-prijmova-pasma-regiony-soudrznosti.

There are also apparent differences in expenditures on food and non-alcoholic beverages (rural households spend 21%, but the population living in cities only 19% of their average expenditure). However, in absolute terms rural households spend on food and non-alcoholic beverages less by an average of CZK 100, because they have their own farmland allowing them to produce some kind of food (e.g. fruit and vegetables).

Differences in income of households are mostly apparent on income level between the smallest municipalities with less than 1,999 inhabitants and cities with over 50,000 inhabitants. In absolute amount, the difference in the aggregate of all income components between these two categories was CZK 22,867. Difference in the level of income from employment was CZK 10,896 as well as in income from operations CZK 3,891 and other income components. The existence of income disparity of rural areas in comparison to the cities is evident. This fact can be obviously explained by less developed tertiary sector in the countryside (tertiary sector is characterised by higher average wage). Differences between categories of municipalities up to 1,999 inhabitants, 2,000-9,999 inhabitants and 10,000 to 49,999 inhabitants are not so significant. However, radically different lifestyle is obvious in case of population of large statutory towns, while the lifestyle of population in small towns has many elements that are similar to that of the countryside.

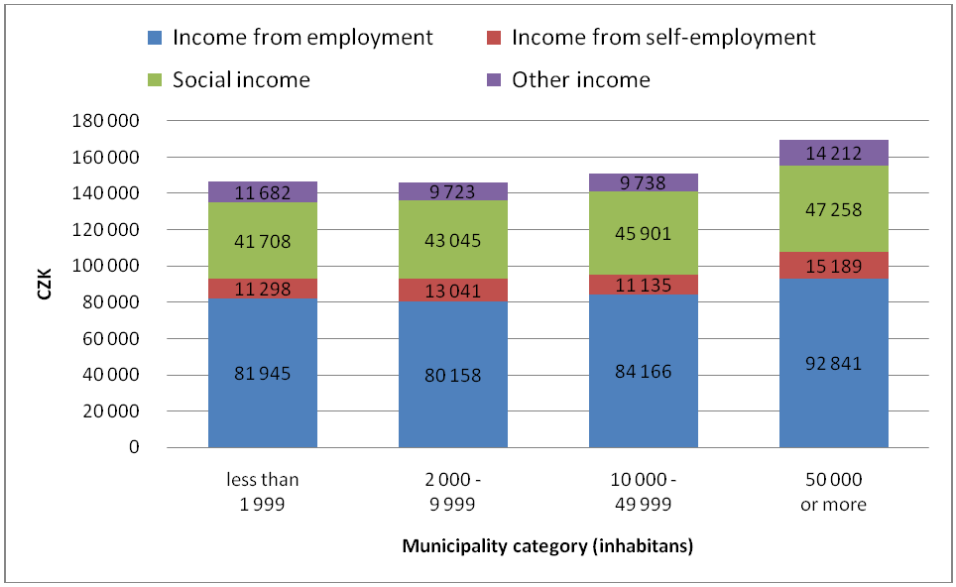

Figure 3. Gross cash income per year according to size categories of municipalities (2014)

Source: CZSO, 2015. *Vydání a spotřeba domácností statistiky rodinných účtů*. Retrieved from: https://www.czso.cz/csu/czso/vydani-a-spotreba-domacnosti-statistiky-rodinnych-uctu-za-rok-2014-domacnosti-podle-postaveni-osoby-v-cele-podle-velikosti-obce-prijmova-pasma-regiony-soudrznosti.

Suburbanism as an example of a threat to rural life

There are many problems in communities with fewer than 500 residents. According to Bernard, the development of these municipalities should not be based on economic functions only, but also on improvement of all residential functions – i.e. improvement of housing, provision of basic services for the residents and securing the recreational functions (Bernard, 2011). However, the correctness of this position can be argued. Taking into account the extreme example of rural communities in suburban areas, which totally fail to fulfil the social function, we encounter a number of difficulties arising in these areas.

Rural population living in suburban areas is characterised by many socio-economic differences in comparison to the rural population remote from urban area as well as urban population. Residential function is closely connected with intensive housing construction. This fact, together with the fact that almost all economic activities of residents goes beyond those sites, creates new features of the local society. Lifestyle, education and age structure is completely different, not only in comparison to the town, but also in comparison to distant rural populations – in

the monitored indicators, the values are in the middle (CZSO, 2009). Lack of economic activity on site forced residents to go to nearby major centres not only for work but also for services, including health care, education, public offices or for leisure activities. The community life is very often not developed there and we can describe the creation of a "rurban" society or "bedroom communities" (Dinič et al., 2016) which lost the most of the benefits of typical urban or rural life. This extreme case is also leading to the question whether there is a rural community? And if we answered no, can we say that this new kind of society can be considered as urban?

Therefore, if we want to solve the problems of small rural communities, it is not sufficient to support only residential function of these areas. It is necessary to support complex solutions (both economic and social) and sustainably increase the quality of life of their residents.

Migration from cities to the countryside in the last 15 years profits not only the rural villages over 500 inhabitants, as mentioned above, but also rural villages in the hinterland of big cities, regardless of the number of population. In the former case, there is a chance that population growth brings higher education, new innovative methods to solve social problems with positive economic, social or environmental effects. But then, suburban areas cannot currently talk about migration as the beginning of positive trends for rural development. The authors are rather inclined to scepticism based on the fact that the lack of social and community life can become a cause of extinction of such villages.

Relationship to the land as the key factor

Due to the changing situation in urban and rural areas it is no longer true that higher proportion of agricultural land is typical for countryside. For example, we can find higher share of farmland in urban areas in regions of western Bohemia or the north and east Moravia (CZSO, 2013). Size, quality and function of farmland has been always changing.

It is alarming that currently, on average, 12 hectares of arable land are disappearing per day in the Czech Republic (Ministry of Agriculture, 2013). A similar trend can be also found in countries of the "Visegrad Four" (V4). The main factors reducing arable land in the Czech Republic are increasing intensity of housing development and occupation of land by photovoltaic panels and transformation of land management (e.g. afforestation). Not only low-quality land disappears but the phenomenon concerns also soils of higher classifications.

The quality of the farmland is not reduced only by its transformation into a different type of soil, but it is also the result of natural erosive processes and the actual economic activity of farmers. The Czech Republic ranks among the countries

with the second highest percentage of leased farmland in Europe (this share was between 76-82 % in 2001-2013). Higher share of leased land in Europe is only in Slovakia (Gebeltová et al., 2014).

While studies confirm that the effective use of direct payments for growing crops brings economic effects for the tenants and the landlord (Ryan et al., 2001; Patton et al., 2008), it is necessary to take account of differences in relation to the soil. Maintenance of high soil quality has greater impact if it is managed directly by its owner (Low, Míchal, 2003). Temporal lease and pressure on profitability for tenant means that their motives to maintain high quality of soil are lower than the owners. Tenants sought, through subsidies, for profitable and economic ways to increase the efficiency of their operations, which in practice means use of arable land for purposes other than just food production. A typical example may be the use of the soil for the production of biofuels or electrical energy by solar panels. Although there are obvious risks associated with the use of fossil fuels (both ecological and politico-economical), it does not prove that the production of biofuels solves this problem. It is rather leading to further soil degradation and to the erroneous thinking of young farmers about the soil. It is very similar to industrial entrepreneurs thinking about machinery – profitability is a key value for their decision-making processes.

There are also problems with the use of solar panels – their set up may seem as temporary at first glance. However, products of this type were never designed for use on arable land. There is a question whether farmland, on which panels are installed, will serve the future generations for food production.

Unbalanced relationship to the land, together with decreasing numbers of young farmers (not only in the Czech Republic), undermines the sustainability of agriculture sector as well as successful rural development (Kristensen et al., 2004).

Global risks for the rural community

The aforementioned pressures exercised by developers to acquire arable land for other than agricultural purposes or the emergence of suburban rural areas represent only a small part of the problems threatening the Czech rural society.

Another often discussed issue across European countries is food security. The Czech Republic is self-sufficient in a very few agricultural commodities. This fact is influenced by the subsidy policy of the EU and the Czech Republic as well as by changing agricultural commodity prices on national and international markets. Due to the unstable political and economic situation in the world there is a need to consider the subsidy policy goals and objectives of investment projects in agriculture. This situation opens the door for discussion about revival of self-sufficiency at national level, which is difficult and unprofitable from economic perspective in the short term, but it should bring positive effects in the long term.

Another global issue is a flexible domestic and foreign capital which extends also to the development of rural areas. The effort to break the limits on coal mining in the Czech Republic should be given as an extreme example. The whole area of Jiřetín was paralysed by the very announcement of the intention (without confirmation of the approval) which brought social and economic problems – local residents gave up on further development of the area, pointing out that although the mining would not affect their locality directly, living next to a mine means the end of a peaceful life in a village. In addition, after the eventual approval of breaking the limits the stress on the environment will increase, not only in the place of actual mining. The problem lies in the fact that only 1/4 of mined coal in the Czech Republic is used for home heating and the rest is converted into electrical energy which is exported abroad. The extreme case opens the question whether the Czech society has the chance to defend themselves faced with the pressure of multinational developers and corporations. It is discussed whether rural regions will justify long-term and sustainable values before dictation of economic profitability (e.g. Moldan, 2003; Sklair, 2002; Suša, 2010).

Countryside and rural society could also turn some global negatives in their favour. Already mentioned the idea of self-sufficiency has the potential to bring to rural regions higher economic activity and society-wide prestige. Presented socio-economic and political crises like wars, threat of terrorism or the refugee crisis in media could also affect the public opinion about travelling abroad. According to GPI (Global Peace Index) the Czech Republic belongs to the 10 safest countries in the world (Institute for Economics and Peace, 2015). It could contribute to strength the ideas of patriotism and also give rise to opportunities for the development of domestic tourism which also includes rural locations.

Rural society (and urban society as well) have to be ready for these opportunities for example through regional institutionalisation and support for bottom-up approach with regard that it is not possible to represent the countryside as a homogenous area.

Community development and local identity as a solution

The current approach of the CLLD (Community-Led Local Development), which has appeared in the new programming period of 2014-2020, responds to the above-mentioned and other problems of individual rural communities. Even in the scientific literature one can find an endogenous shift from an integrated approach to community-led development with emphasis on building social networks and relationships in localities. This can be based on two fundamental aspects. First, the leader has no chance to succeed without the support of the whole community in the area – it will force him to leave (sooner or later). And secondly, the community is responsible for the condition of the soil, landscape and rural areas which

determines the quality of the above. The need to restore their relationship to the locality and its surrounding is presumed. In this context, it seems necessary to support regional and local identity.

Regional/local identity is an individual inner feeling of solidarity with the locality and can be considered as one of the key factors of regional development. This is a very complex phenomenon which has a range of social, territorial and cultural-historical aspects (Raagma, 2002). In this respect, it is questionable whether or not increasing globalisation processes can pose a potential threat to the independence of local cultures (Roubal, 2003). Ways to adapt these processes are on an individual basis rather differentiated. The subject of discussion is regional identity in the context of mobility, which leads to frequent updating of spatial self-identification in some cases, but sometimes there is an anchored regional awareness standing in opposition to the need for using the opportunities provided by the globalised world (Kováčová, 2003).

We are witnessing the emergence of new territorial units at the regional level, redefining the borders of the old regions and the emergence of new structures. There has been a reform of public administration in 2000 in the Czech Republic which established a system of higher self-governing units – regions. In this context, it is necessary to take into account that the process of institutionalisation of a region consists of several phases that they may, but not necessarily, be linked to (Sýkora, Matoušek, Brabec, 2011). According to the Paasi model of institutionalisation of a region (Paasi, 2002), it can be stated that these new territorial entities are not the result of a continuous and gradual process of institutionalisation but the result of reforms implemented top-down (Sýkora, Matoušek, Brabec, 2011). Although these regions have been already integrated into state regional systems, some of them lacked a clearly defined symbolic significance accepted by its own population. This can result from insufficient respect of bottom-up approach during the process of establishment of regions.

Successful development of LAGs (Local Action Groups), which cover 95% of the territory in the Czech Republic, and their activities based on a bottom-up approach, suggest that strengthening the role of the communities and their relationship to the area where they live, may be a very useful tool for resisting local and global threats.

Conclusion

The current rural population in the Czech Republic does not differ too much from the population living in post-socialist countries in the major indicators. Even after a quarter of a century of existence of the state of democratic governance, the negative phenomena of the period of totalitarian regime are not fully eliminated. However, individual analyses show that changes after 1989 have had a major impact on the contemporary Czech countryside.

Significant fragmentation of the Czech Republic in a small rural villages still persists. The smallest villages (up to 500 inhabitants) provide the lowest quality of life for local residents. This is reflected in continued deterioration of the socio-economic characteristics including the overall decline of population. Only small villages in the hinterland of large cities are an exception. There is no decline in population, but these communities also failed to fulfil a different role except residential. The emergence of suburban rural settlements with all of the above-mentioned negative characteristics can be seen as a consequence of the impact of national and international interests of developers.

Rural population is affected by the lack of job opportunities so many of the residents, have to commute to nearby towns. This leads to waste of time on individual level that adversely affects social, cultural or sports activities in the community and limits the development of social relations.

Lower economic activity and a higher proportion of the primary sector in the countryside have apparently resulted in the creation of income disparity in comparison to the urban population. Broader diversification of economic activities of rural areas can contribute to its partial elimination.

Another key factor of the development of rural land and rural population is the relation to a farmland. Decreasing size and quality of the farmland is an example of the incorrect view of this indispensable resource development in the Czech society. Only a change in the mindset of existing and newly starting farmers and the rest of the society can contribute to the conservation of one of the most important stabilising factors in the development of the entire country.

In spite of these negatives, it seems that the different lifestyles of villagers do not lower the attractiveness of life in the Czech countryside. Population growth is not only a result of birth rate, but also a result of migration.

In order to maintain the attractiveness of the countryside in the future, it is necessary to strength the role of the LAGs in rural development further and encourage individuals and entire communities to deepen their relationship to the farmland, to the landscape and generally to the place where they live. Changes in the education process in the Czech society and following the examples of good practice should be exactly the factors that might be very useful in this respect.

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Szabolcs BIRO

Research Institute of Agricultural Economics, Hungary
biro.szabolcs@aki.gov.hu

Impact of the Old and Effect of the New Rural Development Programme in Hungary

Abstract: *In Hungary, over the past decade, the development and up-grading of the infrastructure and basic services caused a decrease in regional differences and a decline in the characteristic differences between rural and urban lifestyles, and farms in various regions developed differently, depending on their conditions. The rural development programmes of the past decade provided opportunities for the rural economy, the regions and the society, they assisted to safeguard the environmental values, induced community initiatives and encouraged the actions of the rural population both financially and mentally. The main shortcoming of the present programmes is that they relieve the symptoms but do not encourage creative solutions and sustainable developments. The developments in rural areas are mainly driven by social needs and basic infrastructural requirements and not by the claim of economic development. The lesson learnt is that the investments are generated by the demand of the market and the rural development by itself is unable to stop the unfavourable regional processes and thus the lagging behind of the disadvantageous regions. Unlike the earlier programmes the present programme focuses on sectors, which produce high value added and ensure significant employment for the rural population. It also supports the development of food processing, livestock farming and horticulture. In the present paper we provide an overview of the main results and impacts of the rural development measures up to now and present the main parts and the new focus areas of the investment measures in the Rural Development Programme of 2014-2020.*

Keywords: *rural development, investment support, value added*

Introduction

Twothird of the area of Hungary are rural areas with almost half of the population (46.9 per cent). Rural areas provide one third of the total gross value added and employment for 40 per cent of the total population. However, only a few people can find a livelihood locally. The role of agriculture in direct employment is decreasing even in the regions of agricultural dominance. The lagging behind of rural areas is indicated by the low level of economic activity rate, the permanently high level of unemployment and enterprise density below the national average (table 1). In rural areas the available skilled labour is limited; the young and qualified generation moves into cities and the population is decreasing. The internal migration can be shown by the fact that between 2001 and 2013 more than 100 thousand people moved into transitional and urban areas.

The lagging behind of rural areas is indicated by the different regional GDP per capita. In rural areas the value of the GDP per capita (EUR[1] 6.6 thousand/capita) amounted to three fourth of the national average (EUR 8.7 thousand/capita) in 2011; compared to Budapest (EUR 19.7 thousand/capita) the lagging behind was three times larger.

In rural areas food processing plays traditionally an important role in employment and income generation. It is indicated by the contribution of the sector to the gross value added, however, it decreased in rural areas from 9.3 per cent to 6.6 per cent between 2000 and 2010, but it is still double of the national average (3.6 per cent). By 2011, the value of this indicator increased again. The agricultural employment increase over the last few years is mainly due to the simplification of the legal and tax background of casual employment, stricter labour inspections and the "whitening" of illegal employment.

Table 1. Main economic indicators by areas, 2003-2013

Denomination	Year	Mainly urban	Transitional	Mainly rural	Total
Activity rate (15-74 age group), per cent	2003	58.3	52.1	53.4	53.8
	2013	62.0	56.7	56.3	57.5
	Change (per cent)	*106.3*	*108.8*	*105.4*	*106.9*
Number of employees, thousand persons	2003	749.1	1,316.7	1,856.1	3,921.9
	2013	769.1	1,384.6	1,784.7	3,938.4
	Change (per cent)	*102.7*	*105.2*	*96.2*	*100.4*
Number of unemployed, thousand persons	2003	28.4	91.2	124.9	244.5
	2013	69.2	171.3	208.5	449.0
	Change (per cent)	*243.7*	*192.4*	*166.9*	*193.6*
Enterprise density (number of enterprises per thousand inhabitants)	2003	109.6	62.5	55.4	67.1
	2013	110.0	78.4	58.6	69.1
	Change (per cent)	*100.4*	*125.4*	*105.8*	*103.0*

Source: based on the STADAT of the Central Statistical Office of Hungary the table was prepared by the Rural Development Department of the Research Institute of Agricultural Economics.

[1] Remark: All calculations are based on the exchange rate of 310 HUF/EUR.

Impacts of the rural development programmes

The second pillar of the Common Agricultural Policy, i.e. rural development, encourages the economic, social and environmental development of the Member States of the European Union through multiannual, targeted, regional and local programmes. Given that nearly 60 per cent of the EU population lives in rural areas, rural development is a sector of outstanding importance for the whole of the European Union. The focus, however, according to the needs of the Member States vary considerably (Potori et al., 2012). By the allocation of the rural development, resources of the European Union mainly the agricultural production (size of the area and agricultural population), environmental conditions and the skills of rural population are taken into account by equal weight. The allocations might be modified according to various factors (history, actual budget of the Member States, distribution of the resources among pillars, negotiating power of the Member State). Hungary, after the accession, enjoyed a beneficiary role but this decreased by the increase of direct payments. However, the resource allocation, based on the criteria listed above, can be considered objective for Hungary (figure 1).

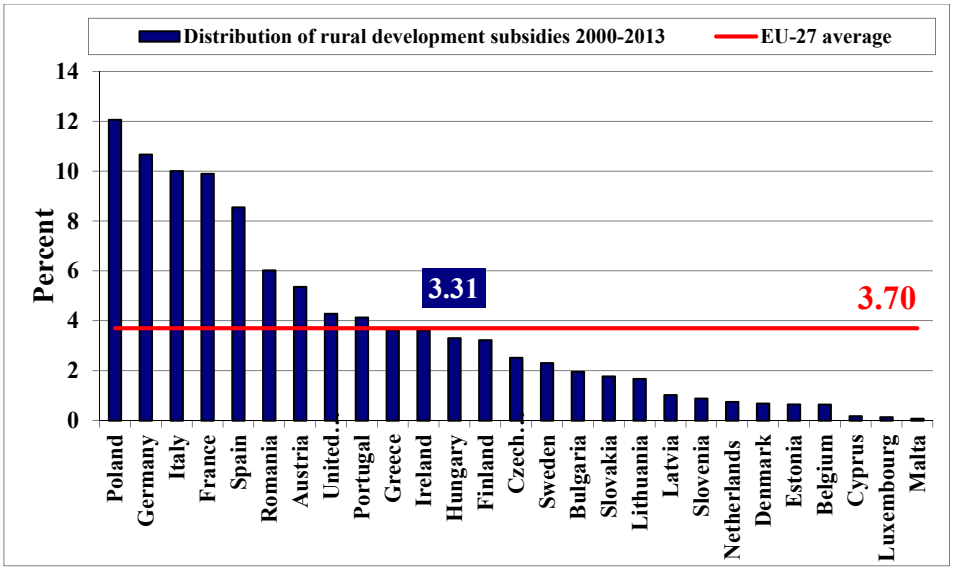

Figure 1. Distribution of rural development subsidies in the European Union, 2000-2013
Source: European Commission, 2013.

In the frame of the national rural development programmes (Special Accession Programme for Agriculture and Rural Development (SAPARD), Agricultural and Rural Development Operational Programme (AVOP), National Rural Development Plan (NVT), New Hungary Rural Development Plan (NHRDP)), financed by the European Agricultural and Rural Development Fund (EMVA), a total of

EUR 586.5 million was used for development in Hungary exceeding the gross annual output of agriculture – the gross output reached EUR 5.35 million on annual average between 2004 and 2012 (table 2).

The measures aiming to increase the competitiveness of food processing directly, to safeguard and improve the rural environment accounted for about 40-40 per cent in the rural development payments, while the amount for improving the quality of life in rural areas reached 13.5 per cent (Biró, Nemes, 2014).

Table 2. Resources of the rural development programmes implemented by co-financing in 2004-2013

Measure	Resource (public funds)		Payments	
	EUR million	Share in total, per cent	EUR million	Share in total, per cent
I. Competitiveness	2,556.0	43.6	1,856.0	43.0
II. Rural environment	2,036.4	34.7	1,697.6	39.3
III. Quality of life in rural areas	1,049.9	17.9	582.0	13.5
Technical assistance	223.1	3.8	184.7	4.3
Total	5,865.4	100.0	4,320.4	100.0

Source: the calculation prepared by the Rural Development Department of the Research Institute of Agricultural Economics (AKI) is based on the data of SAPARD, AVOP, NVT, NHRDP as of February 25, 2014.

The SAPARD (Special Accession Programme for Agriculture and Rural Development) implemented between 2000 and 2003 concentrated on three measures, namely on rural enterprise development (39 per cent), development of the processing of agricultural and fishery products (28 per cent) and on the development of the rural infrastructure (23 per cent). More than two and a half thousand projects were implemented in the framework.

The SAPARD Programme provided financing for purchasing machinery of 76 thousand kW; provided grain storage capacity for 190 thousand tonnes and ensured financing for the restoration of stables for 88 thousand cattle and 450 thousand pigs and supported the preservation or restoration of buildings of architectural value in 124 villages. The local institutional network at micro-regional level (SAPARD regions) established in the course of the project, the local networks and strategies, the rural development experts getting professional, the new way of thinking about local and central resources are all significant elements of the Hungarian rural development. Another result was the establishment of the SAPARD Office providing a base for the operation of the Paying Agency (MVH).

In the Agricultural and Rural Development Operational Programme (AVOP), being in effect in the period of 2004-2006, the priority of 'Competitive produc-

tion of raw materials in agriculture' accounted for the largest share (58 per cent). The priority of 'Modernisation of food processing' attained 14 per cent, while the 'Development of the rural region' (Priority 3) reached 25 per cent. The measures of the Agricultural and Rural Development Operational Programme (AVOP) supported mainly modernisation and improvement of technical conditions primarily in agriculture; however, they also modestly contributed to increasing income generation in rural areas, restoration of the rural architectural values and improvement of the working conditions of production. One of the results of the Agricultural and Rural Development Operational Programme (AVOP) was the purchase of four thousand pieces of agricultural machinery of 128 thousand kW in total and the implementation and modernisation of stables providing housing for 343 thousand pigs. The agri-environmental and afforestation measures accounted for 82.9 per cent in the National Rural Development Plan (NVT) implemented in parallel with AVOP and financed by EMOGA. Based on the ex-post evaluation of National Rural Development Plan (NVT), the measures of the plan had mainly an effect on raising the awareness and form opinions. This also improved the environment and the quality of life in rural areas. Annually about 35 thousand farmers received subsidies from NVT. From among the measures the agri-environmental measure accounting for two-third of the resources provided assistance to 24 thousand farmers for environment-friendly production. The area affected reached 1.5 million hectares.

In the Rural Development Plan of 2007-2013 the measures of the New Hungary Rural Development Programme (NHRDP) focussed mainly on encouraging the investments and increasing the rural income, generating environmental services. From the budget of the Programme (2007-2013) the measures financed aimed to increase directly the competitive agricultural production and food processing (51.2 per cent), safeguard and improve the rural environment (32.4 per cent) and improve the quality of life in rural areas (13.1 per cent) as well as to implement the objectives of LEADER (3.3 per cent).

The New Hungary Rural Development Programme (NHRDP) has a more diversified structure – even if the payments of the measure 'Modernisation of food processing' and 'Agri-environmental measure' accounted for half of the total budget – since its 11 significant measures accounted for three fourth of the total budget (Ministry of Rural Development – VM, 2013).

In the past 10 years, 23 thousand projects were implemented in the food processing sector financed by subsidies amounting to EUR 1.9 million. More than half of the enterprises (54 per cent) implementing investments from subsidies are micro enterprises while more than one fifth of them are natural persons/primary producers; small enterprises account for 11 per cent. The medium-size enterprises have implemented the largest projects from subsidies in the value of EUR 261.3 thousand, while the micro enterprises have spent, on average, EUR 54.8 thousand

from public funds and the primary producers have spent EUR 22.6 thousand on investments. Most of the developments were implemented in the North and South Great Plain regions; the numbers of investments are outstanding in the counties of Szabolcs-Szatmár-Bereg and Bács-Kiskun; 43 per cent of the investment subsidies were spent on the modernisation of livestock farms and 29 per cent on the renewal of agricultural machinery and equipment; 15 per cent of the investments subsidies were used for projects for the food processing developments and 11 per cent of the resources were spent on constructing grain storage capacities and green houses.

The resources available for investments in the programming period of 2014-2020 were similar to the amount spent in the last 10 years (2004-2014), i.e. EUR 1.4 billion to be spent in the frame of the Rural Development Programme and financed from European Agricultural and Rural Development Fund (EMVA); directly a further amount of EUR 322.6 million is planned in the frame of the Economic Development and Innovation Operational Programme (GINOP). This new programme, in accordance with the Regulation No. 1305/2013/EU, determines three targets: safety in the fields of food processing and profitability, environment-friendly and sustainable use of natural resources and aiming to decrease the regional and social differences. The implementation of the above is assisted by coordinated actions (Biró et al., 2015).

Effects of the 2014-2020 rural development programme

In the programming period of 2014-2020 more than EUR 4 billion are available in the frame of the Rural Development Programme and financed from European Agricultural and Rural Development Fund (EMVA) (table 3). The programme, in accordance with the Regulation of 1305/2013/EU, has three target areas: safety of food processing and income; environment-friendly and sustainable use of natural resources; and assistance provided to decreasing the regional and social differences. From among the 11 objectives 8 can be aimed at (knowledge-innovation, competitiveness, environment, climate, energy, employment, decrease in poverty and exclusion) by the interventions. The development objectives of the Rural Development Programme currently under discussion and adjusted to the Hungarian needs are as follows: retaining and increasing the number of rural jobs, improving the working conditions, assistance for the small and medium-size enterprises, increasing energy efficiency, decreasing the energy dependence as well as developing rural areas. The Programme is based on a site assessment and SWOT analysis, by which about 50 requirements were defined by taking into account the economic, social and environmental conditions and the needs of rural areas.

Table 3. Areas of development and the resources of the Rural Development Plan for Hungary 2014-2020

Area of development	Resources (EUR million)
Environment-friendly agricultural production	1,090.3
Competitiveness and income security of agriculture	958.1
Competitiveness of food processing	767.7
Sustainable forestry	348.4
Development of rural areas	387.1
LEADER	193.5
Short Supply Chain sub-programme	87.1
Young Farmer sub-programme	251.6

Source: Kiss, 2014.

The budget and the flexibility of the Programme are determined by the European Agricultural and Rural Development Fund (EMVA) Regulation No. 1305/2013 and the rules and definitions of the New Hungary Rural Development Plan (NHRDP). The programme covers the 5 per cent minimum share of resources of LEADER, and the minimum 30 per cent for projects against climate change, the minimum 30 per cent share of priorities 4 and 5, the multiannual forestry and agri-environmental commitments from the period of 2007-2013 as well as the obligatory financing from the budget of Technical Assistance of the National Rural Network (NVH). The Rural Development Programme is based on six priorities and 17 target areas defined by the regulation of the European Agricultural and Rural Development Fund (EMVA) in order to reach by integrated and coordinated actions the objectives determined.

In contrast to the earlier programmes the present programme focuses on sectors, which generate high value added and significant number of jobs for the rural population as well as on developing food processing, livestock farming and horticulture. In addition, new fields are the environment and climate change (integrated development of water management, improvement of energy efficiency, reduction of greenhouse gas emissions). There is a new type of development flat-rate subsidies available for small farms with simplified business plan.

The best means to increase employment are the subsidies provided for labour intensive sectors and the increased support of livestock farming, horticulture, fruit and vegetable production and forestry. The job generation objective can be reached by one of the eligibilities, which is maintaining the number of jobs, while increasing the number of jobs is given preference in the evaluation. From the supported sectors in the cases of subsidies provided to horticultural investments the main objectives are the energy efficiency increase; the use of geothermic energy as well as the support of post-harvest actions also by co-financing. Employment and resource efficiency are outstanding objectives of the development of livestock farming. The investment resources available for arable crop production can be used for more targeted actions than in the New Hungary Rural Development

Plan (ÚMVP) (e.g., water retention, melioration, modernisation and development of irrigation systems, modernisation of small-size grain storage capacities and grain dryers, machinery and technology development to improve resource efficiency). The optimisation of water management is assisted by subsidies provided in the frame of the Rural Development Programme for water retention, melioration as well as for developing and improving the efficiency of the farms' own irrigation systems focussing on joint investments.

Almost half of the investment subsidies (47.5 per cent, EUR 661.3 million) in the Rural Development Programme are to be used for processing agricultural products and for the development of the wineries; 17-17 per cent of the investment resources (EUR 241.9 and 235.5 million, respectively) are to be spent on the development of livestock farming and horticulture; 12.5 per cent (EUR 174.2 million) will finance the development of water management and 4.5 per cent (EUR 64.5 million) – the construction of small-size grain storage capacities. In the conditions of competition those food processing enterprises can survive and develop which are able to access the market, increase their markets and retain them. In the new period, resources are available not only in the Rural Development Programme but also in the Operational Programme with the largest budget in Hungary, i.e. the Economic Development and Innovation Operational Programme (GINOP), which ensures the development of the food industry. Under the GINOP development projects in food industry normally medium-sized companies can be supported.

The long-term survival of agricultural enterprises can be ensured not only by investments but also by increasing the knowledge, organising the commodities and improving the quality of life in rural areas. The knowledge increase and knowledge transfer as well as extension, playing important roles in improving the competitiveness of producers, constitute also integral parts of the new rural development measures in the new period. New opportunities are provided in this fields by acquiring, increasing and transferring knowledge through EIP (European Innovation Partnership) agricultural innovation operation groups, in the frame of which farmers and researchers can cooperate to find a special solution to a certain problem.

The programme not only finances the operation of the operational groups but also their R&D&I investments. In the Rural Development Programme the two sub-programmes, coordinating the measures applied, offer new opportunities. The objective of the Short Supply Chain (REL) sub-programme is to support the producers in accessing the local markets, while the sub-programme Young Farmers (FIG) provides subsidies to young farmers under 40 with agricultural qualifications launching an enterprise individually and for the first time (Biró et al., 2015). The forestry measures accounting for 6 per cent in the Rural Development Programme – in accordance with the forestry strategy of Hungary – target

the environmental and economic development of the present forestry stock, the dissemination of modern, and environment-friendly forestry partly by new and partly by renewed and simplified eligibilities (figure 2). A fundamental change is that instead of the earlier quantitative increase the support of quality forestry is preferred. One of the new objectives, is the preparation of forestry for the climate change as well as increase in the capability to use renewable energy in forestry.

An outstanding field of the Rural Development Programme is the development of food processing, for which agriculture supplies raw materials. By creating new jobs it can also increase the income security of farmers.

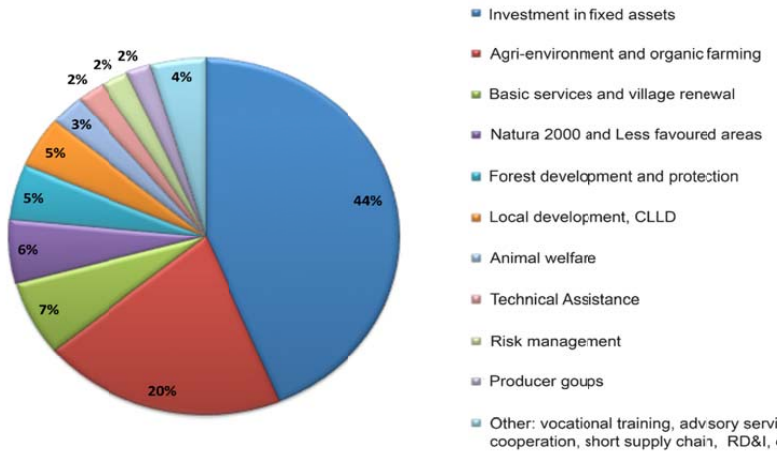

Figure 2. Distribution of the resources among the development aims of Rural Development Programme

Source: Prime Minister Office 2015.

After 2014, joining the national quality schemes (e.g., protection of geographical indication, organic products, wines, etc.) is also supported by the Rural Development Programme as well as the costs of the farmers incurred in connection with the quality system joined. The development of the food processing sector is guaranteed by the fact that resources are available both in the Rural Development Programme and the Economic Development and Innovation Operational Programme (GINOP). Resources are provided to the developments of medium--sized, non-agricultural enterprises not only for the production of non-primary products (Non-Annex) but also for primary products (Annex 1).

The environment-conscious agriculture is ensured both by the earlier agri-environmental measure and by the new eligibility of organic farming introduced in the period of 2014-2020. In the new period by applying the new measures the regional and environmental considerations will prevail more efficiently and

the better coordination of the parallel use of various subsidies will be ensured. The new agri-environmental scheme coming into effect in the next programming period is planned to manage all area-based subsidy schemes (agri-environment, less--favoured areas, Natura 2000, organic farming). The agri-environmental scheme to be launched in 2016 will be more flexible, easier to use and more transparent than the present one; the farmers will receive subsidies 'tailored' to the commitments based on land conditions and demands. In the new period the knowledge increase and transfer as well as the extension will get important roles in increasing the competitiveness of farmers. The agri-innovation operational groups, taking part in acquiring, increasing and transferring knowledge, provide new opportunities assisting farmers and researchers to find solutions to their individual problems.

In the new period, the development of rural areas is ensured by establishing and developing a sustainable infrastructure meeting the local economic and social requirements as well as by the LEADER-type developments based on community decisions, additional income generation and diversification through the subsidies provided for cooperation. The main condition of obtaining a subsidy for small-scale infrastructure development in rural areas is that the development should meet real needs and support sustainable community and economic services. As for LEADER, the focus areas recommended by the Rural Development Programme for Local Action Groups are reducing the impact of the unfavourable regional social and demographic processes, strengthening the local economy, supporting farming that use natural resources in a sustainable way as well as pilot programmes of innovative small villages.

In the Rural Development Programme of 2014-2020 new opportunities are provided by the sub-programmes of the Short Supply Chain (REL) and Young Farmers (FIG) applying the measures in a coordinated way. In the Short Supply Chain (REL) the objective is to assist the development of existing and operating enterprises of Hungarian initiatives and encouraging the foundation of new sustainable cooperation by providing the means required for the developments in the fields of the investment, organisation, training and extension.

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Julian T. KRZYŻANOWSKI

Institute of Agricultural and Food Economics – National Research Institute,
Swiętokrzyska 20, 00-002 Warsaw, Poland, julian.krzyzanowski@ierigz.waw.pl

Impact of CAP 2014-2020 on Sustainability of Polish Agriculture in the Light of Previous Research and Current Documents

Abstract: *The aim of this paper is to present new CAP solutions for 2014-2020, concerning sustainable development of agriculture. The basis for this research is the papers and reports prepared by the Institute within the framework of the Multi-Annual Programme for 2011-2014. Analysis of these works is complemented by Strategy for Sustainable Development of Rural Areas as well as by report drawn up by the Ministry of Agriculture and Rural Development on direct payments in the new Financial Perspective. Analysis of the documents allows formulation of new research areas, for the coming years. Generally, there is some progress going on, at least in documents, however, changes are smaller, than it was expected from the first draft of the EU documents. On the other hand, it appears, explicitly, from the documents under scrutiny, that never in the CAP history, such a stress was given to the environmental issues. Financing of agri-environmental programmes also increased considerably. The years to come will show, whether documentary regulations were really implemented.*

Keywords: *sustainable development, agriculture, CAP, greening*

Introduction

The aim of the study is to present new solutions with regard to sustainable development of agriculture on the basis of abundant literature that result from the implementation of the Multi-Annual Programme 2011-2014 by the Institute. At the same time, the study is based on the EU documents, e.g. Commission working paper (*Impact Assessment...*, 2011), meaningfully subtitled "CAP greening", Polish sustainable rural development strategy 2012 (Strategy, 2012), and the study concerning direct payment system under the new financial perspective by the Ministry of Agriculture and Rural Development (System..., 2015).The analysis of the documents makes it possible to formulate new research tasks, which will be performed in the years to come.

As stated in the literature (Zegar, 2013a; Krasowicz, Oleszek, 2013), when we discuss sustainable development, we need to distinguish between two concepts: sustainable agriculture and sustainable development of agriculture. The former is static in nature, while the latter – dynamic. As the topic of the study is the impact of the Common Agricultural Policy (CAP) on the sustainability of agriculture, we will refer to the latter.

One of the approaches to measuring sustainability of farms (agriculture) is application of a diverse set of economic, environmental and social indicators (Wrzaszcz, 2012; Toczyński, et al., 2013; Matuszczak, Smędzik-Ambroży, 2013; Wrzaszcz, Zegar, 2014). In this case, sustainability measurement has a specific set of characteristics that result from the environmental impact of agricultural production – on the one hand, it may lead to degradation, while, on the other, it can protect natural environment, because of the close link between sustainability and local conditions. To a large extent, the nature of sustainability depends on the farmer's production decisions, including the type of activity, intensity of production or its organisation, the farming system, and local conditions. The local agrisystem should be the determinant of the allowed human activity (interference) due to the fact that the local character of agricultural production decides whether particular agricultural practices are harmful or beneficial for the system (Zegar, 2014a). This results in significant constraints on the practical application of findings, including the sustainability measures used in other countries and by international organisations. This shows certain limits on the possibility to conduct comparative studies in various EU countries.

Agricultural circumstances in other countries or regions are inadequate for the situation of the Polish agriculture. Possibly comprehensive sustainability assessment of a farm requires application of diverse indicators that take account of the full scope of undertaken agricultural practices, and choice of applicable tools that make it possible to measure their impact on the landscape and environment as well as environmental, social and economic benefits of greater sustainability

of farms. The research assumed (Zegar, 2014a) that a sustainable farm is an entity that meets certain environmental, social and economic criteria. Due to the availability of data, previous research focused on environmental sustainability. This is the approach that we are going to maintain in further analysis, primarily to preserve continuity of research and, what we will demonstrate later on, due to the fact that it is compatible with the EU methodology, so it can be used for comparative studies to a limited extent.

The applied method assumed that the basic characteristic of sustainable agriculture is preservation of the production potential of the soil, which is the main element of the natural environment used in agriculture (Zegar, 2014a). Due to that, the minimum postulated basis for implementation of correct agricultural practices is prevention of degradation of soil organic matter, and the assumed aim is to increase fertility and maintain its capability to produce biomass. Agricultural production compliant with respecting natural resources is made possible by skilful crop rotation adjusted to the fertility and type of soil.

The following criteria have been adopted to determine environmental sustainability of a farm – environmental friendliness of agricultural production (Wrzaszcz, 2012):
1. percentage of cereals in the arable land sowing structure (< 66%),
2. number of plant groups cultivated on arable land (> 3),
3. percentage of arable land covered with vegetation for winter (> 33%),
4. stocking density (<2 LU/hectare of agricultural land),
5. soil organic matter balance,
6. gross nitrogen balance, and soil phosphorus and potassium balance.

As we will see below, these are the same criteria as those used for agri--environmental programmes.

The European Union guidelines

In Luxembourg, 24th-25th June 2013, the Irish presidency concluded a political agreement between the Council of the European Union, the European Parliament and the European Commission on four proposed regulations (Regulations, 2013) that are to define the CAP for 2014-2020. The legislative acts were formally adopted in autumn 2013.

The Regulations of the European Commission legitimise the Multiannual Financial Framework for 2014-2020 proposed on 29th June 2011 (Multiannual Financial Framework proposal). The framework defines CAP objectives for the nearest future and determines the budget for agriculture and rural areas. Under the current CAP, the payment of 30% of direct payments (Communication, 2011a) depends on making the agricultural sector more sustainable (the so-called greening).

Agriculture and forestry in the European Union provide environmental public goods and attempt at mitigating climate fluctuations primarily through sustainable land management (*Impact Assessment..., 2011*). Today, the CAP supports sustainable management of natural resources through a combination of various instruments. Farmers are encouraged to protect the environment and counter climate change using direct payments they receive, which are decoupled and connected to the environmental protection through the cross-compliance principle as well as increasingly more targeted funds under rural development programmes, particularly the agri-environmental funds. Thus, the significance of the CAP, particularly under the current financial perspective, should be seen also with the view to maintenance of sustainable agriculture.[1]

Agriculture and forestry significantly contribute to the production of renewable resources. Natura 2000 sites cover more than 10% of the total agricultural land in the EU; nonetheless, about 60% of habitats and 50% of animal species are insufficiently protected. Though the concentration of nitrogen compounds in surface and ground water has decreased in most Member States, there is constant insistence on water quality improvement (this regards high concentration of nitrogen compounds, particularly in areas with intense animal husbandry and residues of plant protection products). Many countries are struggling with severe water shortage. To ensure environmentally friendly status of water in the EU, it is necessary to reduce phosphorus discharge. This all means the necessity of further targeted measures in areas with intense agriculture for the sake of compliance with the Water Framework Directive[2] and the Nitrates Directive[3]. It should also be remembered that soil erosion becomes a serious problem across Europe, and it is estimated that 45% of soil has low organic matter content.

As it can be seen, despite significant effort, the prevention of further ecosystem degradation has not brought satisfactory results. It should be remembered, however, that the European Union set ambitious goals in the field of climate, energy and biodiversity as part of the Europe 2020 strategy. Thus, sustainable natural resource management and climatic measures will be included among primary CAP objectives for the nearest future, just like sustainable development of agriculture and sustainable territorial development in the EU.

In particular, CAP for the nearest future should work in a way that significantly contributes to the achievement of the ambitious EU biodiversity goal by 2020.

[1] The subject is raised, e.g. in The Study on the Provision of Public Goods through agriculture in the European Union (2009), Preserving and enhancing the environmental benefits of "Land Services": Soil sealing, biodiversity corridors, intensification / marginalisation of land use and the permanent grassland (2009), and Reflecting environmental land use needs into EU policy: preserving and enhancing the environmental benefits of unfarmed features on EU farmland (2008).

[2] Directive 2000/60/EC.

[3] Directive 91/676/EEC.

"The EU Biodiversity Strategy 2020[4] includes the following goal for agriculture: Maximisation of grassland, arable land and multiannual plantation area that are covered by biodiversity-related measures under CAP in order to protect biodiversity and stimulate measurable improvement in animal species and habitat conservation status. The ancillary role of ecosystems should increase compared to the 2010 baseline level thus contributing to improved sustainability of the economy."

Strategy for sustainable development of rural areas, agriculture, and fisheries

Sustainable development of the country is not possible without agriculture, and care for natural resources and territorial development. Polish agriculture is decisive for food security, social and economic situation of rural residents, the condition of the environment, and the structure of the landscape (Krzyżanowski, 2014).

In order to stand up to challenges, which all the sectors face under the new financial perspective, and to provide an influx of funds from the European Union, the government has prepared a number of strategic documents, primarily the National Development Strategy 2020 (Strategy..., 2012). The Ministry of Agriculture, on the other hand, has developed the Strategy for the sustainable development of agriculture and rural areas 2012-2020 (Strategia zrównoważonego..., 2012), which diagnosed the need for and the purpose of investments in agriculture and rural areas.

On 25th April 2012, the Council of Ministers adopted the Strategy for sustainable development of rural areas, agriculture, and fisheries 2012-2020 (SDRAAF). Then, on 9th November 2012, the Resolution of the Council of Ministers No. 163 on the adoption of the Strategy for sustainable development of rural areas, agriculture, and fisheries for 2012-2020 was published in *Monitor Polski*, the Polish Official Journal, and thus the resolution entered into force. On 24th January 2013, the Minister of Regional Development issued an opinion on the complete compliance of the Strategy for sustainable development of rural areas, agriculture, and fisheries with the Medium-Term National Development Strategy 2020 entitled *Active Society, Competitive Economy, Efficient State*.

The primary objective of SDRAAF is to define the crucial direction of the development of rural areas, agriculture and fisheries by 2020, and thus, ensure that the scope of public interventions financed from national and the EU funds is addressed properly.

[4] COM(2011)244 final.

The main long-term objective of measures for the development of rural areas, agriculture, and fisheries has been defined in the strategy as follows: "the improvement of quality of life in rural areas and efficient use of its resources and potential, including agriculture and fisheries, for the sustainable development of the country".

The main goal is to be achieved through measures assigned to five detailed aims:
Aim 1. Increase in the quality of human and social capital, employment and entrepreneurship in rural areas;
Aim 2. Improvement in living conditions in rural areas and improvement in their spatial accessibility.
Aim 3. Food security.
Aim 4. Increase in productivity and competitiveness of the agri-food sector.
Aim 5. Environmental protection and adaptation to climate change in rural areas.

Measures under the strategy address new challenges for the civilisation, including: ageing populations, climate change, generational exchange, development of information technologies, occupational and territorial mobility, and the influence of global demographic situation on the food security. The measures were designed based on five key issues, i.e. human capital (1), quality of life (2), security (3), competitiveness (4), and environment (5).

SDRAAF covers the period between 2012 and 2020, i.e. the entire 2014-2020 EU financial perspective, and it will define the directions for the EU funds with regard to the development of rural areas, agriculture, and fisheries.

The issue essential for analysing the possibility of implementing sustainable development of agriculture is the detailed Aim 5: Environmental protection and adaptation to climate change in rural areas. Under the strategy, the detailed aims are translated into priorities. Thus, Priority 5.1. reads "Protection of the environment in the agricultural sector and biodiversity in rural areas".

This priority states that activity in agriculture and fisheries plays a particularly important role in the context of natural values of the country, especially in the parts that are sanctuaries for rare plant and animal species as well as preservation of natural habitats (including primarily meadows, pastures, ponds, and bird nesting sites) that require traditional farming or appropriately planned management.

Thus, measures are undertaken with regard to protection of biodiversity, including unique ecosystems as well as flora and fauna related to agriculture and fisheries (including measures convergent with agri-environmental measures implemented under the Rural Development Programme 2004-2006 and then the Rural Development Programme 2007-2012, measures for supporting agriculture in less-favourable areas – LFA, and high natural value areas – HNV).

Effective protection of biodiversity should consist in the analysis of the efficiency of implemented systemic solution. Thus, in order to determine the impact of changes to agriculture and fisheries on organisms/the environment, natural monitoring should take place, which would be one of the measures that fit the tasks referred to as "development of knowledge of protection of agricultural environment and biodiversity in rural areas and spreading thereof".

Measures for minimising the risk of introducing invasive species that threaten biodiversity or the genetic basis for plant, animal, or fish production are undertaken under the strategy. Taking account of water quality protection (including through rational use of fertilisers and plant protection products) and protection of soil against erosion, acidification, reduction in organic matter content, and pollution with heavy metals, what should be done is to improve (and also to simplify) and popularise the good agricultural practices (particularly through direct payments, whose amounts depend on cross-compliance), and good pond maintenance respecting the need for protection and sustainable use of biodiversity, and support to and popularisation of measures for the development of agricultural farming, and thus reduction in the use of fertilisers and plant protection products.

Regardless of the above undertakings, a water and soil quality monitoring system is developing, and it supports implementation of innovative methods of their protection due to plant protection product use and its negative impact on human health and the environment (which is referred to in the Directive of the European Parliament and of the Council 2009/128/EC establishing a framework for Community action to achieve the sustainable use of pesticides).

The national action plan has also been prepared (Obwieszczenie, 2013), which covers such areas as:

1. ensuring a training system for professional users of plant protection products, distributors of those products, and advisors providing services with regard to plant protection;
2. improving the public awareness of issues related to plant protection products;
3. ensuring supervision of technical condition of equipment for application of plant protection products;
4. protecting water environment and drinkable water against pollution with plant protection products;
5. reducing pesticide use or resulting risks in areas that are available to sensitive population groups and valuable in terms of natural environment;
6. ensuring implementation of integrated plant protection principles by professional users of plant protection products;
7. monitoring the risk related to plant protection products;

The implementation of the last priority includes also measures pertaining to education of producers and processing entities of the agri-food sector on risks

that arise from contamination of soil and water with hazardous compounds from agricultural and fish production, and agri-food processing.

Another instrument for protecting water quality and quantity comprises measures under the Water Framework Directive, i.e. water management plan in river basins (the plans assume basic and supplementary measures for improvement of water quality, including in the agricultural sector) as well as implementation and control with regard to compliance with environmental requirements related to soil and water protection (including cross-compliance). The scale of recultivation of degraded and devastated soil and restitution of its agricultural, natural or recreational function requires increasing.

At the same time, measures are undertaken with regard to rational use of water resources for agriculture and fisheries and increase in water retention, which is important in the context of droughts and floods resulting from climate change (e.g. construction or maintenance of water management infrastructure for retention and regulation of water levels; construction of gravitational irrigation systems; maintenance of water management infrastructure in order to adjust it to gravitational irrigation; construction or maintenance of infrastructure for providing or draining water in water management systems; improvement in conditions for agricultural use of water). Yet, increase in water retention should primarily use natural organic processes, such as water retention in peat bogs or ponds, reduction in retention through year-round vegetation cover, etc.

The said measures are supplemented by the research on protection of agricultural environment and biodiversity in rural areas as well as popularisation thereof, which is done e.g. through improvement and development of counselling system (including agri-environmental counselling and advice concerning fertilisers as well as training for farmers with regard to organic farming, promotion of Good Agricultural Practices and encouragement to apply them), protection of biodiversity and the environment, including soil and water. Under priority 5.1. (Protection of natural environment in the agricultural sector), line of intervention 5.1.1. concerning protection of biodiversity in rural areas is implemented primarily in areas where species subject to protection are found (e.g. national parks or Natura 2000 sites), and neighbouring areas.

Line of intervention 5.1.2 (water quality protection) is implemented across the country. It is particularly important in areas with significant risks for the environment due to intense agricultural production or territorial concentration of animal production.

Priority 5.2. “Shaping of rural space taking account of protection of landscape and spatial order” requires undertaking measures with regard to preservation of unique agricultural landscape forms, proper spatial planning in rural areas, and rational land management.

Priority 5.3. "Adaptation of agriculture and fisheries to climate change and their share in mitigating the change" includes promotion of crops that are less sensitive to droughts and waterlogging, changes to farming techniques due to the shift in growing season, and support for measures that limit and reduce greenhouse gas emissions (primarily methane and nitrous oxide) from agriculture and the agri--food chain.

Agriculture has a large potential in this regard due to:
- modernisation of farms and investment in infrastructure for storing organic fertilisers;
- absorption of carbon dioxide by forested areas and other green areas (meadows, pastures, permanent grasslands);
- support for renewable energy development (use of plant products as energy material, biogas plants);
- proper soil management and use of adequate agricultural techniques;
- recultivation of forestry production potential destroyed by disasters and implementation of preventive instruments (prevention of forest fires);
- carbon sequestration in soil and biomass through rational use of land and cross-compliance, promotion of organic farming, promotion of agricultural land forestation; the measures should be accompanied by spreading knowledge of climate-friendly practices among consumers and agri-food producers (including promotion of Good Agricultural Practices and encouragement to use them, education and raising public awareness of greenhouse gas emission issues and related climate change as well as ways to counter them and adapt to the change), and support for research on mutual influence of rural areas, agriculture and fisheries on climate change.

Lines of intervention under priority 5.3. cover the entire country. At the same time, taking account of weather-related factors and variable water resources on agricultural land, areas where measures that counter or mitigate water shortages in the growing season are particularly important can be identified.

Priority 5.4. reads "Sustainable forest management and hunting economy in rural areas." Forests play an important role in providing public environmental goods and have a significant impact on carbon sequestration. Thus, rational increase in forest resources in rural areas should be supported by foresting low quality soil where cultivation has no economic grounds thus increasing the profitability of the entire rural economy.

Increase in forest resources in rural areas takes place through measures that provide the opportunity to settle tree farms on arable and recultivated land. Though the matter that should be most important is forestation of areas in the enclaves and semi-enclaves of forest complexes that do not play important roles in terms of biocenoses and will contribute to the increase of existing forest complexes,

land that connects smaller forest complexes to create cohesive and continuous landscape forms, the so-called green corridors.

What is more, the establishment of agro-forestry farms should facilitate dual occupation of their owners and reduce the risk of maintaining one of separate farm types. It is important to integrate forestation with implementation of organic farming due to the former's favourable influence on the structure of land use and conditions for biological production.

What is also very important is forestation of land situated in areas where soil and water protection is necessary (e.g. drainage divides). Forestation in mountains, where farming causes soil erosion and nutrient runoff from and, small-area forestation positively affect the environment. Thus, the purpose of forestation is to protect and reinforce the most valuable natural areas. This includes both creation and reinforcement of areas connecting existing protected areas ("corridors") and abandonment of forestation to keep natural habitat as well as wild fauna and flora unchanged.

Priority 5.5. "Increase in the use of renewable energy sources in rural areas" is indirectly related to the issue of agricultural diversification. This includes allocation of agricultural biomass to energy production. It is particularly important that it does not lead to soil abuse, and, as a consequence, to loss of its productivity. In this regard, measures that receive particular support make it possible to use the energy from the biomass and simultaneously use the remaining organic mass to fertilise soil in the next production cycle. The key element for the implementation of the priority is the accomplishment of objectives resulting from the Energy Policy of Poland until 2030. It will particularly concern the implementation of *Directions for Agricultural Biogas Plants' Development 2010-2020*.

Solutions with regard to sustainable development of agriculture adopted in Poland

In 2015-2020, the intention of the economic authority is to achieve the national strategic targets, including objectives of the *Strategy for sustainable development of rural areas, agriculture, and fisheries for 2012-2020*, which was adopted by the government in April 2012, particularly with regard to food security, increase in productivity and competitiveness of the agri-food sector, and adaptation to climate change (System, 2015).

The proposed solutions make it possible to effectively and efficiently use the available EU funds to provide consumers in Poland and other EU countries with healthy high quality food (Kwasek, 2014) and functional food (as an element of sustainable development) in a manner that takes account of the need to restructure

and modernise the agri-food sector as well as the environmental requirements in Poland. It will be possible due to **particular support for active small and medium-sized farms** that have a real chance to develop under conditions of globalising markets and changing consumer expectations.

The tool for that purpose is **shifting 25% of the 2nd pillar envelope** for 2015--2020, i.e. EUR 2.34 billion, which increases the original budget for direct payments to EUR 23.49 billion. Most of the funds thus obtained (about 73%) will be allocated to finance **additional direct payment for small and medium--sized farms** (support for "first hectares" between 3.01 and 30 ha on each farm). Similar effect will be brought by the planned **payment for young farmers**, to which 2% of annual national envelope are to be allocated. Poland also fully uses the possibility to allocate 15% of the national envelope to **production-related payments**. Nearly two thirds of the amount will be allocated to support in the cattle, sheep and goat sector, and the remaining funds for selected plant products.

The new direct payment system is **complementary to other forms of the EU support** for agriculture and rural areas, including the agri-environmental measures of the new Rural Development Plan 2014-2020 (they are mutually complementary to the greening requirements).

Under the new system, the amount of support for specific forms includes the so--called greening payment.

Cross-compliance standards and requirements are binding under the new system (so far). Since 2015, the cross-compliance principle covers fewer requirements and standards of Good Agricultural and Environmental Conditions (GAEC). Requirements that have been removed from its scope concern use of sewage sludge (previous SMR 3)[5], and animal diseases: foot and mouth disease, swine vesicular disease, and the bluetongue disease (previous SMR 13).

Requirements resulting from the birds and habitats directives (previous SMR 1 and 5) were also modified, i.e. prohibition of wilful catching and slaying of birds, destruction of nests and eggs and scaring of protected birds, and picking, destruction and damage as well as collecting of protected plants that were valid across the country have been abolished.

[5] Statutory Management Requirements (SMR) are a part of the cross-compliance system that includes 13 regulations related to climate and environmental change: public health, plant and animal health, and animal welfare, e.g.: SMR 1 – protection of water against pollution with nitrogen compounds; SMR 2 – protection of wild birds; SMR 3 – protection of natural habitats, wild flora and fauna; SMR 4 – legislation concerning food and animal fodder; SMR 5 – limits to the use of certain substances having a hormonal or thyrostatic action and of beta-agonists in stockfarming; SMR 6 – swine identification and registration; SMR 7 – cattle registration and identification; SMR 8 – identification and registration of sheep and goats; SMR 9 – prevention, control, and countering of BSE; SMR 10 – placing of plant protection products on the market.

In the case of Good Agricultural and Environmental Condition (GAEC) standards, the regulations in the following fields have been maintained:

- distance between area where fertiliser is used and water reservoir (GAEC 1);
- procedures concerning issuing water permits for irrigation (GAEC 2);
- protection of underground water against pollution with dangerous substances (GAEC 3);
- the manner of cultivation of arable land on slope inclined more than 20° (GAEC 5);
- prohibition of agricultural land burning (GAEC 6); and
- ban on destruction of trees that are monuments of nature, ditches up to 2 m wide, and ponds whose total area is less than 100 m^2 (GAEC 7).

With regard to the standard concerning preservation of landscape features (GAEC 7), the regulations were supplemented with the prohibition of clipping trees and hedges on farmer's agricultural land between 15th April and 31st July. This does not include willows, fruit trees, and short rotation coppices.

In the case of the standard concerning **the minimum soil cover (GAEC 4)**, what was done was the extension of the possibility to perform the duty of maintaining the cover on arable land by including preservation of stubble, crop residues, and mulch. The percentage of arable land where the soil protective cover has to be preserved was reduced from 40% to 30%, and simultaneously the beginning of the period from which this norm should be applied has been shifted from 1st December to 1st November.

This duty meets environmental sustainability criterion No. 3.

What is more, the obligation to protect permanent grassland and counter the growth of unwanted plant on arable land by cutting the vegetation every year is one of the duties removed from the scope of standards and requirements of cross-compliance. This obligation has been reinforced, and it will be a criterion of eligibility for direct payments for land where production does not take place.

Types of payments under the new financial perspective

Single area payment

The simplified direct payment system with the single area payment (SAP), as the basic type, is still used in Poland. Every **eligible hectare** qualifies the farm for payment.

Terms and conditions for awarding single area payment since 2015 are similar to the previous ones. About 45.7% of the national envelope in the 1st pillar (i.e. total EU funds allocated to direct payments in Poland), i.e. over EUR 1.5 billion per year, has been allocated to this payment.

Area occupied by landscape features situated on the land that has been declared for payment is also eligible for single area payment. Such features include those that are subject to preservation under the standards, i.e. ditches up to 2 m wide, trees that are monuments of nature, ponds with the total area below 100 m^2, and landscape features, i.e. area occupied by unpaved roads, tree belts, walls of terraces that are up to 2 m wide, arable land, and permanent grasslands with single trees where there are less than 100 trees per hectare, and the agricultural activity is similar to practice on agricultural plots without trees.

Buffer zones defined in the payment regulations under the direct support system are also eligible for payments.

Greening payment

Payment for agricultural practices beneficial for the climate and the environment, i.e. greening, is a mandatory component of the new direct payments system. 30% of the national envelope, i.e. about EUR 1 billion, has been allocated to fund it.

Greening takes place through:
- crop diversification,
- preservation of permanent grassland,
- preservation of ecological focus areas (EFA).

What is more, it is possible to diversify crops through a balanced practice under the agricultural, environmental and climatic measure of Rural Development Programme 2014-2020 by compliance through the requirement concerning "cultivation of at least four crops in the main crop during the year, while the total percentage of the main crop and all cereals in the sowing structure may not exceed 65%, and the proportion of each crop may not be less than 10% (crop – defined in Article 44(4) of the Resolution of the European Parliament and of the Council (EU) No. 1307/2013", under Package 1. Sustainable agriculture – cf. p. 19).

This obligation complies with criterion 1 of environmental sustainability.

Table 1. Cross-compliance standards and requirements assigned to specific issues

Area	Primary issue	Standards and requirements	
Environment, climate change, maintenance of good agricultural and environmental condition of land	Water	SMR1	Protection of water against the effects of improper application of fertilisers containing nitrogen on Nitrate Vulnerable Zones
		GAEC 1	Buffer zones along watercourses – compliance with the obligations to use fertilisers at defined distances from reservoirs and watercourses
		GAEC 2	Compliance with procedures concerning issuing water permits for irrigation
		GAEC 3	Protection of underground water against pollution with dangerous substances
	Soil and carbon resources	GAEC 4	Minimum soil cover – obligation to preserve ground cover on at least 30% of arable land area situated in areas exposed to water erosion that are part of a farm at least between 1st November and 15th February
		GAEC 5	Crop cultivation on arable land situated on slopes with inclination above 20° (prohibition of bare fallow and cultivation of plants that require ridging along the slope; the obligation to maintain plant cover or mulch between rows in the case of perennial crops)
		GAEC 6	Preservation of soil organic matter level through ban on agricultural land burning
	Biological diversity	SMR 2	Protection of particular bird species through compliance with obligatory measures on Natura 2000 sites and across the country by adhering to specific prohibitions
		SMR 3	Protection of specific natural habitat type, animal and plant species through compliance with obligatory measures on Natura 2000 sites
	Landscape, minimum preservation level;	GAEC 7	Preservation of landscape features (monuments of nature, ditches up to 2 m wide, ponds with the total area smaller than 100 m^2), and ban on trimming trees and hedges between 15th April and 31st July, except willows, fruit trees, and short rotation coppices
Public health, animal health, plant health	Food safety	SMR 4	Food and animal fodder safety
		SMR 5	Prohibition of use of compounds having a hormonal or thyrostatic action and of beta-agonists
	Animal identification and registration	SMR 8	Identification and registration of swine
		SMR 7	Identification and registration of cattle
		SMR 8	Identification and registration of sheep and goats
	Animal diseases	SMR 9	Prevention, control, and countering of transmissible spongiform encephalopathies (TSEs)
	Plant protection products	SMR 10	Compliance with rules of proper plant protection product application
Animal welfare	Animal welfare	SMR 11	Compliance with calf protection standards
		SMR 12	Compliance with swine protection standards
		SMR 13	Compliance with farm animal protection standards

Source: System, 2015.

All farmers entitled to single area payments are obliged to implement greening. Depending on the area of arable land on the farm and the proportion of permanent grassland on the farm, farmers are obliged to comply with one, two, or three greening practices.

The EU regulations provide for a number of **exemptions from the obligation to comply with them**, e.g. farms where permanent grassland makes up 75% of agricultural land or farms with high percentage of arable land used for production of grass or other green fodder crops, or fallowed due to favourable environmental impact are exempted from the obligatory crop diversification or maintenance of ecological focus areas provided that the remaining arable land does not exceed 30 ha[6].

Farms that take part in the **small farm scheme** are eligible for this payment in spite of the fact that they are "exempted" from greening.

The greening payment is automatically assigned to farmers whose agricultural production complies with the principles of **organic farming**[7] – this regulation applies only to the part of the farm area which is used for organic production pursuant to Article 11 of Regulation (EC) No. 834/2007.

If a farmer fails to comply with greening practices, they incur an administrative penalty that consists in reduction in the amount of direct payments they receive in the specific year[8]. During the first two years of the implementation of greening (2015 and 2016) the penalty will not exceed the amount of the greening payment, and it will amount to a portion of or the entire greening payment depending on the severity of non-compliance.

In further years, however, it will be possible for the penalty to exceed the greening payment (in 2017, by up to 20%; from 2018 onwards, by up to 25%), which in some cases means that the penalty for non-compliance with greening practices will result in a reduction in other payments.

Primary greening requirements

Crop diversification

Crop diversification is a requirement that covers farms with the minimum of 10 ha of arable land, there are the following variants:

[6] See – exemptions with regard to crop diversification – Article 44(3) of Regulation No. 1307/2013 or maintenance of ecological focus areas – Article 46(4) of Regulation No. 1307/2013.

[7] Farmers who comply with requirements defined in Article 29(1) of Regulation (EC) No. 834/2007.

[8] Pursuant to Article 77(6) of Regulation No. 1306/2013.

(a) from **10** to **30 ha of arable land** – these farms are obliged to cultivate at least **two different crops** on the arable land, and the primary crop may not take up more than **75% of the arable land**,
(b) above **30 ha of arable land** – these farms are obliged to cultivate at least **three different crops** on the arable land, and the main crop may not take more than **75% of the arable land**, and the total area of two crops may not exceed **96% of the arable land**.

The following are considered different crops:
- genus in the botanical classification of crops;
- a species from the *Brassiceae* family, *Solanaceae* family, and the *Cucurbitaceae* family;
- winter and spring forms of the same genus;
- fallow land;
- grass or other green fodder crops.

From **15th May to 15th July** the control authority checked the diversification of crops, i.e. whether crops are cultivated in this period, and they take the defined proportion of arable land. Inspection in this regard will be possible both on the basis of the presence of the crop and on the basis of its residues found in the field after the crop has been harvested.

As far as calculation of crop proportions is concerned, a farmer may declare a specific plot of land for payment **only once per year the application is submitted**.

Maintenance of permanent grassland

In order to protect permanent grassland, which greatly contribute to the preservation of biodiversity and play a particularly important role in carbon dioxide absorption and soil protection, obligations have been introduced with regard to permanent grassland maintenance.

Under these requirements, it is forbidden to transform or plough designated **permanent grasslands of high natural value within Natura 2000 sites**, including areas on peat and fenland soils that require strict protection in order to achieve the goals of the Birds Directive (2009/147/EC) and the Habitats Directive (92/43/EEC). Each farmer who owns permanent grassland of high natural value has been individually informed of the fact in the information card enclosed to the provisionally filled in payment application in 2015.

If a farmer ploughs or transforms permanent grassland of great natural value, **they are obliged to retransform the area to permanent grassland**, apart from incurring the penalty in the form of payment reduction.

What is more, in order to prevent mass transformation of permanent grassland to arable land, the **nationwide** obligation to maintain the share of permanent grassland in agricultural land area will be introduced in the country, and **the proportion will not be allowed to decrease by more than 5% compared to the 2015 reference level**.[9] This mechanism is analogous to the current one under cross-compliance.

If the permanent grassland indicator **decreases by more than 5% across the country**, it will be necessary to implement corrective measures that consist in obliging farmers who have transformed permanent grasslands to restore the specific permanent grassland area or recreate the same area of permanent grasslands in other place.

Preservation of ecological focus areas

The farms obliged to preserve ecological focus areas are the ones with **more than 15 ha of arable land**, which have to have EFAs with the minimum area of **5%**[10] of the arable land area.

Farmers may classify the following features as ecological focus areas:

(1) **Fallow land** where no agricultural production takes place between **1st January and 31st July** (after this date, the farmer will be allowed to start agricultural production on the land again).

The following regulations apply to fallow land classified as an EFA:
- it is forbidden to sow and cultivate plants for production purposes, which includes the prohibition of grazing and cutting;
- it is allowed to use herbicides to prevent undesired plants from growing (according to the cross-compliance principle);
- it is allowed to sow field plant seeds in order to increase the benefits of biodiversity provided that such plants are not used for production purposes and as animal fodder.

(2) **Landscape features** owned by the farmer:

A. Landscape elements protected under the Good Agricultural and Environmental Conditions (GAEC):
(a) **trees** that are monuments of nature;
(b) **ponds** with the area smaller than 100 m²;
(c) **ditches** whose width does not exceed 2 m;

[9] The reference level is calculated as the ratio of the permanent grassland area (declared in 2012) and new permanent grassland area that was not taken into account in 2012 and was declared in 2015) to the total area of agricultural land declared in 2015.

[10] After the European Commission has presented the evaluation of the implementation of the practice after 2017, this percentage may be increased to 7%.

B. Other landscape elements that meet the following criteria:
(a) **hedges or tree belts** with the maximum width of 10 m;
(b) **free standing trees** with the minimum crown diameter of 4 m;
(c) **tree lines** that include trees with minimum crown diameter of 4 m; the distances between the trees shall not exceed 5 m;
(d) **tree groups** with overlapping tree crowns and mid-field coppices with the maximum area of 0.3 ha;
(e) **balks between fields** with the width between 1 m and 20 m, where no agricultural production takes place;
(f) **ponds** with the maximum area of 0.1 ha excluding reservoirs with concrete or plastic elements, which include shore vegetation up to 10 m wide;
(g) **ditches** with the maximum width of up to 6 m, including open watercourses for irrigation and drainage, excluding canals made of concrete.

(3) **Buffer zones**, including buffer zones on permanent grassland provided that they differ from neighbouring agricultural land – with the area:
- defined under the GAEC (5 m, 10 m, or 20 m), and
- other buffer zones whose width is not smaller than 1 m and does not exceed 10 m.

Buffer zones may also include riparian vegetation belt up to 10 m wide along a watercourse. **Agricultural production is not allowed in buffer zones**, but grazing and cutting is allowed there.

(4) **Strips of land eligible for payment along forest edges** between 1 m and 10 m wide.

Agricultural production is allowed in such land strips, but in that case weighting factor of 0.3 is mandatory (see table 2 – conversion and weighting factor).

If no agricultural production takes place, grazing or cutting is allowed provided that such strips of land can be differentiated from neighbouring arable land.

Coppices treated as EFAs include species of the *Salix* and *Betula* genera, and *Populus nigra* with its hybrids. In the case of coppices, the area classified as EFA may constitute only 30% of the actual area (see table 2 – weighting and conversion factors).

Table 2. The matrix of conversion and weighting coefficients

FEATURE	CONVERSION FACTOR (m/tree to m^2)	WEIGHTING FACTOR	EFA (after both factors have been applied)
Fallow land (1 m^2)	-	1	1 m^2
Hedges/ tree stands (1 m^2)	5	2	10 m^2
Free standing trees (tree)	20	1.5	30 m^2
Tree lines (1m)	5	2	10 m^2
Tree groups/ mid-field coppices (1 m^2)	-	1.5	1.5 m^2
Balks between fields (lm)	6	1.5	9 m^2
Ponds (1 m^2)	-	1.5	1.5 m^2
Ditches (1 m)	3	2	6 number
Buffer zones(1m)	6	1.5	9 m^2
Strips of land eligible for payment situated along			
forest edge(1 m):			
- no production	6	1.5	9 m^2
- production	6	0.3	9 m^2
Short rotation coppices (1 m^2)	-	0.3	0.3 m^2
Areas forested under RDPs (1m^2)	-	1	1 m^2
Intercrops and green cover (1 m^2)	-	0.3	0.3 m^2
Nitrogen-fixing crops (1m^2)	-	0.7	0.7 m^2

Source: System, 2015.

(6) **Areas forested after 2008** under RDP 2007-2013 (forestation of agricultural land) and RDP 2014-2020 that were eligible for single area payment in 2008.

(7) **Intercrops or green cover** with grasses as companion crops for the main crops or mixtures of **at least two species** from the following crop groups: cereals, oil plants, fodder crops, small grain legumes, large grain legumes, and melliferous plants. **The above mixtures are not kept on the same agricultural plot as a main crop in the year after the mixture was sown**.

Area classified as EFA may constitute only 30% of the actual area.

Mixtures composed exclusively of cereal species are not considered an EFA.

Opportunities for joint implementation of the EFA practice

In the case of large variation between EFAs on neighbouring farms, they can take advantage of the opportunity to meet the requirement jointly. In such case, compliance with the following conditions is required:

- **up to ten farmers** may implement the EFA practice jointly;
- the farms have to **be situated close to one another** – 80% of the area of each farm has to be situated within a radius of 15 km, i.e. within a circle with the diameter of 30 km;
- only **neighbouring ecological focus areas** may be accounted jointly (no minimum area of the contact point has been defined);
- each farmer **guarantees** that at least half (50%) of the area that should be allocated to EFAs (i.e. area equal to 2.5% of their arable land) is **situated on their farm**; the remaining part may be implemented through the common EFA;
- EFAs covered by the joint implementation may comprise a **single area or several areas** and be situated **on the land owned by one or more farmers**, i.e. not all farmers who take part in the joint implementation of the EFA practice have to take part in the creation of the common EFA;
- the farmers are obliged to conclude **a written agreement** concerning (i) financial details of the agreement and (ii) penalties incurred in case of non-compliance on the common EFA.

Thus, it can be seen that the government programme includes many possibilities to make our agriculture more environmentally friendly. When analysing progress in this regard, we should point to important links between the direct payment system and Rural Development Programme (RDP) 2014-2020. Environmental and climate goals are implemented through the greening payment. Requirements that are addition to good agricultural and environmental conditions and greening for selected areas (Natura 2000, LFA, erosion areas) are included in RDP 2014-2020.

Progress in implementation of goals related to sustainable development of agriculture compared to the previous financial perspective

Greening, the main innovation in CAP for 2014-2020, was supposed to be a condition for supporting rural areas and agriculture in providing public goods – "public money for public goods" (Kociszewski, 2014). Looking at the development of CAP objectives and spendings, starting with the 1992 reform, what could be expected was the demand and shift of a large proportion of funds to the 2nd Pillar, including the sustainable development goals. However, this has not happened, and even the policy for the current financial perspective was implemented, there had been a step backwards from the original assumptions (Matthews, 2012).

The last serious reform that shaped Common Agricultural Policy until 2013 took place in 2003, in Luxembourg (Krzyżanowski, 2005). The decisions related to modification of the existing CAP instruments included also a decision to conduct a CAP Health Check in 2008.

This review also defined the directions of future changes to CAP (after 2013). "New challenges" concerning climate change, renewable energy, water management, biodiversity, measures related to restructuring of dairy industry and innovation with regard to the first four tasks were defined and added to CAP objectives.

According to Health Check findings (Sprawozdanie..., 2008), as far as the cross--compliance conditions related to the payments are concerned, two criteria were added to the Good Agricultural and Environmental Conditions – buffer zones along watercourses, and principles governing use of water for irrigation. A portion of Good Agricultural and Environmental Standards were made optional, which provided the opportunity to adjust those standards to specific natural conditions in Member States better.

Farms with up to 15 ha of arable land (originally, the Commission proposed that this obligation concerns agricultural land) are exempted from the obligation to maintain ecological focus areas (EFAs); the proportion of those areas on a farm was reduced from 7% (as proposed by the Commission) to 5%, but it can be raised to 7% after the Commission has presented the report, which is to happen by the end of March 2017, the list of categories of land classified as ecological focus areas has been expanded, e.g. by adding nitrogen-fixing crops (legumes), intercrops, and green cover, apart from fallow land, terraces, landscape features, agri-forest systems, short rotation coppice areas, where mineral fertilisers and/or plant protection products are not applied, strips of land by the forest edge, and forested areas, from which a Member State is to select the ones to be included in the regulations to be introduced there. To determine the EFA percentage, Member States may use relevant weighting factors that reflect the environmental significance of specific areas.

The lower limit of arable land below which a farm is exempted from the crop diversification requirement was raised from 3 ha to 10 ha. Farms between 10 and 30 ha are required to cultivate two different crops (not three as the Commission proposed). The main crop cannot take more than 75% of arable land; and farms with more than 30 ha have to cultivate at least three crops on arable land, and the two primary crops cannot take more than 95% of arable land.

After Health Check findings, innovation, climate change and environmental protection are the cross-sectional theme in measures under the Rural Development Programme. Organic farming now constitutes a separate measure.

A defined portion of measures under the new Rural Development Programme is supposed to contribute to the implementation of environmental and climatic aims. The minimum threshold for allocation of spendings from the European Agricultural Fund for Rural Development of 30% has been established for those measures (the European Commission originally proposed 25%). Apart from organic farming, the agricultural, environmental and climatic measure, support for areas with natural and other particular constraints, their scope (extended due to negotiations) also includes investment in fixed assets with positive environmental and climatic impact and a group of forest-related measures for Natura 2000 sites.

Under the agricultural, environmental and climatic programme, organic farming, payments for Natura 2000 sites and payments related to the Water Framework Directive, the basic requirements have been supplemented with a regulation concerning agricultural activity with regard to agricultural land area (defined in Article 4 paragraph 1(c), second and third indent of the Direct Payments Regulation). Under the agricultural, environmental and climatic programme, organic farming and Natura 2000 payments as well as payments related to the Water Framework Directive, there can be no double financing (i.e. simultaneous payments due to compliance with the same requirements as in the case of greening payments).

Two years later, in the Commission document (Commission Communication, 2010), the main demands related to the sustainable development of agriculture were restated. Environmental activity under CAP is supposed to improve due to the introduction of the mandatory green component in direct payments as well as through support for measures for the environment that are applied across the EU. The above may take the form of simple general measures that are performed annually (e.g. maintenance of grasslands, green cover, crop rotation, or ecological set-aside).

Under the regulations concluding the reform (Regulations, 2013), most of the Council's simplifying solutions concerning greening of direct payments have been preserved, just like in the Health Check.

The provision related to the obligation to maintain permanent grassland at the farm level has been modified. It has been limited to permanent grasslands of great natural value at Natura 2000 sites that include peat and fenland soils. What is more, if proportion of permanent grassland in the total agricultural land area has not decreased by more than 5% in a specific country, a possibility to maintain permanent grassland area at the national or regional level has been introduced instead of the farm-level maintenance, which was originally proposed by the Commission.

The scope of measures for pursuing agricultural and climatic goals has been extended. Apart from organic farming, the agri-environmental programme, support

for less-favourable areas, they include also investment in fixed assets with positive environmental and climatic impact, a group of forest-related measures, Natura 2000, and simultaneous increase in the minimum spendings on those purposes from 25% to 30% (Regulation, 2013c).

In general, it can be said that there has been some progress in making agriculture more sustainable compared to the previous period (its extent will be possible to measure after the programmes have function for several years), though it has not been as big as it could be expected from the initial EU documents.

Agri-environmental programmes for 2014-2020 compared to the previous period (2007-2013)

As stated above, the implementation of crop diversification as one of the primary greening tools is possible through the equivalent practice under the agricultural, environmental and climatic measure under the RDP 2014-2020. Agri--environmental programmes have been an important element of the Rural Development Programme since Poland joined the European Union. Under the 2007-2013 financial perspective, PLN 2.5 billion were spent on the above objectives (ARiMR..., 2015). As far as the 2014-2020 period is concerned, the planned spendings amount to EUR 2 billion under measure 10 – Agriculture, environmental and climatic measure – EUR 1.184 billion (RDP, 2014).

The aim of the implementation of the agri-environmental programme under RDP 2007-2013 was the improvement of the condition of the environment and rural areas, including in particular:
- restoration or maintenance of valuable habitats used for agricultural purposes and preservation of biodiversity in rural areas;
- promotion of a sustainable farming system;
- proper use of soil and protection of waters;
- protection of threatened local farm animal breeds and local varieties of crop plants.

The following agri-environmental packages will be implemented under the agri--environmental programme (Annex 10 to the Programme):
- Package 1. Sustainable agriculture;
- Package 2. Organic farming;
- Package 3. Extensive permanent grasslands;
- Package 4. Protection of threatened bird species and natural habitats outside Natura 2000 sites;
- Package 5. Protection of threatened bird species and natural habitats within Natura 2000 sites;
- Package 6. Preservation of threatened plant genetic resources in agriculture;
- Package 7. Preservation of threatened animal genetic resources in agriculture;
- Package 8. Protection of soil and waters;

- Package 9. Buffer zones.

The basic requirements under the agricultural, environmental and climatic programme have been supplemented with the requirement concerning agricultural activity with regard to the area of agricultural land. This means that agricultural, environmental and climatic payments will cover only those obligations that exceed cross-compliance requirements, relevant criteria and minimum measures that result from the definition of agricultural activity, relevant minimum requirements concerning fertilisers and plant protection products, and other obligatory requirements established through national legislation. In the case for Natura 2000 sites payment, the Council's position has been changed, and the Statutory Management Requirements have been added to the basic requirements (just like in the original proposal by the Commission).

Conclusions and recommendations

The studied material clearly shows that such emphasis has been put on agri--environmental matters for the first time in the history of CAP. As stated above, the current CAP includes a requirement that makes payment of 30% of direct payment on redirection of the agricultural sector towards greater sustainability (the so-called greening). Funds allocated to agri-environmental programmes have also increased greatly.

We have developed tools to measure progress of sustainable development of agriculture. Thus, we can analyse changes to the EU agriculture, including primarily Polish agriculture. It will be a subject of research in the next years and later on. In order to prove positive changes or lack thereof and unambiguously determine the starting point for research, the greening of pre-2014 agriculture in the EU Member States should be determined.

The analysed documents depict it quite optimistically. The EU agriculture provides environmental public goods and contributes to decrease in climate fluctuation. It also significantly contributes to production of renewable resources.

CAP ensures protection of biodiversity and leads to improvement in protection of animal species and habitats.

However, let us remember that Polish agriculture, which has been part of the EU agriculture since over a decade, did not progress in that period towards sustainable development like agriculture in other EU countries, though we can speak of environmental policy under CAP since late 1980s (Kociszewski, 2014).

Certain measures announced in strategies have already been undertaken in

Poland. Nonetheless, it will be possible to confirm progress towards sustainable development of agriculture after a few years, yet in the period covered by the research.

An additional subject of research should cover external and internal conditions for sustainable development (which cannot be directly implied from the documents analysed above).

The former category includes global factors of the following nature:
- economic – the global economic crisis, rapid fluctuation of various product prices, including prices of agricultural products, the necessity to ensure food security for individual countries, development of renewable agriculture;
- environmental – greenhouse gas, declining soil conditions, the necessity to take care of air and water quality to an extent greater than ever, and preservation of biological diversity.

In the agricultural sector itself, there are also conditions that result from Poland's EU membership (further stimulation of rural development, and compliance with agricultural diversification across the EU, development of biofuel production) and from increasingly numerous ties between European and global agriculture through the European Union's attempts at concluding integration agreements primary with the USA, Canada, or Japan. Agricultural trade agreements negotiated on the World Trade Organisation forum are also not without meaning (e.g. for our export opportunities, but primarily for the further chances to support the agricultural sector). If such agreements enter into force, it will likely influence the sustainable development of European agriculture. The negotiations may lead to certain trade-offs with regard to the greening of the sector.

Demographic changes in rural areas, difficulties in expanding the farm area (including growing land prices) and situation resulting from the state policy, including the division of available EU funds for agriculture and rural areas, may be classified as internal factors. Additional condition that is positive but difficult to measure is the increasing farmer's willingness to take joint action, which is well illustrated by the growing number of producer groups, particularly in the fruit and vegetable sector.

On the other hand, unfavourable phenomena also occur – excessive pursuit of rapid increase in income, which results in use of means of production (seeds, animal-derived material, fodder) of uncertain quality, sometimes excessive use of chemicals, which leads to end products of dubious quality.

Once again, the multifunctional nature of agriculture in the EU Member States should be pointed to as an important feature of the sector, which is totally different from what can be seen in other countries, e.g. the USA, where agriculture is

focused on maximisation of production and exports.

The European Union attaches importance to the "environmental" aspects of agriculture, such as: protection of the environment and biological diversity, preservation of landscape, cultural heritage and traditional mode of life, food security, sustainable rural development, and food safety, or animal welfare.

At the same time, it is not easy for the EU agriculture to function in the international environment that has not accepted those values yet. The non-tariff barriers to trade with the USA, such as those listed below are a good illustration of the above fact:

- animal welfare – the EU standards in this regard are high and restrictive, which greatly affects production cost and reduces competitiveness of price of some of the EU agricultural products on international markets,
- certain technologies used for agricultural production in the USA, e.g. meat produced using growth hormone or ractopamine, use of chemicals for decontamination of meat, issue of meat from cloned animals, or food produced from genetically modified organisms.

It should be thought that the EU patterns will become more popular due to development of societies in non-EU countries towards health- and environment-oriented direction.

The road, however, is not easy. It is worth mentioning here the so-called *Codex Alimentarius*, i.e. the collection of internationally agreed food standards that should be complied with by individual countries The FAO/WHO *Codex Alimentarius*, the Commission includes 180 states and the European Community as members. The practical compliance with the standards varies strongly among individual countries.

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Artur WILCZYŃSKI, Ewa KOŁOSZYCZ, Michał ŚWITŁYK

West Pomeranian University of Technology Szczecin, Szczecin, Poland,
michal.switlyk@zut.edu.pl, artur.wilczynski@zut.edu.pl, ewa.koloszycz@zut.edu.pl

Income of Small Farms in Poland in 2013-2020

Abstract: *Polish farms mostly represent small and very small economic size (60% of the total number of farms). Their economic viability is largely dependent on the help from the EU and the state, in the form of various support instruments. Their economic results are a factor in price changes on the agricultural market. By creating potential scenarios of the farms' working conditions, we can assess their impact on the overall economic situation of the farms. To this end, scenario analysis was applied in the research along with the creation of models of small farms specialising in cattle and pig fattening, milk, cereals, oil seeds, and protein crops. The study has shown that for 2020, the most likely scenario assumes that all of the researched farms will have smaller incomes than in 2013. Entrepreneur's profit for the studied farms will be negative. The most favourable economic situation might occur on dairy farms, which – according to the optimistic scenario – might achieve income parity. This results from changes in the new CAP system of direct payments.*

Keywords: *small farm, models of farms, farm income, scenarios, farm subsidies, income parity*

Introduction

Polish agriculture is characterised by a dispersed farm structure determined by the size of farms. According to Central Statistical Office of Poland (Polish: *Główny Urząd Statystyczny, GUS*), about 60% of Polish farms belong to the category of small and very small farms, whose economic size is within the range between EUR 2,000 and EUR 25,000. These farms constitute a majority among farms specialising in cattle and pig fattening (more than 70% of farms), cereals, legumes, or potatoes (64%, 75%, and 74%, accordingly) (GUS, 2014). Despite the fact that the owners usually earn low incomes from their agricultural activity, their significance stems from additional functions, such as social and environmental ones (Zegar, 2012). Performance of these functions is especially in the interest of the community, since more and more often consumers search for natural products from an environment which is not destroyed or overexploited in the production process. With a view to meeting these needs, a variety of solutions are being introduced, among them regulations which aim at preserving the existing natural conditions and, at the same time, achieving economic results which will allow the farms to develop. The solutions proposed and implemented by the EU as part of the Common Agricultural Policy are designed to ensure food security, increase in productivity and competitiveness, and environmental protection in Europe. Specifically, more attention was paid to small and medium-sized farms. They have been given preferential support conditions in order to allow them to develop and retain their diversity and multifunctionality. The mechanisms applied in case of these farms may, however, influence their profitability in various ways. The literature on the subject broadly analyses the effects of supporting farms due to implementation of agricultural practices beneficial for the climate and the environment (the so-called greening payments). As the research results demonstrate, the adverse effects of this regulation will not impact small farms, but will affect a relatively small group of the largest farms, mostly those with a highly simplified production structure and lack of Ecological Focus Areas, primarily specialising in livestock and crops (Czekaj et al., 2014; Kołoszycz and Wilczyński, 2014). Subsidizing selected sectors of production could potentially result in increased incomes on cattle farms by 2020 (Kulawik, 2020). The study of the effects of introducing redistributive payment for the first hectares shows that they will have no impact on the incomes of small German farms, which are expected to maintain their current profitability levels (Balmann and Sahrbacher, 2014). Hungarian research shows that redistributive payments will not affect any structural changes on the farms (Potori et al., 2013). In the opinion of experts, the payment – aimed mostly at small farms – will not solve their fundamental problems (Poczta, 2010) and they may still struggle to achieve income parity (Kołoszycz and Świtłyk, 2015). Consequently, the aim of this article is to define the future level of income for Polish small farms with different production profiles by 2020, taking into account the price changes for means of production and for agricultural products as well as the support system for small farms. The additional aim of the study is to attempt to indicate the direction of production on small farms, which could allow to achieve the highest incomes or income parity in 2020.

Material and method

The study was conducted on model farms, created on the basis of technical and economic data concerning farms included in the Polish Farm Accountancy Data Network in 2013 (Goraj et al., 2015). Models were created on the basis of the value of medium-sized highly specialised farms, which due to their economic size could be categorised as very small or small (with standard output between EUR 2,000 and EUR 25,000), selected because of their type of farming (classification TF8 in FADN). As a result, 7 models of farms were created:

- 3 models of very small farms, with the economic size of EUR 2,000-8,000 (FADN size classes 2 and 3), highly specialised in cattle fattening (CF-VS), pig fattening (PF-VS), and production of cereals, oilseeds, and protein crops (COP-VS),
- 4 models of small farms, with the economic size of EUR 8,000-25,000 (FADN size classes 4 and 5), highly specialised in cattle fattening (CF-S), pig fattening (PF-S), production of cereals, oilseeds, and protein crops (COP-S), and milk production (M-S).

The selection of highly specialised farms was supposed to emphasize the significance of the impact of changes in product prices, costs, and the support for farms with different production profiles. The constructed models were based on FADN's information on average resources available on small and very small farms, their production structures, and the prices of goods produced on the farms. Basic information on the analysed model farms are presented in table 1.

Table 1. Basic parameters of model farms

Parameters	Unit of measurement	Model farms						
		Pig fattening		Cattle fattening		Milk	Cereals, oilseeds, protein crops	
		PF-VS	PF-S	CF-VS	CF-S	M-S	COP-VS	COP-S
Agricultural area	ha	6.6	12.8	7.9	17.8	14.3	12.1	26.5
Livestock density	LU/100 ha	71.6	109.0	64.1	74.2	101.4	2.6	2.2
The share of rented area in agricultural land	%	2.9	16.5	7.6	19.1	24.9	10.1	28.9
Total production per 1 ha of agricultural land	PLN thousand/ha	4.9	6.8	3.4	3.5	6.2	3.0	3.2
The share of primary product sales in total sales	%	96	93	73	74	82	92	99
Total workload	AWU	1.3	1.5	1.3	1.6	1.8	1.1	1.3
Share of hired labour in total workload	%	0.8	0.7	1.5	0.6	0.6	0.9	1.6
Farm capital per 1 ha of agricultural land	PLN thousand/ha	31.8	29.4	29.3	28.6	27.3	29.6	29

Source: own study on the basis of: L. Goraj, M. Bocian, D. Osuchm, A. Smolik, 2015, *Parametry techniczno-ekonomiczne według grup gospodarstw rolnych uczestniczących w Polskim FADN w 2013 roku*. Warszawa: IERiGŻ-PIB.

The calculation of economic results was based on FADN methodology, but it lacked details (e.g. the exclusion of VAT balance in the balance of surcharges to operational and investment activity from the overall income of a farm). The farm income was calculated with the use of the following formula:

$$DR=Pr+Pz+Pp+Do-P-Kb-Ko-A-W-C-O+Di$$

where: *DR* stands for farm income; *Pr* – crop production; *Pz* – livestock production; *Pp* – other production; *Do* – subsidies to operational activity; *P* – taxes; *Kb* – direct costs; *Ko* – overhead costs; *A* – depreciation; *W* – wages; *C* – costs of production factors; *O* – interest; *Di* – subsidies to investment activity.

The analysis of the economic situation was supplemented with an assessment of production profitability, and establishment of the price of the primary product which would cover the production costs. Production profitability was calculated as the relation of farm income to the farms' total production. Setting a minimal price for the primary product, which would allow to cover the production costs, was done with the use of CVP analysis (cost-volume-profit analysis).

The study also included a calculation of entrepreneur's profit, which was done by subtraction of the estimated costs of engaging own production factors – land, work, and capital, in accordance with the premises of FADN (Goraj et al., 2015), from the overall farm income. For 2014-2020, interest rates on deposits up to 2 years from 2015 were used to estimate the opportunity costs of capital.

The study takes into account the system of direct payments for 2015-2020, with the inclusion of the single area payment scheme, the greening payment, coupled payments, and the redistributive payment. Payments beyond the level of direct subsidies calculated for 2013 on model farms (in comparison with the amount of payments presented in the average FADN results) remained on the same level in the consecutive years of the analysis.

The study was expanded to assess the parity relation of incomes for small farms with non-agricultural population. In the following study, the author uses the relation between the farms' farm income, and the average annual net salary in national economy (minus withdrawals). Since the study is prognostic in nature, it was assumed that the increase in wages would be consistent with its average rate of change in 2006-2014.

Farm models have been verified in terms of their economic results for the base year, which allowed to carry out the next phase of the research related to the analysis of the impact of changes in prices, costs, and subsidies on the economic results of the farms.

The study assumes constant volume and structure of production for 2013-2020. Such an assumption was possible because the farms within the reformed Common Agricultural Policy are exempted from the use of agricultural practices beneficial for the climate and environment. Moreover, such practices are already used with the current structure of production (COP-S farm). The prices of products and means of production in 2014 and 2015 were defined on the basis of the price change index in relation to the previous year. For this purpose, the used data were obtained from the Institute of Agricultural and Food Economics (Seremak-Bulge, 2015; Abramczuk et al., 2014) (for 2015, the authors used the data for the first three quarters of the year).

The evolution of costs and prices for products for the subsequent years was considered in three scenarios: most likely, optimistic, and pessimistic scenario.

The most likely scenario took into account the price forecasts developed by the European Commission for 2015-2025 (European Commission, 2015). Taking into consideration the evolution of prices in crop and animal production in the past, both the optimistic and pessimistic scenarios included their highest and lowest levels in 2008-2014. The price change indexes for selected products in respective scenarios are presented in figure 1.

The optimistic scenario assumed:
- in 2016-2017: reaching the level of pig prices from 2014 (an increase of 15% compared to 2015),
- in 2016: return to the level of beef prices from 2014 (an increase of 6% compared to 2015) and an annual increase of 5% by 2018,
- in 2016-2017: increase of milk producer prices to the level from 2013-2014 (an increase of 18% compared to 2015),
- in 2016-2017: increase of cereal prices to the level from 2011-2012 (an increase of about 20% compared to 2015).

The pessimistic scenario assumed:
- in 2016: a decline of pig prices to the level from 2007 (a decrease of 20% compared to 2015),
- in 2016: a decrease of beef prices to the level from 2011 (a decrease of 8% compared to 2015) and remaining at that level in 2016-2017,
- in 2016: the milk producer prices on the level from 2008-2009 (a decrease of 12% compared to 2015),
- in 2016-2017: the cereal prices lower by 24% compared to 2015, and at the level of prices from 2009-2010.

In the following years covered in the analysis, the price changes in the optimistic and pessimistic scenarios were established in accordance with the tendencies adopted in the most likely scenario.

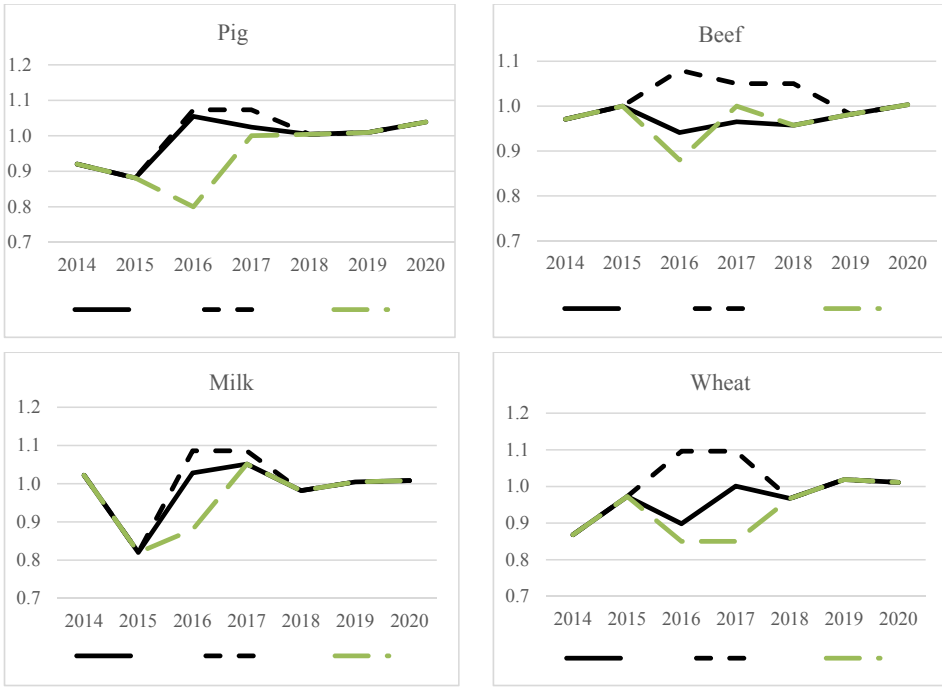

Figure 1. Price change indexes of selected products from farms included in the adopted price scenarios in 2014-2020

Source: own study.

In order to retain the differences between the farms in the base year, chain indexes were used to estimate the prices and costs in individual years of the analysis. The prices for most of the means of production in 2015-2020 were estimated on the basis of the average rate of change in 2006-2014, published by GUS. For diesel fuel prices, projections of the World Bank Group were used (World Bank Group, 2015). Due to a high correlation (Pearson correlation coefficient 0.94) between the prices of feed for cattle, for pigs, and the prices of spring barley, it was assumed that the prices of feed will evolve according to the price changes for spring barley. Similarly, an analysis of correlation between the prices of seed with the prices of wheat demonstrated a strong connection between variables (Pearson correlation coefficient 0.71), which is why also in this case it was assumed that the seed prices would follow the pattern of price change for winter wheat. Figure 2 presents the formation of the prices for selected means and factors of production in 2015-2020.

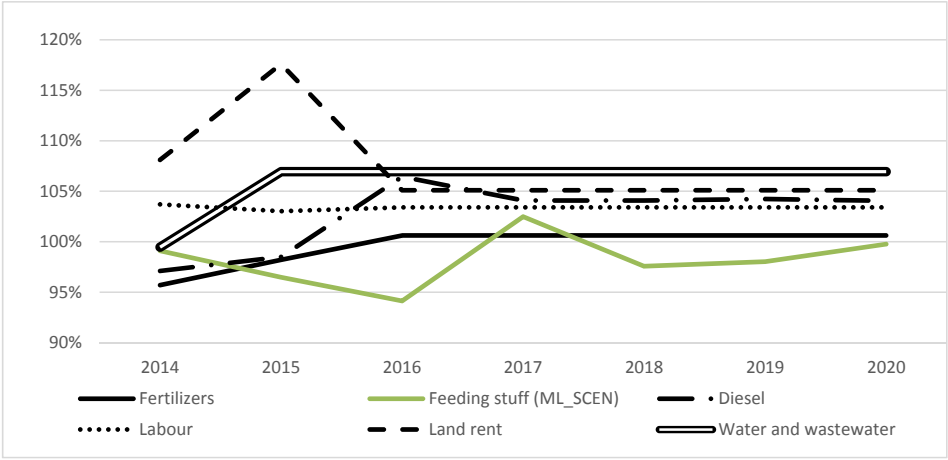

Figure 2. Price change indexes for means and factors of production in 2014-2020
Source: own study.

Results

To assess the economic situation of model farms, two types of profit were used: the farm income, and the entrepreneur's profit. Since the farms represent different agricultural types in accordance with FADN's TF8 grouping, it was essential to ensure comparability of the achieved results. Therefore, it was decided that the adopted unit of measurement would be the income from total workload for operational activity of the farm, expressed in hours.

Incomes of the studied farms are presented in tables 2 and 3, divided according to the three scenarios analysed. Studying the data from table 2 it can be noted that in 2013-2015 farm income per one hour of labour decreased in all types of farms. The most unfavourable situation occurred on farms highly specialised in pig fattening. On a very small farm, the decrease in farm income was over 80%, while on a small farm (economic size between EUR 8,000 and EUR 25,000) it exceeded 50%. This situation was connected with an economic downturn on the pork market. Pig prices in 2015 were lower by almost 20% compared to 2013, along with growing production costs and a lower level of direct payments for this type of farms in 2015. The model farm which was characterised by the lowest decrease of farm income in 2013-2015 was a farm specialising in milk production. The decline in profitability between 2013 and 2015 was only 4%. Maintaining the income at almost the exact same level in the first three years covered by the analysis was possible owing to new CAP direct payments, namely payments for production including payments for cows and cattle. The above-mentioned payments allowed to diminish the adverse effects of the drop in milk producer prices

(2015) on the profitability level of the analysed farm. The analysis shows that between 2013 and 2015 the return on milk sales decreased by almost 15%.

Table 2. Farm income per working hour on model farms

Scenario/ year	Model farms						
	Pig fattening		Cattle fattening		Milk	Cereals, oilseeds, protein crops	
	PF-VS	PF-S	CF-VS	CF-S	M-S	COP-VS	COP-S
2013	1.67	7.22	1.22	6.18	10.65	5.82	11.98
2014	1.12	5.70	0.95	5.72	10.99	4.04	7.97
2015	0.29	3.29	0.78	5.47	10.19	3.57	7.08
The most likely scenario (ML_SCEN)							
2016	0.58	3.85	0.25	4.52	10.25	2.19	4.11
2018	0.51	4.28	-0.28	3.58	10.34	1.42	2.48
2020	0.32	4.53	-0.80	2.63	9.55	0.69	1.06
Pessimistic scenario (PES_SCEN)							
2016	-0.89	0.02	-0.09	3.88	8.31	1.65	2.93
2018	-1.10	0.05	-0.43	3.30	8.33	-0.50	-1.70
2020	-1.37	0.10	-0.95	2.35	7.52	-1.29	-3.25
Optimistic scenario (OPT_SCEN)							
2016	0.68	4.12	1.01	5.97	11.01	4.42	8.95
2018	0.93	5.35	1.49	6.94	11.60	4.71	9.63
2020	0.75	5.65	0.94	5.94	10.83	4.08	8.42

Source: own study.

The simulations showed that in the most likely scenario (2016-2020), for most of the analysed model farms, the farm income will be lower than in 2015, with the exception of farms highly specialised in pig fattening and dairy farms (in the early years of the projection). It is envisaged that by 2020, the farm income of a very small farm specialising in pig fattening will increase by over 10% compared to 2015. On a small farm specialising in the same type of production, the income will be higher by almost 35%. Calculations show that starting with 2018, a very small farm (CF-VS) specialising in cattle fattening will operate at a loss. The expected developments for farms highly specialised in cereal, oilseeds, and protein crops production should also be mentioned. Simulations indicate that the profitability of production on these farms will be decreasing systematically. As demonstrated in the data from table 2, in 2020 the farm income on these farms will be lower by about 90% compared to 2015.

From the analysis of the pessimistic scenario it can be inferred that in 2020 only small farms focused on livestock production will actually gain income from their activity. The remaining farms will incur losses. Situation will be the best for dairy farms, where the farm income in 2020 will be at about PLN 7.5 per working hour. This income will be over three times higher than on a farm specialising in cattle fattening, which is in the second place in terms of the highest profitability demonstrated by the analysed farms in the pessimistic scenario.

If, in accordance with the projections of the optimistic scenario, the producer prices for farm products change, it can be expected that in 2020 the farm income will increase compared to 2015. The most beneficial effects of such developments will be visible in the case of farms specialising in pig fattening. On a very small farm, the farm income will increase more than threefold, and on a small farm – almost twofold. Nonetheless, it will be the small (in terms of its economic size) dairy farm and the small farm highly specialised in cereals, oilseeds and protein crops production that will report the highest income per working hour. In the case of the former, the farm income in 2010 will be close to PLN 11 per working hour, while in the case of the latter, it will be at about PLN 8.5 per working hour.

In numerous scientific studies it has been postulated that only a complete account of production costs (taking into account the valuation of own factors of production) shows the actual capability of a farm to generate income and develop. In consequence, the entrepreneur's income is analysed. Data from table 3 show that all of the analysed model farms, both in 2013-2015 as well as in the forecast period, will incur losses connected with agricultural activity. Such a situation takes place regardless of the adopted scenario, the economic size of the farm, or its type of farming. The obtained results demonstrate that by 2020 this unfavourable tendency will only become more pronounced.

Table 3. Entrepreneur's income per working hour on model farms

Scenario/ year	Model farms						
	Pig fattening		Cattle fattening		Milk	Cereals, oilseeds, protein crops	
	PF-VS	PF-S	CF-VS	CF-S	M-S	COP-VS	COP-S
2013	-14.84	-10.76	-15.74	-12.41	-7.21	-12.02	-7.86
2014	-15.41	-12.16	-15.91	-12.84	-6.77	-13.87	-11.92
2015	-16.59	-14.83	-16.42	-13.35	-7.79	-14.71	-13.13
The most likely scenario (ML_SCEN)							
2016	-16.86	-14.86	-17.52	-14.90	-8.31	-16.69	-16.76
2018	-18.10	-15.66	-19.24	-17.12	-9.44	-18.74	-19.79
2020	-19.55	-16.75	-21.05	-19.46	-11.54	-20.85	-22.72
Pessimistic scenario (PES_SCEN)							
2016	-18.32	-18.69	-16.42	-15.54	-10.25	-17.24	-17.94
2018	-19.72	-19.89	-19.39	-17.41	-11.45	-20.66	-23.97
2020	-21.25	-21.18	-19.31	-19.74	-13.57	-22.83	-27.03
Optimistic scenario (OPT_SCEN)							
2016	-16.75	-14.58	-16.75	-13.45	-7.55	-14.47	-11.93
2018	-17.69	-14.59	-17.47	-13.76	-8.18	-15.46	-12.64
2020	-19.12	-15.62	-19.31	-16.15	-10.26	-17.47	-15.36

Source: own study.

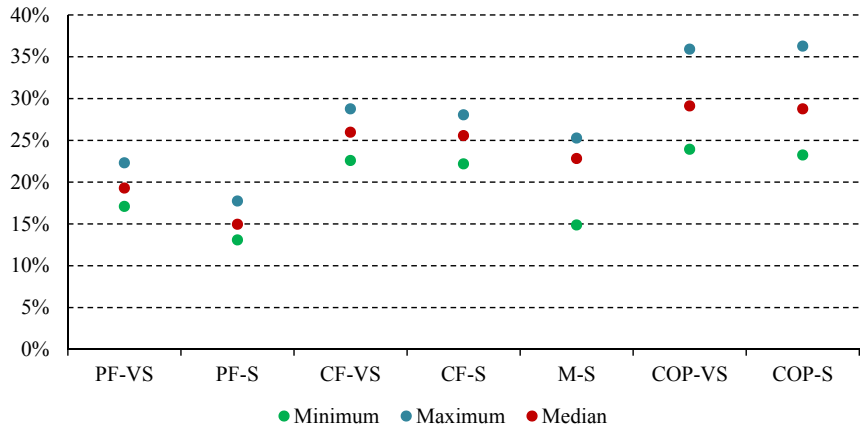

Figure 3. The share of subsidies in the total returns of model farms
Source: own study.

Very important factors for the income of the analysed farms are the subsidies (direct payments included) which shape the level of profitability. Their share in the total returns is varied and dependent on the type of farming (fig. 3). The conducted research showed that over the analysed period, the share of subsidies in the total returns on most farms does not undergo major changes. Depending on the assumed scenario, the difference does not exceed 3%. The only farm where an increase in the share of subsidies in the total returns went from 15% in 2013 and 2014 to 25% in 2020 was a dairy farm. The above conclusions allowed to present the research results in the form of basic parameters of descriptive statistics (fig. 3). Farms specialising in pig fattening are characterised by the lowest share of subsidies in the total returns. As can be observed, the median for this share on a very small farm is 19% and it decreases with the increase in the scale of production (on a farm of small economic size it amounts to 15%). In the case of farms specialising in cattle fattening, the maximum share of subsidies in the total returns is as much as up to 30% and it is similar for both analysed farms specialising in this particular type of production. The highest share of subsidies can be observed on farms producing cereals, oilseeds, and protein crops. For these farms, the maximum share of subsidies in the structure of total returns takes on values above 35%, while the median is close to 30%. The analysis also shows that the strongest impact of the adopted scenario on the size of subsidy share in the total returns can be observed for farms producing cereals, oilseeds, and protein crops. In the pessimistic scenario, this share amounts to 36%, while in the optimistic scenario it does not exceed 25%.

The profitability of production calculated as the ratio of farm income to total returns is presented in table 4. Simulations showed that on most farms only in the optimistic scenario the profitability of production in 2020 will be similar or

higher than in 2015. On farms specialising in pig fattening, it can be expected that in 2015-2020 profitability will be stable or higher. On a small-size farm, the profitability of production will increase by about 30%. However, comparing the profitability between the first and the last year of the analysed period (2013-2020), it will decrease by over 30%. Analysing the results obtained for the most likely scenario it should be noted that high yield declines will be experienced on farms highly specialised in the production of cereals, oilseeds, and protein crops. Comparing the results for 2015 with the production profitability in 2020, the decrease will amount to about 80%, regardless of whether it is a small or a very small farm.

Table 4. Production profitability (taking into account internal consumption and gratuitous transfer of a farm) on the analysed farms

Scenario	PF-VS				PF-S			
	2013	2015	2018	2020	2013	2015	2018	2020
ML_SCEN	0.15	0.03	0.05	0.03	0.26	0.14	0.17	0.18
PES_SCEN	0.15	0.03	-0.13	-0.16	0.26	0.14	0.00	0.00
OPT_SCEN	0.15	0.03	0.09	0.07	0.26	0.14	0.21	0.21
Scenario	CF-VS				CF-S			
	2013	2015	2018	2020	2013	2015	2018	2020
ML_SCEN	0.12	0.08	-0.03	-0.09	0.33	0.31	0.22	0.16
PES_SCEN	0.12	0.08	-0.05	-0.11	0.33	0.31	0.21	0.15
OPT_SCEN	0.12	0.08	0.14	0.09	0.33	0.31	0.36	0.31
Scenario	COP-VS				COP-S			
	2013	2015	2018	2020	2013	2015	2018	2020
ML_SCEN	0.37	0.28	0.13	0.06	0.37	0.26	0.10	0.04
PES_SCEN	0.37	0.28	-0.06	-0.14	0.37	0.26	-0.09	-0.16
OPT_SCEN	0.37	0.28	0.32	0.27	0.37	0.26	0.31	0.26
Scenario	M-S							
	2013		2015		2018		2020	
ML_SCEN	0.48		0.53		0.53		0.49	
PES_SCEN	0.48		0.53		0.48		0.43	
OPT_SCEN	0.48		0.53		0.56		0.52	

Source: own study.

The data presented in table 4 also show that a dairy farm is characterised by the highest production profitability. It was similar within the entire analysed period and in all scenarios. There was usually between PLN 0.48 and PLN 0.55 of farm income per every unit of returns from the farm's operational activity.

Specifying the producer price for the primary product, which could cover the production costs, is an especially valuable piece of information. For this purpose, the CVP analysis, which allows to determine the BEP (Break Even Point), can be employed. Since the BEP in value terms is expressed in the value of production, in order to determine the producer price necessary calculations were made. The results are presented in table 5. Moreover, for cognitive purposes, calculations were made for both situations in which subsidies are included in the operational activity of a farm, and those in which subsidies are ignored in the economic balance.

Data from table 5 show that achieving the BEP on farms highly specialised in animal production requires a similar producer price for the primary product in both 2015 and 2020. Only on farms whose main product are cereals it is foreseen that in order to cover the production costs, the average producer price of four cereals should increase by about 10%.

Table 5. The producer price for the primary product in the analysed model farms, allowing to reach the BEP

Model farm (primary product)	Unit	2013	2015	2016	2018	2020
The producer price for the primary product allowing to reach the BEP (excluding subsidies for operational activity)						
PF-VS (pig fattening)	PLN/kg	4.93	4.86	4.73	4.84	4.90
PF-S (pig fattening)	PLN/kg	4.45	4.44	4.37	4.38	4.37
CF-VS (cattle fattening)	PLN/kg	7.98	8.04	8.07	8.24	8.36
CF-S (cattle fattening)	PLN/kg	6.80	6.84	6.85	6.99	7.10
M-S (raw milk)	PLN/kg	0.75	0.75	0.75	0.76	0.78
COP-VS (cereals with the exception of maize)	PLN/dt	72.34	70.84	71.08	73.97	77.23
COP-S (cereals with the exception of maize)	PLN/dt	72.74	71.48	71.67	74.88	78.60
The producer price for the primary product allowing to reach the BEP (including subsidies for operational activity)						
PF-VS (pig fattening)	PLN/kg	3.71	3.73	3.63	3.72	3.89
PF-S (pig fattening)	PLN/kg	3.57	3.58	3.61	3.56	3.47
CF-VS (cattle fattening)	PLN/kg	5.62	5.66	5.75	5.90	6.24
CF-S (cattle fattening)	PLN/kg	4.21	4.18	4.25	4.37	4.71
M-S (raw milk)	PLN/kg	0.49	0.35	0.35	0.37	0.42
COP-VS (cereals with the exception of maize)	PLN/dt	37.43	37.99	39.01	41.63	47.77
COP-S (cereals with the exception of maize)	PLN/dt	34.72	33.51	33.69	36.77	40.34

Source: own study.

Once the subsidies for operational activities (with direct payments) are included in the CVP analysis, it is clear how significant those subsidies are for the profitability of agricultural production on the studied farms. When they are included in the calculation of BEP, the producer price for the primary product which allows to cover the production costs can be 20% or even up to 50% lower. It is especially visible on the example of the studied farms highly specialised in the production of cereals, oilseeds, and protein crops. Considering a farm of a small economic size, covering the production costs in 2020 is possible with an average producer price for four cereals amounting to PLN 40 per decitonne. If the farm is not subsidised, the price should be almost twice as high. Making similar comparisons in the case of farms specialising in pig fattening, the price should be higher by 25-30%, for cattle fattening – 35-60%, for dairy farms – twice as high.

The income parity, calculated as the relation of farm income to the average net wages in the national economy, is presented in figure 4. In 2015, the lowest income parity (only 8%) was typical of a very small farm specialised in cattle fatte-

ning (CF-VS). The highest parity was observed for small farms, producing dairy, and cereals, oilseeds, and protein crops; it oscillated around 65-75%. If the forecasts of the most likely scenario are to come true, on each of the model farms the income parity will be decreasing in the coming years. In 2020, for most farms it will not exceed 10%. The best situation will be on a dairy farm, with the income parity exceeding 50%.

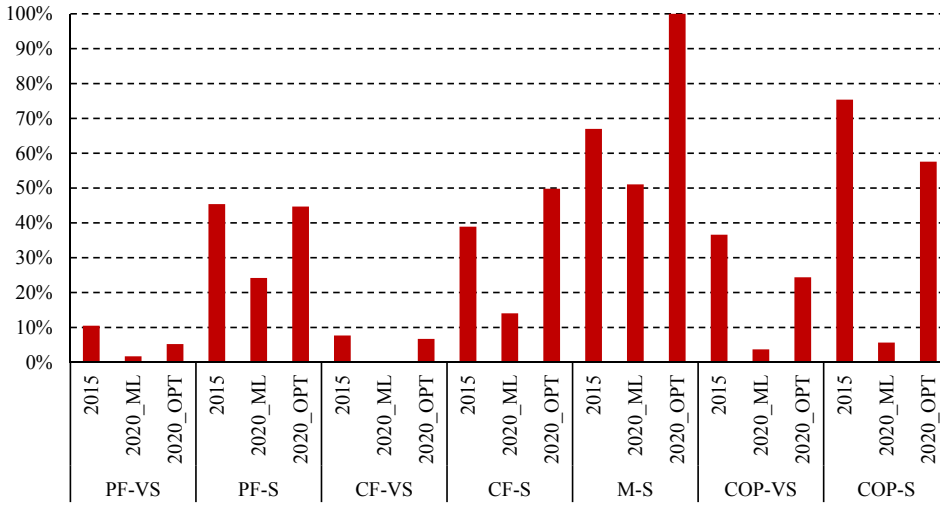

Figure 4. Income parity in the most likely scenario (ML) and the optimistic scenario (OPT)
Source: own study.

Simulations conducted for the purposes of the optimistic scenario showed that in 2015-2020 the value of income parity might be similar or higher. Such a situation will occur on small farms in terms of their economic size, and farms specialising in animal production. Just like in the case of the most likely scenario, the parity level for dairy farms should be noted. It has been estimated that in 2020, it will be almost 102%, which means that a monthly farm income will be higher than the projected net wage in the national economy. The obtained study results demonstrate that even in the optimistic scenario the income parity for farms specialising in the production of cereals, oilseeds, and protein crops will be decreasing. In 2020, it will be lower by about 12-18% compared to 2015. This is the highest decline among all the analysed farms in which a decrease of income parity is forecast for 2015-2020.

Conclusions

The conducted study on the profitability of small agricultural farms in Poland clearly indicates their low profitability (economic size not exceeding EUR 25,000). For the majority of researched farms, the farm income does not guarantee development or even a minimum subsistence level. If we take the entrepreneur's profit to be the foundation of an agricultural farm's activity, then the study shows that none of the analysed farms meet this criterion. During the entire research period (2013-2020), the entrepreneur's profit was a negative value regardless of the type of farm (in accordance with FADN's TF8 grouping). This means that the model farms, having taken into account the costs of alternative use of production factors, incurred losses related to their agricultural activity.

Comparisons made between the farms showed that by 2020, the situation will be the most favourable for small dairy farms. On those farms, regardless of the assumed scenario for the agricultural market, the farm income throughout the entire projection period will be similar or higher than the one achieved in 2013. However, this situation is not determined by the increase in production value, but rather results from the direct payments introduced into the system. The introduction of payments for production – and especially payments for cattle and cows – significantly influenced the size of direct payments. The conducted research has shown that the new solutions in the area of granting direct payments will not improve the economic situation of small farms. With the exception of dairy farms, it can be concluded that the effect will be neutral or negative. Especially in the case of farms highly specialised in the production of cereals, oilseeds, and protein crops, where a decrease in the amounts of direct payments is forecast, the situation can be unfavourable.

The calculation of income parity demonstrated the disadvantage of farms with economic size not exceeding EUR 8,000. Farms specialising in pig and cattle fattening can achieve parity not exceeding 10% according to the optimistic scenario. The only farm with actual income parity in this scenario will be a dairy farm.

The presented research results may contribute to the debate on the direction that should be taken with regard to small agricultural farms in Poland. Many researchers have advocated the preservation of these farms due to their social, cultural, or environmental function. On the other hand, the level of profitability of their agricultural production suggests they must have diversified sources of returns. Hence, questions arise: With which model of a small farm we will be dealing? Will we still talk of an agricultural farm?

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Michał SOLIWODA

Institute of Agricultural and Food Economics – National Research Institute, Warsaw, Poland, michal.soliwoda@ierigz.waw.pl

How to Improve a Farm Financial Management? The Lesson from Poland

Abstract: *There are some logical connections between financial results (as some kind of proxy for 'outcomes' of financial management) at farm level and the income situation of the agricultural sector, in general. The main aim of this paper was to present selected challenges from the perspective of improvement of farm financial management in Poland. Multifaceted aspects for farm financial management in Poland were indicated. Key elements leading to a significant improvement of farm financial management were identified (within a proposed conceptual framework). Improvement of farm financial management as a long-term process (both at farm and sectoral levels) should concentrate on four components that are quite closely related to each other, namely: (1) human and social capital on rural areas, (2) institutions, (3) regulations, (4) financial products. Particular attention should be paid to providing reliable data for further processes of financial management. Thus, there is a strong need for promoting systems of agricultural accounting. Furthermore, institutional infrastructure may substantially affect popularisation techniques and tools for financial management at the farm (e.g. tools, based on some FADN solution, such as Individual Farm Report with additional report).*

Keywords: *agricultural finance, financial management, farm, financial analysis, FADN.*

Introduction

Agriculture is treated as a very risky sector. As Kay, Edward and Duffy (2012, p. 31) convincingly state "the unpredictability of the production process is unique to agriculture". Economic and financial results of farm households may strongly fluctuate as a result of many factors, including both exo- and endogenous ones. Barry (2003, p.2-3) underlines some of 'the sector's unique characteristics': (1) 'close linkages between the household and business' (based on family-sized operations); (2) a 'relatively high capital intensity'; (3) 'non-depreciability of farm land', and, consequently, problems concerning liquidity of assets; (4) a relatively low level of profitability (compared to other sectors of the economy); (5) time--dependent sequential processes of agricultural production which is dependent on a set of natural conditions. Finally, the above-mentioned distinguishing features of agricultural sector indicate a need for public policy initiatives.

A combination of family household and small business may be treated as a farm household (Schmaunz, 2007; Doluschitz, Morath, Pape, 2011; Mußhoff, Hirschauer, 2011). This determines some challenges for financial management of farms. There is a relatively growing body of literature (e.g. Gloy, LaDue, 2003; Mishra, Wilson, Williams 2009; Wolf, Lupi, Harsh, 2011; Ahrendsen, Katchova, 2012; Barnard, Nordquist, 2012; Turvey, Woodard, Liu, 2014; Purves, Niblock, Sloan, 2015) that explores the use of various techniques of financial management in agriculture, with particular emphasis on the specifics of the financial processes in this sector. Whereas American literature in agricultural finance has identified several institutional, top-down (including government-support programmes) and bottom-up initiatives related to dissemination of tools supporting financial management, German literature has focused on a linkage between financial planning and control.

Financial management of a household (including farm household as a specific entity) as – a part of whole-farm management – deals with an essential question how to use financial resources efficiently[1]. Amid growing concerns about the impact of the EU and national agricultural subsidies on economic and financial situation of farms in Poland, the number of various initiatives (including formal networks, oriented to policy goals, such as FADN, commercial/semicommercial programmes for farm financial management) has rapidly increased in Poland. The important issue of improving financial management is important in practical terms, because there are some logical connections between financial results (as some kind of proxy for 'outcomes' of financial management) at farm and sector levels. This implies some difficulties that can be solved using tools of public policies.

[1] For example, one of encyclopaedic definitions (from the Encyclopaedia Britannica) of 'farm management' emphasizes a strong orientation of farm household toward achieving economic goals: "making and implementing of the decisions involved in organizing and operating a farm for maximum production and profit" (Farm Management, 2016).

The main aim of this paper is to indicate selected challenges from the perspective of improvement of farm financial management in Poland. The remainder of the article is as follows. In the first part we present multi-faceted aspects farm financial management in Poland. Then, in the second section we identify key elements leading to a significant improvement of farm financial management (within a proposed conceptual framework). The answer to the question posed in the title of the paper is presented in concluding remarks.

Multifaceted aspects of farm financial management in Poland

Table 1 presents changes in the number and the share of agricultural holdings in Poland. As Dzun (2014) concluded, the number of agricultural holdings conducting agricultural activity has significantly decreased in 2002-2010. The main factors reducing the dynamics were the introduction of direct payments (Pillar 1 of CAP) and change in the definition of the category "households conducting agricultural activity".

Table 1. Agricultural holdings conducting agricultural activity by the legal and organisational form

Description	Agricultural holdings			Agricultural holdings conducting agricultural activity				
	2002	2010	Change 2010/2002	2002	2010	Change 2010/2002	% of total number	
							2002	2010
Agricultural holdings	2,933,228	2,277,613	77.6	2,177,591	1,891,065	86.8	74.2	83.0
of which: natural persons	2,928,578	2,273,284	77.6	2,174,015	1,886,888	86.8	74.2	83.0
of which: legal entities	4,650	4,329	93.1	3,576	4,177	116.8	76.9	96.5

Source: adapted from Dzun (2014) whose calculations were based on GUS data (Central Statistical Office).

Within the framework of the Multi-Annual Programmes (2011-2014 and 2015--2019) the Institute of Agricultural and Food Economics – National Research Institute (IERiGŻ-PIB) monitors annually the financial and economic situation of commodity farms in the form of entities belonging to natural persons. Particular attention is paid to quantitative exploration of relationships between subsidy rates and economic/financial situation of farms. The panel of farms[2] over the period of 2005-2012 consisted of 5,068 entities, but, as a result of me-

[2] It should be noted that "the database of the Polish FADN includes many detailed records of data, verified in terms of their correctness and uniformly processed, which may be used in various types of economic analyses. Thus, it is a uniquely valuable resource." (see: Góral (ed.), 2015, pp. 107-108). More details concerning rules of selection of farm households, cutting outliers objects, as well as shaping of descriptive statistics for the variables analysed were presented in Góral (ed.), 2015 (pp. 103-124).

thodological changes in the Polish FADN[3], 2010 is currently treated as baseline year[4]. As Table 2 shows, in 2013 financial performance, expressed by ROE and ROA, noticeably declined (in comparison to the previous years). Furthermore, current liquidity can be regarded as relatively stable and even there was a trend to maintain excess financial liquidity. Subsidy rate (I) in 2013 was higher than in previous years, 2010-2012. This may be treated as a typical 'risk factor' at the sector level,

Table 2. Economic and financial situation of commodity farms – the panel prepared for monitoring financial situation of farms

Variable	Unit	Years 2010-2012	2010	2011	2012	2013	Change [%] [2013/2012] x 100
ROE (1)*	%	6.0	5.3	6.1	6.5	5.5	86.0
ROA (1)*	%	5.8	5.1	5.9	6.2	5.4	86.2
Current liquidity	Times	4.0	3.7	4.1	4.2	4.0	94.5
Coverage of overall loans with cash flows	Times	0.9	0.9	0.9	0.9	0.8	92.7
Share of gross margin in agricultural production	%	56.4	57.7	56.2	55.7	53.6	96.1
Equity growth	%	8.0	7.8	8.1	8.2	7.2	88.3
Family farm income	PLN [thousand]	94.9	84.1	96.1	104.4	97.5	93.4
Subsidy rate (I)**	%	17.0	18.5	17.9	15.1	17.7	116.9

Note: *own labour costs were deducted in the numerator of these indicators, ** calculated as: [(subsidies to operational activities + subsidies to investments + compensation for milk)/ (vegetable production + animal production) × 100%].

Source: based on data presented in Góral (ed.), 2015 (calculations on the FADN data).

Table 3 presents some critical areas for financial management in Polish agriculture, including legal environment, access to external financing, structural changes, risk management as well as socio-demographic aspects. It should be underlined that processes of financial management are determined by the group of factors that are beyond the control of farm operators (for example, 'legal environment'). Nonetheless, to some extent the areas related to 'risk management' and 'socio-demographic aspects' may be controlled by agricultural producers (decisions on succession as a noteworthy example).

[3] Farm Accountancy Data Network (FADN) may be treated as an information tool that supports decision making processes related to Common Agricultural Policy. Moreover, the concept of FADN (designed in 1965) has evolved into 'an instrument for evaluating the income of agricultural holdings and the impacts of the Common Agricultural Policy' (European Commission, 2015).

[4] See: Góral (ed.), 2015 (pp. 103-124).

Table 3. Critical areas for financial management in Polish agriculture

Areas	Particular challenges	Remarks	Importance from the perspective of 'improvement of farm financial management' (at micro level)
Legal environment	Tax expenditures: agricultural taxation and social securities (*podatek rolny*) as preferential forms; agro-environmental regulations; dilemmas on legal definitions of 'farm' for different purposes	Agricultural taxation is based on the so-called 'agricultural tax' (*podatek rolny*), that is a typical lump-sum levy. Moreover, there is no linkage between the income situation and this tax burden.	There is no category of income tax (except for payers of personal income tax from special branches of agriculture), which maintains the state of information gap in Polish agriculture
Access to external financing	The EU subsidies (mainly direct payments)	A strong dependence on an external financial support; justified rationales for financial reporting in some Rural Development Programme Areas (measures concerning farm investment)	There is a complex and subtle mechanism how the EU subsidies affect financial situation. In the case of reducing the scope for funding, a reduced rate of subsidization may mean a weakening of the financial stability of small family farms.
	Access to credit and loans	Still, there is a limited willingness of Polish farmers to take credits and loans (debt-to-assets-ratio < 15%)	Use of agricultural accounting system may be treated as a form of collateral for financial institutions.
Structural changes	Changes in the number of commodity farms, average area, intensity, product orientation	'A polarised structure of farms' in Poland (Wąs and Małażewska, 2012) may be maintained.	Differences between scale of financial processes between small--sized family-owned farms and large-sized agricultural enterprises
Market structure in the agri-food systems	The degree of vertical and horizontal integration	Participation of farms in formal and informal forms of vertical and horizontal integration leads to increase in their bargaining power. Agricultural finance found the positive impact of the degree of overall integration on financial efficiency of farms.	Limited possibilities of adaptation of selected solutions related to financial management from food processing industry to farm households.
Information systems in the agribusiness	Commercial agricultural decision support systems (including agricultural accounting-based systems), public systems (mainly related to sectoral dimension)	A limited number of initiatives are being implemented. This mainly refers to monitoring of market situation (e.g. Integrated Agricultural Market Information System in Poland).	The information gap relates to the lack of accounting and financial reporting obligations for most households in Poland. This leads to some negative implications.
Risk management	Insurance products	Partially state-subsidized crop insurances; mutual funds as the institutional form	Unwillingness of farmers to buy insurance products
	Income diversification	Income diversification should be considered in parallel with development of entrepreneurship on rural areas	Increase in total income, the element of reducing the level of income risk
Socio--demographic aspects	Socio-demographic aspects: ageing, problem of succession	A strong need for careful merging of small farms	Possibilities of using the positive effects of economies of scale
	Quality of human and social capital	The importance of initiatives of lifelong learning programmes (for example, as on-line course) will be growing.	A particular attention should be paid to promoting record-keeping systems with some analytical functions

Source: own studies.

Figure 1 presents a detailed cycle of processes indicating how the impact of subsidies (mainly, in the form of direct payments) could lead to the improvement of the financial situation of the farm. Although this mechanism was described by American agricultural economists (see: Krop, Katchova, 2011), this may refer to the situation in Polish agriculture. The positive effect of subsidies on income stabilisation leads to better creditworthiness, what may potentially encourage higher investment activity in a farm. The aforesaid changes at the micro level lead to a transformation in the scale of the sector.

Figure 1. Mechanism: how may agricultural subsidies lead to higher investment activity of farms?

Source: adapted from Góral (ed.), 2015 (based on Krop and Katchova, 2011).

How to lead to a significant improvement of farm financial management? A conceptual proposal

As figure 2 shows, improvement of farm financial management as a long-term process (both at farm and sectoral level) should concentrate on four components that are quite closely related to each other, namely, (1) human and social capital on rural areas, (2) institutions, (3) regulations, (4) financial products[5]. Nevertheless, some additional and detailed factors may be found as the combination of the aforesaid key components. Moreover, a part of them relates to characteristics of farm operators that affect how farm resources are utilised. It should be added that the linkage between 'institutions' and 'regulations' can be referred to the structural changes in the agri-food systems.

As for the quality of human and social capital on rural areas, the importance/role of financial education on rural areas cannot be neglected. The results of Osteen et al. (2003) suggested that participants of financial education programme (in general) may benefit from, for example, better analysis of financial data collected by accounting systems. Moreover, a holistic approach to farm management includes an integration processing financial data with typically strategic or operational data. This may be illustrated by the concept of Balanced Scorecard or other pyramidal constructions that can be also used by farmers.

[5] Barry (2003, p. 15) stressed the processes and areas related to 'finance' (in general, in a broad sense) refer to the evolution of agricultural finance. Having cited Weston' article from 'Financial Management' (1994), similarly as in the case of 'general finance', he admitted that new concepts, then methodologies, practical tools, have been evaluated as the consequence of changes in economic, financial and societal environments.

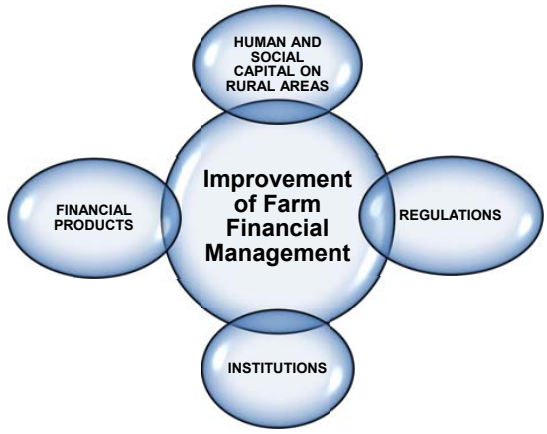

Figure 2. Key components for improvement of financial management in Polish agriculture

Source: own studies.

Soliwoda (2014) proposed hybrid solutions (instead of costly audits) of maintenance of accountancy systems oriented to management objectives in Polish agriculture. It should be noted that public policy intervention should be focused on partly subsidized support in the form of hiring (participating) economists from agricultural advisory centres. The above-mentioned solution would be beneficial not only to farmers, but also to the central budget. Such approach would promote improvement in financial management. According to the current legal status, obligations of maintaining even simplified accounting system refer to a very limited group of large-sized agricultural holdings. This leads to the occurrence of the information gap, and as a result, a lot of simplifications in financial management (Soliwoda, 2014).

There are some initiatives supporting simplified financial controlling (analysis of financial reports with a financial control). This refers to the so-called Individual Farm Report (*Raport Indywidualny*) that may be used by farmers participating in the Polish FADN system. For example, "the Individual Farm Report provides the picture of the agricultural holding's activity" (Polish FADN, 2015), including necessary data for decision-making processes (simplified cash flow statement, balance sheet, report on land ownership, land usage, labour, agricultural production). Box 1 enumerates a set of actions (classified into three groups) that may be used for improvement of farm financial management in Poland. It needs to be highlighted that most family farms in Poland do not have any record-keeping systems. This means that making financial decisions is based on some simplified categories (for example, monthly cash flows, cash farm income, etc.).

Box 1. Actions to improve a farm financial management – adaption of the U.S. practices to conditions of Polish family farming

Scale
- Use fixed resources fully.
- Identify low-cost ways to expand, such as renting additional land or facilities.
- Examine whether management ability and emotional stability are sufficient to handle the additional stress of expansion.
- Scale back the farm business to allow a significant increase in off-farm income.
- Analyse various options for succession or merging with another farming unit.

Efficiency
- Reduce family living expenditures and operating costs.
- Improve enterprise record-keeping and analysis.
- Reorient priorities; focus on management.
- Use advisory (extension) services.
- Improve marketing skills and performance (other areas of management).
- Off-farm income as additional source of income.
- Reduce family withdrawals to a level that is consistent with efficiency or level of farm employment.

Capital Structure and Investment Activity
- Establish minimum standards for the financial performance of new investments.
- Use retained earnings to finance the equity component of capital purchases.
- Maintain adequate financial reserves.
- Structure debt in order to maintain balance between assets' useful lives and repayment periods.
- Identify and sell unproductive/unprofitable assets, reduce and restructure debts.
- Take into a detailed investment analysis.

Source: adapted from Boehlje (1994); Barnard and Boehlje (1998-1999), Jolly and Vontalge (1995).

As Miller et al. (2012, p. 39) stated "financial success requires skill, diligence, and the willingness and ability to change your farm operation", a particular attention should be paid to financial education programmes oriented to various needs of farm operators. Evidence from the U.S. (see: Ahrendsen and Katchova, 2012) aimed to evaluate the financial performance measures of farm households (collected by Economic Resource Service (ERS) from Agricultural Resource Management Survey (ARMS) data). Wolf et al. (2011, p. 259) emphasise the aspect of cooperation between farm and providers of a financial record-keeping system. This may be used as the tool for 'benchmarking farm financial performance over time'.

Concluding remarks

Critical areas for financial management in Polish agriculture include, *inter alia*, legal environment, access to external financing, structural changes, risk management, as well as socio-demographic aspects. A system of CAP measures, including direct payments, leads to significant changes in financial situation of Polish farms. Particularly, small-sized farms have benefited from financial support. A peculiarity of the agrarian structure in Poland (marginal farms vs agricultural enterprises) indicates that most problems related to financial management refer to small-sized family-owned farms.

Particular attention should be paid to providing reliable data for further processes of financial management (mainly, analysing/monitoring, planning and control). Thus, there is a strong need for promoting systems of agricultural accounting. It should be noted that information gap may be reduced by even simplified bookkeeping and financial reporting (using a cash method) for most farms. Nevertheless, as experiences from some EU countries indicate, there is a very crucial problem of how to set criteria and thresholds for this requirement.

Given lessons learnt from countries representing a highly developed agriculture that may benefit from public financial support (e.g. Canada, the USA, Western countries – the EU Member States, Switzerland), a basis is preparing and using cash flow statement. Furthermore, institutional infrastructure may substantially affect popularization techniques and tools for financial management at the farm level. This refers to software tools, based on some FADN solution (for example, Individual Report with additional report). The role of agricultural counselling combined with FADN system in Poland may be essential in promoting innovative (with respect to Poland) tools. What is needed is "quality improvement" of human and social capital on rural areas (related to skills and qualifications necessary for financial management). To achieve this goals, some measures, mainly lifelong learning programmes for farmers (on-line courses, case studies, virtual farms, etc.), may be implemented.

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Oksana PERKHACH

Department of Administrative and Financial Management, Lviv Polytechnic National University, Lviv, Ukraine, oksanaukr@hotmail.com

Technical and Economic Security as a Part of Sustainable Development of Agricultural Enterprises of Ukraine

Abstract: *Issues of economic security both regarding country and enterprise level are very acute under conditions of globalisation. Ukraine has a high agricultural potential: fertile land, suitable climate, favourable geographical location and others. However, there are factors that hinder the development of agriculture in this country. These include threats of technical and economic security. As a result of agrarian reform in Ukraine, the property of former collective farms passed into the ownership of private businesses. Technical equipment and other means of production were not modernised or repaired because of financial problems in many agricultural enterprises. As a result, farmers lost significant crop yields, which was reflected in low profitability of financial and economic activity. Market development of agrarian sector requires new approaches to technical support of agricultural enterprises. Modern agricultural producers need physical capital that provides high productivity, energy frugality and usability. The main purpose of this study is to explore the current status of technical and economic security of agricultural enterprises in Ukraine and to recommend ways of its improvement.*

Keywords: *technical and economic security, agricultural enterprises, physical capital, efficiency, sustainable development*

Introduction

Problems of sustainable development of agricultural enterprises started to be acute and important during economic and political crisis in Ukraine. Agricultural enterprises have to operate in conditions of uncertainty and unpredictability. The main reasons for such situation are instability of agricultural market infrastructure, disparity in prices, dependence on natural conditions of production and all of the above together, along with some other factors make agriculture a risky business. Consequently, it is necessary to provide economic security to agricultural enterprises. Current business development is closely linked to the high level of economic security. Because only in such conditions it is possible to provide effective strategic planning, efficient management and monitoring of both internal and external business processes, etc.

Ensuring economic security of any legal entity is impossible without efficient use of resources, including physical capital. New technologies and high quality of physical capital play a crucial role in converting agriculture to an effective and competitive direction of development ensuring technical and economic security.

Under "technical and economic security" we understand provision of physical capital to an enterprise, its modernisation and reconstruction to achieve continuous production of competitive products and profit generation. The sustainable agricultural production can be achieved only if the enterprise would respond in time to changing market conditions and, on this basis, effectively use capital assets.

In the scientific literature, there are many publications on technical support for agricultural production and efficient use of capital assets (Лагодієнко, 2002; Поперечний, 2009 and others). Special attention is paid to issues of economic security at different levels – from the state to enterprises (Яремова, 2012; Ареф'єва, 2004 and others). However, issues of ensuring technical and economic security of agricultural enterprises are not sufficiently investigated.

The study aims at exploring the current status of technical and economic security of agricultural enterprises in Ukraine and recommending ways of its improving.

Material and method

Theoretical and methodological basis of the research is formed by statements of domestic and foreign economic scientists on issues of effective usage of capital assets and ensuring economic security. Data from State Statistics Service of Ukraine were used for the research. The research also applies methods and techniques of economic investigations.

Results

Agriculture is one of the most important branches of the economy in Ukraine. In 2014, it provided up to 11% of gross value added. The employment in this sector of the economy is more than 3 million people. There are almost 52.5 thousand of agricultural enterprises and entrepreneurs, and they use 36.4 million hectares of agricultural land. However, there are almost 30% of unprofitable agricultural enterprises, which cannot ensure economic security under such financial results. The economic efficiency of many kinds of agricultural production is too small for investment, modernisation and renewal of physical capital (Поперечний, Клебан, 2009). Krupin (2014) argues that mechanisation of Ukrainian agriculture is on a very low level as well, which makes work even harder and efficiency much lower.

Economic sustainability of agricultural enterprises depends on internal factors, such as resource potential and its effective usage, technological equipment of production, economic and technological development of the enterprise ensuring a high level of profitability. Resources are the basis of production and, consequently, its economic life. It is important to note that a company may have enough resources, by quantity and quality, to take up agricultural production and to take into account market demand for competitive production. But, if resources are not used effectively, then, it will not ensure technical and economic security for the enterprise.

Technical and economic security of agricultural enterprises can be characterized by the following criteria:
- Quality and quantity of capital assets in accordance with market demand;
- Physical capital capacity to provide competitive production;
- Ensuring sustainable development of agricultural enterprises due to effective use of physical capital.

Basic indicators of technical and economic security in Ukrainian agriculture are shown in table 1.

The residual value of physical capital in agriculture trends upwards, because of capital investment increasing up to 62% in 2014 against 2010. The largest share of these investments was made by agro-industrial holding companies (Бородіна, 2014). They have access to "cheap" financial resources from international financial corporations and other organisations. They usually invest in new technologies, which are conductive to loss of jobs. The large-scale agricultural enterprises (agro-industrial holding companies) are better provided with physical and working capital, than small-scale farms or households. The small-scale agricultural enterprises do not have enough money to make capital investments. Also they do not have expensive mortgages to borrow money from banks (Калетнік, Пчелянська, 2012). Besides, Ukrainian banks do not offer any special credit pro-

grammes for small-scale agricultural producers for capital investment and interest rates are too high. Most of bank credits (70%) were given to farmers for short-term financing of agribusiness. The rest of bank credits (30%) was directed to large-scale agricultural enterprises for capital investments (Крючко, 2013). The main problem of technical and economic security of agricultural enterprises of Ukraine is that these enterprises mainly use the physical capital rented by the owners of property shares. Agreements of rent are conducted for a short period. Depreciation of fixed assets is counted neither by renters, nor by holders. Thus, one of the sources of physical capital renewal – depreciation – is lost.

Table 1. Basic indicators of technical and economic security in Ukrainian agriculture

Indicators	2010	2011	2012	2013	2014	2014 in % to 2010
Residual value of physical capital, UAH million	63,444.6	77,969.1	88,367.6	98,134.8	103,033.7	162. 4
Rate of capital consumption, %	...	32.1	34.2	35.4	38.4	x
Output per UAH 100 of physical capital, UAH	307.18	299.73	252.64	257.66	244.04	79.4
Physical capital per 1 employee, UAH thousand	98.01	123.04	141.64	168.56	195.62	199.6
Net profit per UAH 100 of physical capital, UAH	27.19	32.41	30.25	15.21	19.67	72.3

Source: State Statistics Service of Ukraine, Statistical Yearbook "Agriculture of Ukraine", author's calculation.

However, the rate of capital consumption was high and in 2014 it was about 38%. It means that the high level of physical and moral capital consumption cause high maintenance and repair costs, which, in turn, negatively affects the profitability and provision of technical-economic security to agricultural enterprises.

Increase in the production is the main result of effective physical capital use. We can notice that physical capital use in Ukrainian agriculture was not effective, because in 2014 output per UAH 100 of physical capital decreased by 21% against 2010. The explanation of this index is that the rate of capital investment growth is higher than the rate of gross agricultural production growth.

The indicator of physical capital per 1 employee increases. In 2014, it was almost two times higher than in 2010. It was affected by decreasing labour force in agriculture. Employees were dismissed because of implementation of new techniques and technologies in agricultural production, or they found better jobs in other branches of the Ukrainian economy.

The main indicator of technical and economic security of agricultural enterprises is net profit per UAH 100 of physical capital. It decreased by 27% in 2014 compared to 2010. Decreasing profitability of agriculture, in general, is the result of macroeconomic and military and political situation in Ukraine.

Thus, the total working physical capital and its effective use makes an impact on technical and economic security. High level of indicators of technical and economic security of agricultural enterprises would affect the sustainable development of rural areas, because getting a profit by entities gives an opportunity to raise wages and to develop the social infrastructure of enterprises.

According to market economics, effective physical capital use is determined by market conditions. All economic decisions, including those which are related to the physical capital formation and use, should be made taking into account current and expected market situation. Hence, the physical capital will be directed to those sectors of agriculture, which will generate the greatest profit. Unfortunately, agricultural producers make production decisions taking into account current prices and market information of previous years, because the service of market monitoring and forecasting is not well-organised in Ukraine. In such circumstances, it is difficult to form not only strategic, but also current development programmes aimed at efficient use of physical capital, profit-making and ensuring technical and economic security.

There is the tendency for gradual decrease in machinery in agricultural enterprises (table 2). From this it follows that the loading per 1 tractor or 1 combine is increasing. In these conditions, it is difficult to provide mechanised field work on time. Agrarian producers could not use 25-35% of tractors, combines and other machines due to technical problems and physical capital consumption. This leads to the extension of field work and loss of 20-30% of the harvest.

Table 2. Agricultural machinery in agricultural enterprises, at the end of the year

Indicators	2010	2011	2012	2013	2014	2014 in % to 2010
Tractors, thousand pcs	151.3	147.1	150.1	146	130.8	86.5
per 1000 ha of arable land, pcs	*8*	*8*	*8*	*8*	*7*	*87.5*
Grain harvester combines, thousand pcs	32.8	32.1	32	30	27.2	82.9
per 1000 ha of grain sown area, pcs	*4*	*4*	*4*	*4*	*4*	*100.0*
Potato harvester combines, thousand pcs	1.7	1.7	1.6	1.5	1.3	76.5
per 1000 ha of potatoes sown area, pcs	*59*	*49*	*40*	*16*	*43*	*72.9*

Source: State Statistics Service of Ukraine.

There are also many cases, when one enterprise has more machinery of some kind than it is needed and another enterprise does not have the necessary quantities of this type of machinery. Consequently, in such case it is advisable to organise associations of enterprises for optimal machinery use. Within the framework of an association it would be possible to create and coordinate schedules of using machinery and the rent for them. Also it is advisable for small-scale enterprises to create service cooperatives for the purpose of buying new machinery for common use.

Nowadays, agricultural enterprises write-off 2.6-6.5% of existing machines annually, and buy only 2.3-4.6%. For normal reproduction of technical machines it is necessary to renew them by 18-20%. For example, now the Ukrainian agricultural producers use 2% of domestic grain harvesters, 20% of foreign grain harvesters and 78% of old constructive combines from Soviet times. The situation is the same for other types of technologies. Domestic technology and machinery lag behind the world by 2-3 generations, which is characterised by high power inputs and low productivity. Domestic technologies demand more man-hours. Low level of mechanisation affects the amount of production costs. For instance, in large-scale enterprises the technologies of crop production consist of 90-95% of mechanised work, and in small farms it consist of 65-75% (Лупенка, Месель-Веселяка, 2012).

It is complicated or sometimes impossible to use most of physical capital of animal production in a different way. It is difficult to use the old stock-raising farms in circumstances of the existing new technologies. For a long-time these premises were not used, so their condition deteriorated. Because of low business activity in rural areas it is difficult to sell some means of production, which are not used now or would not be used in the future.

Agricultural producers (large-scale enterprises, in general) start to invest in animal production. They build new constructions for stock-raising farms and storehouses using new technologies of agricultural production. We can see that stock-raising farms for cattle increased by almost 4 times in 2014 compared to 2010. Producers also put money in conservation of vegetables, because this field of operation is also problematic for them (table 3).

Indicators of synergy effects of resource use accumulated combination of labour effectiveness, land use, technical and economic efficiency in agricultural enterprises. These indicators include yield of crops and productivity of livestock and poultry (table 4). Increase in such indicators is among the key conditions for sustainable rural development.

Table 3. Constructions for agricultural purposes that were put into operation

Indicators	2010	2011	2012	2013	2014	2014 in % to 2010
Stock-raising farms, thousand enclosures: for cattle	3	23	14	8	11	366.7
for pigs	24	15	3	1	15	62.5
for poultry	7,229	5,120	220,647	2,754	11,195	154.9
Poultry farms: of egg production, thousand laying hens	1,560	220	5,359	1,546	2,852	182.8
of meat production, million heads per year	13.2	84.9	9	0.2	7.3	55.3
Storehouses for potatoes, vegetables and fruit, thousand tonnes of simultaneous storage	25.5	192.7	78.7	42.4	77.3	303.1

Source: State Statistics Service of Ukraine.

Table 4. Indicators of synergy effects of resource use in agricultural producers of Ukraine

Indicators	1990	1995	2000	2005	2010	2012	2013	2014
Yield of grain and leguminous crops, centners per hectare	35.1	24.3	19.4	26	26.9	31.2	39.9	43.7
Yield of potatoes, centners per hectare	116.8	96.2	121.6	128.4	132.5	161	159.7	176.4
Yield of vegetables and cucurbitaceous, centners per hectare	149	120.2	112.3	157.1	173.6	199.2	199.9	207.8
Yield of fruit, berries and grapes, centners per hectare	42.7	29.9	38.4	63.7	78.2	89.9	103.5	95.2
Milk yield per cow, average for year, kg	2863	2204	2359	3487	4082	4361	4446	4508
Eggs laying per hen, average for year, pcs.	214	171	213	274	281	293	289	276
Daily average live weight gain obtained by raising, feeding and fattening of cattle, g	431	259	255	392	461	504	508	525
Daily average live weight gain obtained by raising of pigs, g	229	117	120	281	375	448	474	481
Wool clipping per sheep, average for year, kg	3.4	2.9	3	3.5	3.4	3.3	3.2	3

Source: State Statistics Service of Ukraine.

There is an upward trend in the indicators of yield of crops and productivity of livestock and poultry (except of wool clipping per sheep). Replacement of equipment and investment in better fertilisers, although not significant, but produce the expected results. However, despite positive trends, Ukraine is far behind European indicators of agricultural productivity (table 5).

Table 5. International comparisons of agricultural productivity in 2013

Indicators	Ukraine	Poland	Hungary	Austria
Yield of grain and leguminous crops, centners per hectare	39.9	37.7	47.9	59.9
Yield of potatoes, centners per hectare	159.7	187.8	218.3	286.3
Yield of vegetables and cucurbitaceous, centners per hectare	185.2	351	190.9	381.7
Yield of fruit, berries and grapes, centners per hectare	99.4	97.9	86.7	121.1
Milk yield per cow, average for year, kg	4446	5388	6869	6460

Source: State Statistics Service of Ukraine.

Technology backwardness, inability of farmers to buy quality seeds, agricultural chemistry tools and new agricultural machinery, great difficulties to take out cheap loans – these are the main reasons hampering the development of agrarian sector of Ukraine.

Conclusions

Thus, according to data as stated above, we can identify the following main threats to technical and economic security of agricultural enterprises in Ukraine:
- Lack of own financial resources for capital investment;
- The big share of physically and morally obsolete agricultural machinery;
- Unprofitable production of some kinds of agricultural products;
- Undeveloped joint usage of agricultural machinery;
- Low business activity in rural areas.

Timely detection and removal to threats of technical and economic security will ensure the sustainable development of agricultural enterprises. For this purpose it is advisable:
- To create favourable conditions for investment from other sectors of the national economy and foreign direct investment on the formation of production potential of agricultural enterprises;
- To improve directions and methods of government support of renewal of physical capital of small-scale agricultural enterprises;
- To provide information support to agricultural enterprises; this will allow them to change production specialisation on time and to earn profit;
- To promote the expansion of technical services and joint usage of agricultural machinery, including cooperatives, associations and rents.

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Diana CRICLIVAIA

Moldova State University, Postdoc at Warsaw School of Economics, Moldova
criclivaia@gmail.com

Impact of Moldovan Tax System on Local and Agriculture Sector Development: 25 Years of Experience and Challenges

Abstract: *Moldova's transition from planned to market economy required a total reconstruction of the tax system structure, particularly: taxes, tax administration and legislation of tax matters. However, in practice, Moldovan tax system (MTS) was not able to solve the multitude of problems that occurred. This system is unfair as it hampers economic growth, applying half measures, and does not ensure state programs and services are efficient especially on agriculture sector. The legal economy was substituted with "shadow one" that gets alarming proportions until present. The largest share in total informal employment holds agricultural sector, and the main contribution belongs to households. Due to the specificity of this type of employment, 80% of informally employed people are working in rural areas, which is detrimental for an economy where about 55% of population lives in rural areas and almost 28% are employed in agriculture. The paper aims to reveal the weaknesses and strengths of MTS, related to development on agriculture sector, considering several suggestions for most appropriate taxing culture changes (e.g. personalized VAT reform based on successful experience of Latin America).*

Keywords: *Moldova, taxation, agriculture, tax system, tax policy.*

Introduction

Nowadays, the Moldovan agriculture receives highly favourable tax treatment for its high risks, low profitability, and high capital intensity[1]. However, taxation system of agriculture is still considered, by farmers, as a burdensome one. Moreover, according to our research they do benefit from such favourable tax arrangements. The annual cost of farming sector that benefits from tax arrangements is estimated at more than 0.6% of GDP, with the largest share being for VAT treatment, followed by direct taxes and social security contributions. Tax expenditure amounts to about 60% of tax collections (which represent less than 1% of GDP) in agriculture.

The evolution of the Moldovan tax legislation is largely detached from tax law theories and development. Moldovan tax law is influenced more by political reasons, rather than a well-thought approach of imposing economic aspects, which generates imperfections, multiple discrepancies, contradictions and deficiencies. Three administrative-territorial reforms[2] and other changes to local finances have caused considerable uncertainty and reduction in the weak Moldovan economy from an institutional point of view through contradictory or not logical legislative base.

Due to the territorial spread of the activity, large number of population involved[3], the necessity for state levies and given the vulnerability to exogenous shocks[4], ag-

[1] In fact, we argue, that before the transition to market economy there was no tax system existed in the common sense. The state played a dual role in the system as a tax collector and tax payer, owning centralized banking system, which tracked *kolhoz* collective farm and *sovhoz* soviet farm transactions. Budget revenue were ensured by two primary sources: turnover tax on consumption goods and services was extremely low or negative (subsidies) on basic products, and very high on luxury goods, and *kolhoz* / *sovhoz* profits, classified as deduction of surplus product rather than profit taxes varying from 50 to 100%. However, without strict rules on deductible production costs, total tax liability becomes negotiable. Thus, the state adjusted arbitrarily tax structure and administrative procedures to meet budgetary requirements. Moreover, negotiable tax liabilities allowed state to exclude bankruptcy through collective and soviet farms tax relief request and generate lack of transparency within the system. The population was unaware of tax procedures or even of tax burdens. Only a few persons knew about them (director and superior economist). There were other taxes also (e.g. Personal Income Tax (PIT), considered undesirable to tax works directly and the payroll tax, designed to increase the effective price of labour) that did not play a significant role in centrally planned economies.

[2] In the analysed period (1990-2014) Moldova had three administrative-territorial reforms: 1994, country's territory was divided in 38 *raioane* (districts), including five in Transnistria and three in Gagauzia; 1998/1999, the districts were amalgamated in 10 *judete* (counties), accompanied by a significant administrative reform, with new division of competency and resources, as in Romanian model, returning to the pre-soviet administrative-territorial structures from sub-optimally small local governments, reinforcing self-administration; 2001/2003, new administrative-territorial reform adopted by the Communists, which took effect after the local elections in 2003. The current model of territorial reform was established, with significant reductions in local autonomy and was justified by the need to reduce the number of local government employees and to bring services closer to the people.

[3] About 55% of the population (3.5 million people) lives in rural areas and almost 28% are employed in agriculture.

[4] During its transformation, Moldova has faced four major crises (The economic, social and political crisis of 1989-1992, The Russian Financial Crisis of 1998, The global economic and financial crisis of 2008 and The Ukrainian and Russian crisis of 2014-present), each of which revealed the need for fiscal adjustment and, more importantly, for putting public revenue and expenditure on a long-term sustainable path.

riculture is commonly rated the hardest to tax of all hard-to-tax sectors[5]. The difficulty of taxing agriculture is of major concern in countries like Moldova, where agriculture still accounts for relatively important share of GDP (more than 12%). Thus, taxing agriculture more effectively becomes central for development issue.

There is a number of steps countries can take to ensure that they collect an appropriate amount of tax from individuals or businesses operating in their jurisdictions. The paper aims to reveal the weaknesses and strengths of MTS, related to development on agriculture sector, considering several suggestions for the most appropriate taxing culture changes.

To this end, three main questions are addressed:
(1) What do we need?
(2) What do we see?
(3) How to move forward?

This research is relevant for three groups of addresses: governments and policy-makers, academic staff and researchers, and households and farm producers. The article focuses primarily on the situation faced by Moldova in the last 25 years. A large amount of data provided by World Bank, IMF, OECD, Main State Tax Inspectorates, Ministry of Finance information and other sources of technical expertise was collected, synthesised, and analysed.

Optimal formula of fair taxation

Moldova's transition from planned to market economy required a total reconstruction of the tax system structure, particularly: taxes, tax administration and legislation of tax matters. However, in practice, Moldovan tax system (MTS) was not able to solve the multitude of problems that occurred. This system is unfair as it hampers economic growth, applying half measures, and does not ensure state programmes and services efficiently, especially in agriculture sector.

Even though the ingredients of optimal formula are well known, Moldovan government and farmer's community are still looking for it. These ingredients represent the answer to our first question: **What do we need?**:

1. Transparent, simple and fair tax rules providing for sufficient revenue;
2. Compliant taxpayers willing and able to pay their fair share;
3. Effective tax mechanism giving farmers a certain advantage over agricultural products' importers either through less burdensome tax regime or by subsidizing some part thereof;

[5] The three hard-to-tax sectors are conventionally taken to be small business, services and agriculture, in ascending order of difficulty, although all components of the hard-to-tax are not necessarily small (Bird, 1983).

4. Efficient tax administrations that have the legislative tools and practical means to check the correctness of the taxpayers tax return, in order to stimulate the honest taxpayer and fight with incompliant one.

Transformation of Moldovan tax reforms

Based on the pace and direction of tax reforms as well as relative success of reform implementation, we can distinguish six stages of transformation (Criclivaia, 2015):

I – 1990-1991: the initial stage, where taxation was aimed to perform only the fiscal function of the system[6], define the configuration of the MTS for an independent state.

The necessity for tax reform appeared in 1990. According to the Concept of the tax reform, MTS must provide a homogenous and fair attitude to all taxpayers, ensure a stable basis for state programmes financing and services development, structured to guarantee social and economic facilities for population and sectors of the economy.

Decision No. 68 on 7.03.1990 of the Council of Ministers of MSSR was the first important legal act that created a new body – State Tax Inspectorate, independent subdivision within the Ministry of Finance (MoF).

This stage is characterized also by implementation of the Concept of agrarian reform and social and economic development of the state (Law No. 510a of 19/02/1991) and by adoption of the Law No. 627-XII/1991 on the privatization, Law No. 459-XII/1991 on the property and Law No. 828/XII /1991 on the Land Code.

II – 1992-1994: the second stage was characterized by legalization of general principles of law, including taxation, and implementation of a control function.

Real tax reform started on 17 November 1992 with the adoption of the Law on the foundations of the state tax system that determined the economical, juridical and organizational aspects of MTS, provided types of taxes: VAT, Excises, CPT, PIT, Land Tax, Road and transit taxes, taxpayers' and authorities' obligations, rights, liability for infringements and fiscal accountability. This law ruled MTS for a decade up to enforcement of Title V of the Tax Code on 1 July 2002. On 2 December 1992 comes into force the Law on taxation businesses' benefit (CIT). All

[6] The beginning of this stage coincides with *perestroika* (reconstruction), transparency and acceleration launched by Gorbachev in early 1986 and Soviet Union collapse in 1991. The first step was taken in 1987-88 by introducing fixed "economic rates", where planed absolute amount of payments were transformed into fixed percentage rates.

businesses – legal entities in Moldova, regardless of ownership forms and legal framework, including enterprises with foreign investments, international associations and organizations exercising entrepreneurial activity directly or through permanent representatives and subsidiaries were subject to this tax. However, due to the subject of our paper it has to be mentioned that the agricultural enterprises, except those of industrial type, do not pay the tax on the benefit derived from the agricultural activity.

Law on local taxes and fees No. 186-XIII/1994 also matters as tax related acts in this period. The introduction of local taxes, settlement of their amount, provision and facilities were charged by the local tax authorities, thus, establishing a flexible taxation system according to the needs and interests of communes, municipalities and districts.

III – 1995-1996: the MTS accelerated development stage, characterized by fiscal leverages' mechanism transformations, particularly by stimulating investment activity for production development, establishment of budgetary mechanism in 1996 in the Law on budget system and budget process and Law on budget classification, complication of tax system through a very impressive number of legal acts, e.g. the provisions on deductible business expenses demanded knowledge of the entire set of detailed rules. In 1996, there were 41 legislative acts in force regulating taxation of companies' benefits, including 11 laws, one parliamentary decision, three Decrees of the President, 7 Government's Decisions, 17 instructions and practical guides of the Ministry of Finance and Tax Inspectorate, a few instructions of the Department of Statistics, etc. One of the tax incentives of this stage for farmers was that of 1995, based on which agricultural enterprises started to pay a single land tax, which included real estate and road taxes, previously paid separately.

On the other hand, this stage was marked by:
- Different tax regime for imports and exports between former USSR and non-USSR members as well as among them in the Commonwealth of Independent States;
- Tax discrimination of domestic investors transformed Moldova, through undiscerning tax privileges granted, into an oasis for fiscal speculations and hidden business, i.e. for experienced tax fraud foreign companies.

IV – 1997-2005: – this stage is characterized by implementation of the Law No. 1217/1997 on the privatization programme for 1997-1998, Law on normative price and procedure on sale-purchase of land No. 1308-XIII/1997, new Fiscal Reform Concept and continuous MTS management improvements, such as National Accounting Standards, Government Decision on the tasks of the State Treasury, through adoption of: The ***Tax Code*** (1997-2001), which establishes tax rates and bases for domestic taxes; The Law on ***Customs Tariffs*** No. 1380-XIII/1997; The Law on ***State Social Insurance*** No. 489-XIV/1999; Law on ***Farms***

No. 1353-XIV/2000; Law on ***Entrepreneurial Cooperatives*** No.73/2001; Law on ***Local Public Finance***, No. 397-XV/2003. The Law No. 243-XV/2004 on subventions of production risks in agriculture also has to play a role in the agricultural sector development.

The privatization of agricultural assets of the former collective farm enterprises was carried out massively in 1998-2001, and in many cases, with serious violations of legal regulations. In addition, a large part of the capital was destroyed greatly due to a lack of transparency in the privatization process, biased legislation and group interests embodied in buying assets at extremely low prices. These factors decisively influenced the liquidation of enterprises that could be restructured and privatized. The process of privatization has resulted in a highly fragmented structure of land ownership. Thus the land privatization process produced over 1 million of new landowners (World Bank, 2016). Moreover, a large degree of heterogeneity in the characteristics and performance of agriculture producers has been established which lasted until present time. According to the data from the 2011 Agricultural Census, there are about 900,000 farms in Moldova, with an average size of 2.5 hectares (World Bank, 2015)[7].

However, privatization brought different possibilities for property income (e.g. interest, dividends, annuity, income from sales of the property) to their owners, which ultimately gave more revenue tax sources to the government. Thus, since 1999 a considerable increase in transactions for the sale of agricultural land and land rent benefits can be observed. Trends and dynamics of this process are reflected more accurately in the evolution of market prices for agricultural land. If, at the beginning of sale transactions, the market price of a hectare of farmland in Moldova was MDL 3364 (in 1999), the average price for 2015 reached MDL 19,851 per ha or 5.9 times more (current prices). In some regions (e.g., Mun. Chisinau and suburbs), the market price of agricultural land is MDL 100 thousand per ha and more. Currently, more than 50% of total agricultural land is used under the lease relation system, thus performing the land consolidation function as well.

V – 2006-2010: this stage of improvement of national legislation focused on tax administration and fiscal reporting and favourable investment environment.

The main challenges of the period are:
- Law No. 111-XIV/2007 on ***fiscal amnesty*** cancelling all tax debts until 01.01.2007,
- The Tax Code set the ***CIT rate to zero %*** entering into force on 01.01.2008,
- Law No. 111-XIV/ 2007 on ***capital legalization***.

[7] 88% of producers engaged in fruit production (nearly 400,000) have holdings of less than 0.1 hectares. Another 9% (just over 40,000) have holdings between 0.1 and 0.5 hectares. At the larger end of the spectrum, fewer than 1,000 farmers have holdings of 10 hectares and more. Of these, 115 farmers have holdings of more than 100 hectares.

– Strategy for attracting investments and promoting exports for 2006-2015 granted ***many tax and customs facilities***,
– New ***Title IX "Road Taxes"*** was added to the Tax Code.

This stage was also characterized by many tax exemptions for the farmers. Thus, for the 2006-2010 period, farmers were exempted on corporate income tax (CIT), real estate tax, road taxes, fee for water abstracted by farmers[8].

VI – 2011-present: this stage aimed to develop MTS into a modern efficient European tax system. In this context the actions consisted in:

- Continuation of reform of tax system, ***bringing VAT and excise legislation in line with the EU acquis and international requirements***, to reach the minimum EU rates by 2025.
- ***Reduction and/or elimination of import duties*** starting in November 2014.
- ***Annulment of almost all tax facilities and reintroduction of 12% CIT*** since 2012. In 2014, the government decided to reintroduce some exemptions, including the exemption of farmers from VAT on imports as well as from VAT within the country on sale of tractors, agricultural machinery and irrigation equipment. However, according to the requirements/suggestions of World Bank (World Bank 2016) these incentives will be removed soon.
- ***Establishing more cooperative and collaborative relations*** (agreements with the Swedish Tax Agency, the French General Directorate of Public Finance, the Dutch Tax and Customs Administration, and the Estonian Tax and Customs Board and others). Foreign donor agencies play an important role in the national economy. A large number of international donors and donor organizations such as USAID, TACIS, SIDA, DFID, Soros Foundation, organizations from Japan, Poland and the Netherlands, have recently become more active in supporting agricultural activities, including through investments, grants, low interest rate loans and bank guarantees, through technical assistance.
- ***Fight against tax evasion and avoidance***. Institutional framework registered many changes during the last 25 years as regards control and sanction functions of tax violations. In 1990, it was attributed to state tax inspectorates, then in 1991 to Financial Guards that was transferred to the Centre for Combating Economic Crimes and Corruption (in 2002). After 10 years it was passed to the Ministry of Internal Affairs and due to amendment of the Tax Code on 01.01.2014 it comes back to the tax authorities. Thus, the above-mentioned changes were inefficient, confirmed by growing ratio of tax evasion to GDP that was 4.5% in 1994, 43% in 2010 and about 50% estimated in 2014. For this reason ***this stage of MDS transformation is focused on fighting against tax evasion and avoidance*** to eliminate duplication of the functions of control, ensure transparency and cost efficiency for all involved parts. Thus, the Criminal Code introduced Article 244 and 244[1], the Contravention Code – Article 301, Tax Code – Chapter 11[1] – Indirect Methods of

[8] Law No. 261 of 27.10.2005 on amending and supplementing certain acts, Official Gazette No.157-160, Article 782, effective date: 01.01.2006.

estimation of individuals' taxable income, Convention on Mutual Administrative Assistance in Tax Matters signed in 2011, etc. The biggest area of tax evasion is represented by VAT frauds. Some sectors (one of them is agriculture), where there are numerous tax exemptions and a greater diversification of VAT rates, pull, in fact, government money on a net basis. It is, therefore, necessary to further review the VAT framework to stop any leakage of resources in such a way.

- ***Fiscal decentralization strategy*** aiming at improving the quality and delivery of public services (setting new rates for sharing national taxes with the two tiers of local government, introduction of formulas for transfers to local governments and removal of subordination in financial relations between top and bottom-tiers of local government).

Generally, we consider the last period as the most relevant to Moldova's needs as regards the Taxing Culture Change and results will not hesitate to come.

Development of the main taxes

The contribution of agriculture to the state budget is smaller than its share in GDP (less than 1%). The main components of the existing taxation system are: land tax, income tax, VAT and excise duties, and social security contributions. Farmers and agricultural producers are forced to pay also other taxes, such as water tax, real estate tax, customs tariffs, etc.

a. Personal Income Tax (PIT)

During all 25 years of transformation, the personal income tax system maintained a progressive rate structure with the number of brackets ranging from 2 to 7 and tax rates from 7 to 50%. Initially, Moldova had numerous exemptions and deductions from PIT that included various benefits, in-kind allowances and interest income, however, later on (see table 1) the national tax authority initiated changes in the PIT system with the view to broadening and simplification of the rate structure.

The PIT was withheld by the employer and transferred to the budget. For this reason, individuals were not required to declare income[9]. Nowadays, all individuals are subject to PIT. There are 2 income brackets and 18% is the highest rate, and the minimum rate is 7% for the income of not more than MDL 27,852. All taxpayers are entitled to file the income tax return with some exceptions[10]. Thus, the taxpayer is required to file an income tax return not later than by 25 March after the end of the tax year, which coincides with the calendar year[11].

[9] Only individuals who obtain income from self-employment were required to submit tax returns.

[10] Tax Code, Article 83.

[11] It has to be noted that mandatory taxpayers' obligation to file a tax return occurred for the first time after 1998. Moreover, during 1999-2014 period, the term to file the income tax return was not later than 31 March after the end of the tax year.

It should be noted that numerous alterations to PIT system did not result in substantial changes of PIT revenues in terms of GDP, mostly because of low compliance and other exemptions. This revenue source amounted to between 1.6% and 2.8% of GDP (figure 2).

The proposed measures to the PIT are to support low-income persons and gradually shift the tax burden to families with average and above average incomes. Thus the progressive system of PIT is kept during all years of the analysed period. Since 2010, the increase of instalments of taxable income, personal exemption, major exemption and exemption for dependents has been subjected to inflation rate.

Table 1. Moldova: main changes in PIT system, 1990-2015

1992	Law on PIT adopted with 7 income brackets (10%, 15%, 20%, 25%, 30%, 35%, 40% and 50%)
1995	Law enacted 6 brackets (10%, 15%, 20%, 30%, 40% and 50%)
1996	Law enacted 5 brackets (10%, 15%, 20%, 30%, and 40%), min. rate 10% for income < 3 minimal wages (min. wage MDL 187)
1997	New Tax code set two PIT rates of 20% and 32%[12]
1998	Tax code enacted 3 brackets (ti<6000 – 15%, 16,200<ti<10,800 – 20%, ti>10,800 – 32%). Exemptions introduced (personal exemption – MDL 2,100, major personal exemption – MDL 10,000; exemption for dependents – MDL 120) and income threshold raised to MDL 10,800[13]
1999	PIT rates were reduced to 28%, 15% and 10%
2001	Min. income threshold was raised (ti<12,180 – 10%, 12,180 <ti<16,200 – 15%, ti>16,200 – 28%)
2003	PE and ED were raised to MDL 3600 and MDL 240, respectively
2004	Max. rate was reduced to 22%, income brackets and exemptions remained the same
2005	PIT rates were reduced to 20%, 14% and 9% (ti<16,200 – 9%, 16,200<ti<21,000 – 14%, ti>21,000 – 20%). PE and ED were raised to MDL 3960 and MDL 600, respectively
2006	PIT rates were reduced to 20%, 13% and 8%, income brackets remained the same. PE and ED were raised to MDL 4500 and MDL 840, respectively
2007	PIT rates were reduced to 20%, 10% and 7%, income brackets remained the same. PE, MPE and ED were raised to MDL 5400, MDL 12,000 and MDL 1440, respectively
2008	Income brackets were reduced to two, max. rate was reduced to 18%, min. rate at 7% was valid to 2015; PE and ED were raised to MDL 6300 and MDL 1560, respectively, and income threshold was also raised to MDL 25,200
2009	PE and ED were raised to MDL 7200 and MDL 1680, respectively
2010	PE, MPE and ED were raised to MDL 8100, MDL 12,000 and MDL 1800, respectively
2012	PE, MPE and ED were raised to MDL 8640, MDL 12,840 and MDL 1920, respectively; Additional chapter 11 was added to Tax Code – Indirect methods of estimation of Individuals' taxable income
2013	PE, MPE and ED were raised to MDL 9120, MDL 13,560 and MDL 2040, respectively, and income threshold was also raised to MDL 26,700
2014	PE, MPE and ED were raised to MDL 9516, MDL 14,148 and MDL 2124, respectively, and income threshold was also raised to MDL 27,852
2015	PE, MPE and ED was raised to MDL 10,128, MDL 15,060 and MDL 2256, respectively, and income threshold was also raised to MDL 27,852

ti – taxable income

Source: elaborated by the author based on STS Reports.

[12] Law No.1218-XII from 3.12.1992 on Personal Income Tax, Official Gazette, No.12, 30.12.1992. Repealed on 01.01.1998 with effect from the entry into force of Title I and II of the Tax Code.

[13] Abbreviation used: personal exemption (PE); major personal exemption (MPE); exemption for dependents (ED); Moldovan Leu, national currency (MDL).

b. Corporate Income Tax

All economic entities from Moldova were subject to the Corporate Income Tax (CIT), regardless of the form of ownership and legal framework, enterprises with foreign investments, international associations and organizations exercising entrepreneurial activity directly or through a permanent establishment and subsidiaries.

Table 2. Moldova: main changes in CIT system, 1990-2015

1992	Law[14] on CIT adopted with tax rate of 32% for most companies and 1.5% -55% for special cases, exemptions and tax holidays for agriculture related activities and joint ventures
1997	New Tax Code unified CIT rates at 32% and eliminated many special tax exemptions, benefits for agriculture related activities and joint ventures remained
1999	CIT rate was reduced to 28%
2002	CIT rate was reduced to 25%
2003	CIT rate was reduced to 22%
2004	CIT rate was reduced to 20%
2005	CIT rate was reduced to 18%
2006	CIT rate was reduced to 15%
2008	CIT rate was set to zero percent; Regulation determining tax liabilities on income tax was adopted.
2207	Reporting period for the losses in the future on CIT increased from 5 to 3 years
2012	CIT rate was reintroduced to 12% for companies, 7%/18% – individual entrepreneurs and *7% – Farmers*, cancelling all general and individual tax incentives, except those guaranteed for a specific time: free economic zones, interest on bank deposits and corporate securities as bonds; A single simplified 3% CIT of revenues from the operational activity of small- and medium-sized enterprises (non-VAT payers) was enacted; Reporting period for the losses in the future on CIT was reduced from 5 to 3 years.

Source: elaborated by the author based on STS Reports

In the early 1990s, the CIT system in Moldova had multiple rates varying widely for specific cases and sectors from 1.5% to 55% (with a general rate of 32%), with numerous exemptions and incentives for foreign investment. Characteristic for this period was the progressive method used for taxing corporate profits[15]. In 1997, Moldova moved towards rationalization of rate structures and unified rates at 32%. Since then the overall trend was toward a reduction in CIT rates between 32% and 0% from 1997 to 2008. The CIT rate at 12% was introduced in 2012, being maintained until the present time. Thus, since 2012, according to the Tax Code, Moldova applies Income Tax Rates[16] as follows: (a) for physical persons and individual entrepreneurs – 7% and 18%; (b) for legal persons – 12% from taxable income; (c) ***for Farmers – 7% from taxable income***; (d) for economic entities whose income was estimated in accordance with Article 225 and Article

[14] Law of Republic of Moldova No. 1214-XII of 02.12.1992, on Corporate Profit Tax, Official Monitor, No.1, 30.01.1993. Abolished on 01.01.1998, with the entry into force of Title I and II of the Moldovan Tax Code.

[15] Max. rate 70%, min. rate 32% for profits < level of profitability set by the government.

[16] In order to distinguish Income Tax for Legal persons from Income Tax for individuals and others we will use the CIT concept.

225 – 15% of the surplus of the estimated income compared to the gross income registered in the accounting system of the economic agent (table 2).

Households and economic entities – farm producer, which are obliged to pay CIT in income instalments, have the right to pay it in two stages. First – 1/4 of the CIT – up to 30 September. Second – 3/4 of this amount – up to 31 December.

Statistics show that an essential reduction in the CIT rate, many exemptions and tax holidays (e.g. households were exempted from CIT for a period of 3 years during more than 15 years (Article 49(1) of the CF)[17], economic entities – farm producers for a period of 5 years (from 01.01.2006 to 31.12.2010)) did not achieve its goal to stimulate investments and legalize illicit incomes in agriculture sector, which ultimately was expected to help raise the needed budget revenues. In order to revamp incentives to invest in agriculture and provide income support to the poorest farmers, the World Bank suggested to increase the rate for agricultural enterprises to the standard 12% and introduce a presumptive turnover-based tax (World Bank, 2016).

c. Social security and mandatory health insurance contributions (SC and MHIC)

Social and health insurance contributions are a substitute of the payroll taxes system. In order to establish a reasonable tax burden both for the employer and for the employee, SSCs and MHICs were reviewed throughout the period. The evolution of social and health contribution rates are presented in Table 3 and 4.

Table 3 shows a huge difference between general SSC (from 30% in 2002 up to 29% in 2015) and SSC paid in agriculture (from 29% in 2002 up to 6% in 2015) as well as between the fixed sum required from individuals (MDL 2013 in 2006 up to MDL 6372 in 2015) and landowners and tenants of farmland who work the land individually (MDL 525 in 2002 up to MDL 1584 in 2015).

The size of the contribution of landowners and tenants of farmland, who work the land individually, does not depend on the area of agricultural land. The contribution in question allows the taxpayer to benefit from the minimum pension and death benefit.

According to the data from table 4 we can see that owners of agricultural land and other individuals are entitled to application of 75% discount for the amount of the MHI contribution set out in the fixed sum if this sum is paid within 3 months from the date of entry into force of the law on Mandatory Health Insurance.

[17] On the expiry of 3-year exemption, the above-mentioned businesses are entitled to a 35% reduction of income tax rates within two years (Article 49 point 10 of the CF).

Table 3. Moldova: main changes in SSCs system, 1990-2015

	Social Security Contributions
1999	Law on social insurance system No. 489-XIV of 08.07.1999 adopted with SSC rate at 32% (paid by employer and employee at the rate of 29% and 1%, respectively). Pension reform.
2002	SSC rate reduced to 30% (paid by employer and employee at the rate of 29% and 1%). For land owners, that are passed for rent; for landowners organized in collective associations for processing of land; for individuals and companies that rent farmland based on a contract – MDL 1.7 annually for a unit grade/hectare and 29% in labour remuneration fund and other rewards under individual labour contracts for each employed person. For ensuring landholder (of each founder) who does not owns their own agricultural land – MDL 525 annually
2004	SSC rate at 30% (paid by employer and employee at the rate of 28% and 2%, respectively)
2005	SSC rate reduced to 29% (paid by employer and employee at the rate of 27% and 2%)
2006	SSC rate 29% (paid by employer and employee at the rate of 26% and 3%) or fixed sum for individuals (MDL 2013) and tenants of farmland and landowners who work the land individually (MDL 1795)
2007	SSC rate at 29% (paid by employer and employee at the rate of 25% and 4%) or fixed sum for individuals (MDL 2318) and tenants of farmland and landowners who work the land individually (MDL 576)
2008	SSC rate at 29% (paid by employer and employee at the rate of 24% and 5%) or fixed sum for individuals (MDL 2920) and landowners and tenants of farmland who work the land individually (MDL 725)
2009	SSC rate at 29% (paid by employer and employee at the rate of 23% and 6%) or fixed sum for individuals (MDL 3708) and landowners and tenants of farmland who work the land individually (MDL 920)
2010	SSC rate at 29% (paid by employer and employee at the rate of 23% and 6%) or fixed sum for individuals (MDL 4044) and landowners and tenants of farmland who work the land individually (MDL 996)
2011	SSC rate at 29% (paid by employer and employee at the rate of 23% and 6%) or fixed sum for individuals (MDL 4368) and landowners and tenants of farmland who work the land individually (MDL 1080)
2012	SSC rate at 29% (paid by employer and employee at the rate of 23% and 6%) or fixed sum for individuals (MDL 4704) and landowners and tenants of farmland who work the land individually (MDL 1164)
2013	SSC rate at 29% (paid by employer and employee at the rate of 23% and 6%) or fixed sum for individuals (MDL 5220) and landowners and tenants of farmland who work the land individually (MDL 1296)
2014	SSC rate at 29% (paid by employer and employee at the rate of 23% and 6%) or fixed sum for individuals (MDL 5748) and landowners and tenants of farmland who work the land individually (MDL 1428)
2015	SSC rate at 29% (paid by employer and employee at the rate of 23% and 6%) or fixed sum for individuals (MDL 6372) and landowners and tenants of farmland who work the land individually (MDL 1584)

Source: elaborated by the author based on National Social Insurance Agency data.

The proposed measures aim to strengthen the financial stability of the social security system and to expand public health services packages offered through Mandatory Health Insurance Contributions. However, the Wold Bank suggested to reconsider current tax incentives for private pension saving and consider removing the reduction in the SSC rate for farmers in order to revamp incentives to invest in agriculture and provide income support to the poorest farmers (World Bank, 2016).

Table 4. Moldova: main changes in MHICs system, 1990-2015

Mandatory health insurance (MHI) Contributions	
1998	Law No. 1585-XIII of 27.02.1998, on Mandatory Health Insurance
2002	Law No. 1593 on Amount, Procedure and Terms of MHI Contribution Payment
2004	Mandatory health insurance system implementation. MHICs rate at 4% (paid by employer and employee at the rate of 2% and 2%). The fixed sum (MDL 441.2) set for owners of agricultural land and other individual taxpayers
2006	The fixed sum (MDL 816 set for owners of agricultural land and other individual taxpayers
2007	MHICs rate increased to 5% (paid by employer and employee at the rate of 2.5% and 2.5%). The fixed sum (MDL 1209) set for owners of agricultural land and other individuals
2008	MHICs rate increased to 6% (paid by employer and employee at the rate of 3% and 3%) First time application of 50.0% discount for the amount of MHI contribution set in fixed sum (MDL 1893.6)
2009	MHICs rate increased to 7% (paid by employer and employee at the rate of 3.5% and 3.5%). First time application of 50.0% discount for the amount of the MHI contribution set in the fixed sum (MDL 2637.6) for owners of agricultural land and other individuals
2010	First time application of 75.0% discount for the amount of the MHI contribution set in the fixed sum (MDL 2772) for owners of agricultural land and other individuals
2012	MHICs rate at 7% (paid by employer and employee at the rate of 3.5% and 3.5%). Application of 75.0% discount for the amount of the MHI contribution set in the fixed sum (MDL 2982) for owners of agricultural land and other individuals
2013	The fixed sum (MDL 3318) set for owners of agricultural land and other individuals
2014	MHICs rate increased to 8% (paid by employer and employee at the rate of 4% and 4%). The fixed sum (MDL 4056) set out for owners of agricultural land and other individuals
2015	MHICs rate increased to 9% (paid by employer and employee at the rate of 4.5% and 4.5%).

Source: elaborated by the author based on National Health Insurance data.

d. Value Added Tax[18]

VAT was intended mainly to hit consumers, but in reality this tax has proved to be particularly burdensome for economic units creating a financial system which was in a disastrous state, disfavouring their development. The introduction of VAT at 28% in 1992 was unsuccessful. As a result it was reduced to 20% in 1993, being maintained until the present[19] (table 5).

Along its long way of transformation, the VAT system underwent many changes, especially after following the 2005 EU-Moldova European Neighbourhood Partnership Action Plan. The proposed measures to VAT were turned to support production and gradually shifted the tax burden on population. During the period of transformation many exemptions and VAT incentives were granted and ultimately eliminated, at the same time increasing the registration threshold for VAT payers. As a result, an important share of tax revenue growth is based on a decrease

[18] The tax on goods' circulation and sales, which had about 143 of allowances was replaced by VAT by way of the Presidential Decree regarding Value Added Tax, No. 257 of 27.12.1991. The tax on goods' circulation and sale use to be applied depending on the organizational and legal form and property type of entity and/or depending on the specific branch of the relevant companies. Fiscal policy in relation to tax on goods' circulation and sales did not play a regulatory role in the economy; planned management was incompatible with such a role.

[19] Tax Code, Article 96.

in VAT refunds, which is not a part of the competitive and sustainable economy growth action plan. Nevertheless, some improvements as regards simplification of VAT refund procedures can be found during the last 5 years. Thus, it has extended the VAT reimbursement amounts credited to a wider range of transactions[20], starting over the process of stimulating real economy.

Besides all of the above, the introduction of "personalized" VAT reform, could have significant poverty and shadow economy reduction effect while enhancing neutrality, equity and simplicity, which favours administration. Some researchers (Carbacho et al., 2013; Berrex et al., 2010b and 2012) found a solution to "the Impossible Trinity of a consumption tax, which requires a broad base, a uniform rate and relief for poorest taxpayers". These solutions, have been successfully applied for 15 years in Latin America. According to them:

- All exemptions and lower rates have to be removed and monetary compensation to correct the regressive effects of VAT for a particular group of taxpayers has to be implemented;
- The exclusions from the tax base and differential treatment strengthening the neutrality and efficiency of the tax by reducing the cascade effect have to be limited;
- Generalization of VAT facilitates tax administration and promotes formality by using electronic payments;
- The determination of the refund amount has to be based on objective criteria;
- The proposal has to be tailored to the conditions of informality and levels of institutional development of public administration, thus to minimize the potential for manipulation and patronage.

The most used tax incentives by the agricultural enterprises are reduced tax rate (table 5) and possibilities not to pay VAT in case of annual amount received from the taxable deliveries of goods/services (except imported goods/services) is valued at less than MDL 100,000 in 12 consecutive months. These possibilities lasted since VAT implementation and there is no secret that many households and farmers used them to avoid tax.

Thus the Wold Bank suggested to remove the VAT exemption for agricultural machinery and re-introduce a unified VAT rate for agriculture products combined with compensation for low-income households in order to revamp incentives to invest in agriculture and provide income support to the poorest farmers (World Bank, 2016). The proposals for 2016 include the requirement for all businesses to register as VAT and gradual exclusion of a number of existing forms of fiscal incentives for businesses and individuals from the Tax Code.

[20] According to 2014 STS Report over the past 5 years (2010 to 2014) the amount of the VAT refund doubled from MDL 1058.3 to MDL 2375.5 million.

Table 5. Moldova: main changes in VAT system, 1990-2015

1991	Presidential Decree on VAT
1992	VAT adopted with a standard rate of 28%, using the origin principle in the trade within the CIS
1994	Law on VAT standard rate reduced to 20% and a zero rate enacted.
1995	Law required VAT to be based on invoices, introduced destination principle except for trade with Russia
1997	Law on Application of Title III "VAT" of the Tax Code
1999	Reduced rate of 8% introduced for selected food items and 5% for natural gas
2003	Compulsory registration threshold for VAT payers raised from MDL 100,000 to MDL 200,000
2004	Tax incentives excluded for certain goods and raw materials used in agriculture and for equipment and complementary aggregates, except for those used in manufacturing of agricultural production. Measure was extended in 2005.
2006	Selected medical drugs were moved to the reduced rate (8%) group
2007	Compulsory registration threshold for VAT payers raised from MDL 200,000 to MDL 300,000 and a special provision for VAT payers' registration threshold to MDL 100,000 was introduced
2008	Selected other medical items were included in the reduced rate (8%) group
2010	Sugar and selected plants and animals were moved to the reduced rate group (8%); Amendments on VAT refunds enacted; Reduced VAT rate increased for liquefied and natural gas from 5% to 6%.
2011	Compulsory registration for VAT invoices, whose value is exceeding MDL 100,000; Compulsory registration threshold for VAT payers raised from MDL 300,000 to MDL 600,000; Extension of the VAT refund provisions for investments (expenses) incurred for farm tractors.
2012	VAT exemption for wind energy generating sets; Cancellation of VAT exemption to fixed assets invested in social capital; Sugar was moved to the standard rate group (from 8% to 20%); min. threshold raised to the category of assets that are deposited into the social capital without paying VAT (ordinary customs duty), from MDL 3000 to MDL 6000.
2013	Regulations on VAT refund adopted; Selected plants and animals were moved to the standard rate group (from 8% to 20%); Reduced VAT rate increased for liquefied and natural gas from 6% to 8%.
2014	Reintroduction of VAT exemption to fixed assets invested in social capital; Extension of the VAT refund provisions for companies providing passenger transportation services and not registered as VAT payers; Phytotechny, horticulture, animal breeding and sugar beet, produced, imported and/or delivered in the Republic of Moldova were moved to the reduced rate group (8%).

Source: elaborated by the author based on the Moldova Ministry of Finance, Medium-Term Expenditure Framework (MTEF) and STS Reports.

e. Excises

Excises were introduced in 1992. The list of goods subject to the excise duty, including a range from 20 to 60 categories, did not undergo big changes during the analysed period (table 6). Both expansion of the Goods List, subject to excise duty, and additionally, their exclusion is dictated by existing economic fluctuations, which determine the inclusion or exclusion of the targeted categories. Excise fiscal facilities granted did not influence the total excise duty given its maintenance without amendments.

As regards the excises structure, it has to be noted that during the first 10 years the highest share was owned by excises collected from wine from grapes, cognac and champagne, and tobacco products. Since 2000, the excises derived from petroleum products represent the biggest part, followed by tobacco production, cars and alcoholic beverages.

Table 6. Moldova: main changes in excise duty system, 1990-2015

1992	Presidential Decree on Excises
1994	Law on excise duties adopted in percentages applied to the selling price
1995	Excise duties were established in fixed rates in monetary expression for a unit of goods subject to excise duty.
1997	Introduction and further increase in the rate of excise duty on wines raw materials for wine production.
1998	Fixed single rate of excise duty enacted for both domestic and imported goods. Expansion of Goods List with cars and coffee beans, ground coffee and instant coffee, fur, televisions, tape recorders, video recorders, furniture, office furniture, household and luxury, caviar, red caviar, perfumes; Increase in excise duty on beer, cigarettes and cigars, diesel, petrol.
2000	Law on Application of Title IV "Excise Duties" of the Tax Code. Since 1 May 2000, for all goods (production) subject to excise duty the same units are applied and positions are allocated according to the tariff classification of goods of the Republic of Moldova.
2002	Expansion of Goods List with petroleum derivatives
2004	Established ad valorem percentage share of value market for cognac, vodka, whiskey, rum, brandy and liqueurs (previously was absolute amount per unit of measure).
2005	Expansion of Goods List with ethyl alcohol derivatives
2006	Exclusion from Goods List of license for gambling; Increase in excise duty on tobacco products and spirits and decrease of those with less alcohol
2008	Adjustment to the inflation projected rate of excise duties paid in fixed amounts, except fuels. Measure planned to be kept till 2017; Gradual adjustment of excise taxes on tobacco products to the countries of the region and the European practice; Excise duty on filter cigarettes for both the domestic production and for the import adopted the tax base to the maximum price for retail sale; Review of excises quotes for goods that do not meet the World Trade Organisation requirements (e.g. caviar, perfumes, etc.).
2010	Expansion of Goods List, with crystal items; Increase in almost all goods, subject to excise duty.
2012	Exclusion from Goods List of crystal items; Expansion of Goods List with imported fuel oil, liquefied gas, nitrogen and oxygen imported; Exemption from excise duty on confiscated property, ownerless property, ownership pass based on succession and treasures rules; Increase in excises quotes for cars (about the 50%) with some exceptions.
2013	Exclusion from Goods List, subject to excise duty of wine from fresh grapes and grape must.
2014	Exclusion from Goods List of alcohol and their derivatives, which are used in food and non-food industry and precious metals; Excises structure changed for alcohol production from the combined quota to specific rate, along with their increase; Expansion of Goods List with other tobacco and manufactured tobacco substitutes tobacco "homogenised" or "reconstituted", tobacco extracts and essences; Increase in excise duty on cars with service term more than 7 years.

Source: elaborated by the author based on the Moldova Ministry of Finance, Medium-Term Expenditure Framework (MTEF) and STS Reports.

It has to be mentioned that currently, the amendments to the excises chapter were made in line with harmonization and in accordance with the legal framework timetable established under the Association Agreement between the EU and the European Atomic Energy Community and Member States, on the one hand, and Moldova, on the other. Statistics show an increase in tobacco and fuel excises in line with Moldova's commitment of narrowing the gap between regional levels and the EU average. As a result, since 2010 there has been an increase in excises in total tax revenue with almost one per cent of GDP (figure 2).

In the medium and long term, the authorities intend to continue the process of gradual harmonization of the excise tax rates with the EU minimums. Unfortunately, not all EU requirements take into account Moldova's reality. According

to the EU practices, the car taxation system is scheduled to be revised by cancelling the excise duty (depending on CO_2 emissions) in the near future, which will probably have a negative impact on low and medium level income parts of population.

f. Real Estate Tax

Over the years, the land tax has undergone some changes. The payers of this tax were individuals and legal persons – owners, holders or beneficiaries of land. Initially, the tax rates were insignificant and differentiated, depending on the classification and fertility level of the land. Since 1995, agricultural enterprises have started to pay a single land tax, which included real estate and road taxes, previously paid separately. Consequently, land tax rates have been increased. Real estate tax, according to the President's Decree, began to be paid by all legal persons with fixed production and unproductive funds as well as by the citizens – owners of buildings and constructions.

Currently, notwithstanding Title VI of the Tax Code, land tax and real estate tax is calculated separately. In the real estate development process separation of tax base – land and improvements on them – generated legal and administrative issues. Imputing the fairness of the tax base was necessary to improve the evaluation system and subsequent unification of these taxes in a single tax (table 7). In case of the payment of both land tax and real estate tax before 30 June, all taxpayers (including households and economic entities – farm producers) benefit from a discount of 15% of the tax to be paid.

The first attempts to change the taxation system of real estate were taken in 1999 by introducing progressive coefficients depending on the total area of the main housing and constructions of individuals not engaged in entrepreneurial activity and registered ownership right. Statistics show the highest level of tax collected in GDP for this year followed by a huge decline until the present. Thus, increase in the tax burden on wealthier citizens did not have the expected positive impact, although it has burdened work and cadastral bodies with maximum tax inspectorates.

Nevertheless, implementation of new real estate tax system based on real estate value estimated at market prices started recently is expected to play a significant role in the near future. In order to incentivize better use of land, the World Bank proposed to:
– Abolish or ease the restriction on land acquisition by foreigners;
– Continue effective valuation of land and property and adopt value-based taxation property;
– Introduce a special tax on uncultivated land.

Table 7. Moldova: main changes in real estate tax system, 1990-2015

1992	Law on land tax and taxation method. President's Decree on real estate tax
1995	Single land tax adopted for agricultural enterprises
1999	Progressive coefficients introduced. For large properties (with surfaces comprised between 100 and 150 square meters) the tax rate was 1.5 times bigger (with surfaces comprised between 150 and 200 square meters), 2 times bigger (with surfaces comprised between 200 and 300 square meters), 10 times bigger and for very large real estate (more than 300 square meters) it was 15 times bigger.
2000	Law on Application of Title VI "Real Estate Tax" of the Tax Code, Real estate tax adopted with 0.1% of the property's book value for entrepreneurial activity, for non-residential properties ranged between 0.1% and 0.3% of the property's book value, depending on their location.
2007	New real estate tax system implementation based on real estate value estimated at market prices; The first phase is related to housing (apartments and private houses, land relating to the property) in cities and towns, including towns that are part of them, except villages (communes).
2010	The second phase is related to garages and land on which they are located; fruit-growing associations' consignments with or without citizens' constructions placed on them and real estate of the economic entities used for commercial and industrial purposes. Real estate tax increased from 0.02% to 0.25%. For large properties (with surfaces comprised between 100 and 200 square meters), the tax rate is 3 times bigger, and for very large real estate (more than 200 square meters), it is 28 times bigger.
2012	New Real Estate rate for housing – apartments and private houses in villages (communes) related to Chisinau and Balti, in the amount of 0.05% (minimum rate) and 0.3% (maximum rate) and land farm with buildings located on them, in the amount of 0.1% (minimum rate) and 0.3% (maximum rate); Real estate tax increased to 0.05% (minimum rate) and 0.3% (maximum rate) for housing (apartments and private houses, land relating to the property) in cities and towns, including towns that are part of them, except the villages (communes) and garages and land on which they are located; fruit-growing associations' consignments with or without citizens' constructions placed on them and real estate of the economic entities used for commercial and industrial purposes; Cancellation of provision related to the taxation of real estate with a grade of less than 50% completion. Thus, following the proposed changes to be taxed all real estate estimated market value regardless of their degree of completion.
2013	Expanded list of categories of taxable items. Land tax and real estate tax is calculated separately for each category.

Source: elaborated by the author based on the Moldova Ministry of Finance, Medium-Term Expenditure Framework (MTEF) and STS Reports.

Since 2016, Moldova will change the current system of real estate evaluation. All property owners will be forced to evaluate their assets, and thereafter every three years – to re-evaluate them. Specialized companies authorized by the landlord will carry out the evaluation. It involves additional costs for owners for the benefit of the evaluators, but those who will not comply with this requirement, risk fines of up to MDL 100 thousand and a tax three times higher.

Impact of MTS on local and agriculture sector development

Moldovan tax reforms generally correspond to the "flat-rate tax" approach, based on simplification and aligning the *de jure* tax burden with the *de facto* administration capacity.

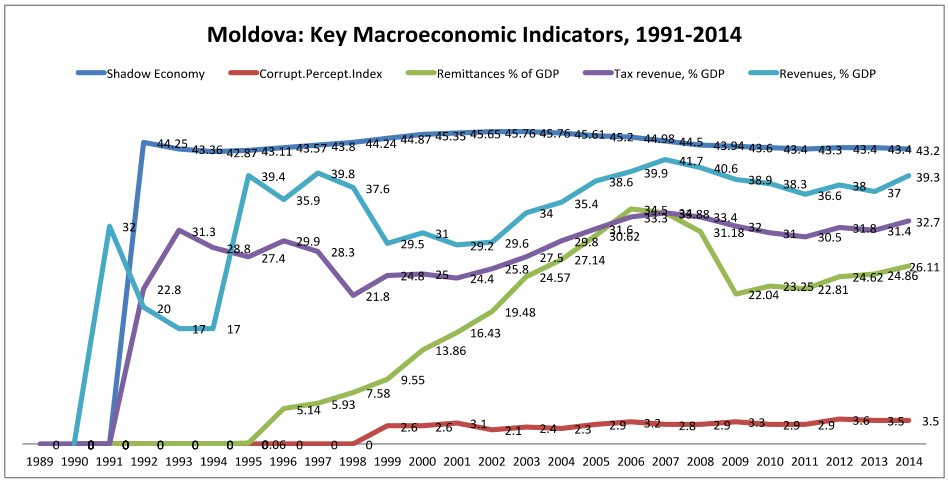

Figure 1. Moldova: Key Macroeconomic Indicators, 1991-2014

Source: elaborated by author based on the Moldova STS, World Bank, Transparency International and Elgin and Oztunalz (2010) data.

An increase in tax payments in 1990-1995 was caused mainly by high inflation[21]. In 1996, this reserve is exhausted, while reduction of GDP and tax evasion continued their pace. Reform, started in 2000, reducing tax rates without reducing revenue, by broadening the tax base and reducing the number of exemptions. It is widely seen as helping to:

– *Accelerate GDP*. The cumulative decline in GDP of 65% between 1990 and 2000 turned Moldova into the poorest country in Europe, which has lasted until present time.
– *Combat corruption*. Moldova score of public-sector corruption below 3 on a scale of 0 (highly corrupt) to 10 (very clean). This problem is evident just analysing subsidies' allocation among farmers. Most of them is allocated to a relatively small number of beneficiaries (over 80% of resources are allocated to less than 10% of beneficiaries) (Budianschi et al., 2012).
– *Reduce shadow economy*. The average rate of the shadow economy in Moldova is 44.4% during the analysed period. The largest share in total informal employment holds agricultural sector (66.4% in 2012), the main contribution belongs to households (1/3). Agriculture is one of two sectors where informal employment exceeds the formal one (74% in 2012) (Budianschi et al., 2012). Due to the specificity of this type of employment, 80% of informally employed people are working in rural area, which is detrimental for an economy where about 55% of population lives in rural areas and almost 30% are employed in agriculture.

[21] Up to 77% of the enterprises' benefit were ensured by inflationary pressure.

– *Reduce poverty*. According to the World Bank data the highest poverty rates are registered among the agriculture-related population: 21.7% of farmers and 31.3% of agricultural workers were found to be in poor in 2013, with these two categories accounting for 31% of the country's poor population (World Bank, 2015).
– *Stop the migration process*. The transition to a market economy in agriculture has resulted in a loss of jobs. According to statistical data employment in the agriculture sector counted up to 70% of total taxpayers at the beginning of MTS's transformation. Unfortunately, latter on, there was a strong and stable downward trend in the number of employees in the agricultural sector. The pace of decline in the number of workers in the agricultural sector amounted to 5% annually. Thus, the statics shows a huge decrease up to 50% in 2000, 28% in 2011 and 16% in 2015.

To this end, further improvement in tax collection, by promoting voluntary compliance among taxpayers, and therefore administration are needed[22].

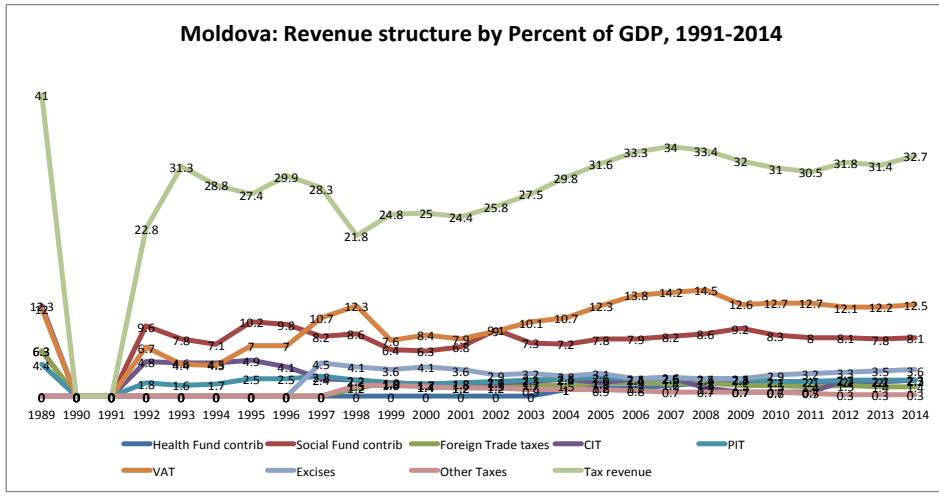

Figure 2. Moldova: revenue structure by percent of GDP, 1991-2014

Source: developed by the author based on different source of the public available data.

Over the past 25 years (1990-2014), the share of tax revenue as a percent of GDP has changed, with volatility from 21.8% to 34.0%, but never reached its pre-1990 level of 41%. The tax revenues are holding the major budget revenues, reaching the highest rate of 85.4% in 2014, including indirect taxes (45.8%) and

[22] It has been recognized that to ensure fiscal discipline and efficient management of public financial resources, the main possibilities for raising revenues should not be through raising taxes, which can reinforce compliance problems, but improving collection and, therefore, administration.

direct ones (39.7%). While social contributions remained a significant source of revenue, the collection of CIT and customs tax revenues declined substantially (e.g. CIT is reduced from 12.3% in 1989 to 2.2% in 2014 and Foreign Trade taxes – from 6.3 to 1.4, respectively). Introduction of VAT changed the structure of tax revenues, reaching 38.2% of the total in 2014.

Even though Moldova is an agricultural country its current GDP was not so much influenced by this structure. In 2015, a value of USD 6.188 billion was recorded, which was decline compared to 2014. This result was helped by lower indicators of agriculture, forestry and fishing (-1.7%), with a share of 11.7% in GDP formation.

Agriculture was always one of the least taxed sectors in the economy. Taxes collected from agriculture amounted to 0.8% of GDP in 2013. Moreover fiscal cost of tax expenditure (forgone tax revenue) is over 0.6% of GDP and it has not been negligible (table 8).

Table 8. Tax revenue and expenditure from/to agriculture sector, 2013

Taxes and contributions	Tax expenditure, % of GDP	% of total taxes from agriculture
Reduced CIT rate	0.07	59.0
Reduced VAT rate	0.50	9.7
Reduced Social Security rate (SSCs)	0.05	6.1
Reduced Health contribution rate	0.01	1.2
Total	0.63	63.0

Source: World Bank. 2014. Moldova Public Expenditure review: Agriculture Study.

In Moldova, there are two ways of public spending on agriculture:

– Direct budget spending (in the form of subsidies (current and capital), services (research, education, food safety and extension services) and through donor-supported programmes);
– Tax expenditure (through reduced CIT, VAT, SSCs and health contribution rates).

Table 8 shows that tax expenditure is over 0.6 of GDP, sizable compared to both taxes collected from agriculture and public spending on the sector. Thus, there is 60% of the tax collected in agriculture and about 40% of direct spending on agriculture.

In order to answer our second question: **What do we see?** we can highlight the following features in agriculture area:

– ***Inefficient tax collection***, including excessive expenses and huge administrative burden. Tax expenditures represent around 60% of taxes collected. Informal employment exceeds the formal one (74%).

- ***Law tax morale***:
  - Aggressive attitude of Tax Authority and judges towards taxpayer (finished civil cases in favour of MTA was – 97.2% in 2008 and 85% – in 2013);
  - Uncertainty of tax law (tax law changes – 2-3 times per year);
  - Subsidies are allocated to a relatively small number of beneficiaries (over 80% of resources are allocated to less than 10% of beneficiaries).
- ***Decreasing support of GDP from agriculture sector***. Taxes in the agricultural sector represent less than 1% of GDP.

Conclusion

Based on our research, it is possible to conclude that tax system does not achieve both financial function[23], contributing to the destabilization of the financial structure (budget deficit, external debt, etc.), and the regulating function (changing tax laws create undue burdens for taxpayers and tax administration, loss of taxpayers' confidence and ultimately their emigration abroad[24]). The tax system, after 20 years, was characterized by oversize, austerity and state's inability to efficiently manage the available resources and some steps were taken in the last 5 years. All changes, slowed down or even harmed the country's development, in particular at local level. Farmers are so constrained that a lot of them decide to abandon this activity. The ability of authorities to implement inefficient laws and their severe administrative burdens are the main reasons for farmers to stop this type of activity.

In order to answer our third question: **How to move forward?**, the following recommendations were formulated:

Merging the current 35 administrative-territorial units (including local tax offices) into a not more than six or eight modernized facilities. This measure would allow regional offices to operate effectively (small offices are costly) and assure uniformity of the tax law implementation, develop and maintain all recent knowledge, share experience, and specialize in all aspects of the tax administration;

Due to seasonal agriculture activities, there is a need in tax reporting choice to introduce the possibility to choose between: monthly, quarterly, and annual reporting. Larger intervals are less time consuming when compliance burden is critical in seasonal periods. Thus farmers are usually available in the winter to provide tax reporting.

Introducing the possibility of registering entity as VAT payer from zero sales. Thus, small producers that have local processors as customers or any distribution

[23] The government of Moldova is losing up to 20% of its revenue due to tax collection effort.

[24] According to the 2004 population census, 25% of the labour force works abroad.

networks will benefit from the same advantages available to medium and large farmers thus stimulating domestic competition.

Cancellation of restrictions on the acquisition of land by foreigners. Thus, motivating new investors would improve development and competitiveness issues.

Different approach on taxing culture for local farmers vs importers – one of the challenges the country's government is to establish an effective tax mechanism that would ensure transparency, simplicity, tax collection at the same time giving farmers a certain advantage over importers of agricultural products either through less burdensome tax regime or subsidizing part thereof.

Improvement in tax collection, by promoting voluntary compliance among taxpayers, and therefore administration are needed as well. It has been recognized that to ensure fiscal discipline and efficient management of public financial resources, the main possibilities for raising revenues should not be through raising taxes, which can reinforce compliance problems, but improving collection and therefore administration.

Introduction of "personalized" VAT reform. This reform could have significant poverty and shadow economy reduction effect while enhancing neutrality which favours administration.

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Predrag VUKOVIĆ, Zoran SIMONOVIĆ, Nataša KLJAJIĆ

Institute of Agricultural Economics, Belgrade, predrag_v@iep.bg.ac.rs, zoki@, medianis.net, natasa_k@iep.bg.ac.rs

Complementarity of Multifunctional Agriculture and Rural Development with Rural Tourism and Possibilities for their Implementation in the Republic of Serbia

Abstract: *Rural economy is not strictly related to agriculture, but also includes the so-called non-agricultural income genereting activities in rural areas.. Rural areas in Serbia are characterised by spatial-geographic diversification, socio-economic devastation and relatively good ecological, cultural and historical preservation. Thus, the concept of sustainable development imposes itself as an imperative in strategic planning and is in line with the increasing demands for the development of rural tourism, because it is rural tourism provides opportunities and has the capability to connect a larger number of economic activities in rural areas. The concept of rural tourism cover two complex because it touches upon two important economic sectors: agriculture and tourism.*

The key question for the Republic of Serbia is determining the "gap" between the current situation and the desired objective. To this end, the paper approaches the complex problem through phases. The first step shows theoretical and methodological approach to the concept of multifunctional agriculture. Later on, the concept of rural tourism is explained with a review of the current situation, and in the end complementarity within the development of rural tourism (between agriculture and tourism) is indicated as well as the significance it would have on initiating the overall economic activities in rural areas.

Expectations, based on particular countries' experiences in the European Union, are that the application of the model of multifunctional agriculture and within it the implementation of rural tourism in areas that possess the necessary conditions, could reinforce the overall economic activities and contribute to ending the current negative trends. The state with its institutional mechanisms and development policy should play an important role in this process.

Keywords: *multifunctionality, agriculture, rural development, model, rural area, economic activities*

Introduction

The multifunctionality of agriculture first appeared as a concept in 1992 at a conference in Rio de Janeiro. The final document was signed by 178 of governments of the UN member states and contains 40 chapters on 500 pages. The full title of the final document is *The Rio Declaration on Environment and Development, and the Statement of principles for the Sustainable Management of Forests* and XIV chapter entitled: "A. Agricultural policy review, planning and integrated programmes in the light of the multifunctional aspect of agriculture, particularly with regard to food security and sustainable development"[1].

During the 1990s this term was broadly accepted in numerous political documents which dealt with development concepts of agriculture and rural areas. There is a consensus that the concept emerged because it was necessary to present the reformed European agricultural policy to the opponents of the World Trade Organization in a politically acceptable form.

Despite several attempts to give a comprehensive definition of multifunctional agriculture, which were so far made, there is still no one definition, but the concept promotes agricultural production, which in addition to its basic function has a number of non-production functions related to rural and sustainable development as well as a strong socio-demographic function.

As much as the European Union is a good example of understanding and practicing the concept of multifunctional agriculture, rural economy and rural development, in Serbia, unfortunately, this happens without incentive. The Republic of Serbia is still dominated by traditional, monofunctional agriculture, and implementing the concept of multifunctional agriculture and rural development is in the initial phase.

The Republic of Serbia belongs to the group of the top agricultural producing countries in Europe with the dominant pre-modern agrarian structure. Agriculture still represents one of the most important industry sectors, both in terms of participation in the gross domestic product, and the employment structure. It is characteristic that this share has increased over the years.

In order to eliminate the current negative trends in rural areas, it is necessary to reform agricultural and rural economy. The change of attitude towards rural areas is essential. This is a long and complex process that institutions and organizations dealing with agricultural activities need to perform at all levels.

[1] web link: http://sustainabledevelopment.un.org/content/documents/Agenda21.pdf

The concept of multifunctional agriculture and rural development

During the 1960s a certain distancing from the previously dominant traditional understanding of agriculture occurred (Bogdanov, Đorđević-Milošević, 2005). Namely, the restrictions of conventional conceptions of agriculture (integral, sustainable and organic) led to the emergence of a new concept which would connect primary agricultural production and its other important functions, for example, social, demographic, cultural, etc. (Rossing et al., 2006).

In this regard, the development of some alternative systems of agricultural production started. Evolution of farming systems with the basic characteristics is shown in table 1.

OECD (2001) describes the multifunctionality of agriculture through the existence of production and non-production benefits that arise as a result of agricultural production. Non-production benefits have characteristics of externalities or public benefits that are not directly observable in the market.

Table 1. Systems of agricultural production

Conventional	Production of food for population (urban and rural), job provision (employment and income) for rural population. The concept is basically aimed towards growth of productivity and towards enabling full employment of manpower in agriculture.
Integral	It strives towards reduction of the use of dangerous pesticides and other harmful ingredients in agricultural production. It does not substitute conventional systems, but its purpose is to contribute to awareness development of the need for improvement of agricultural production through the application of appropriate technologies in the whole chain of production, processing and consumption.
Sustainable	The stress has been put on the management in order to enable constancy in the returns of certain land under cultivation.
Ecological (organic)	It strives towards reducing the influence of chemical and all other harmful inputs in agriculture in order to enable organic production of food.
Multifunctional	It strives to include all basic functions of rural areas and unite them in interests of agricultural producers. The concept includes primary agricultural production with the stress on the environmental protection.

Source: Vuković, Roljević and Sarić (2009), The Strategic Orientation to the Concept of Multifunctional Agriculture and Environmental Protection, p. 46. *Poljoprivredna tehnika*, No. 4, pp. 45-53.

If we accept this interpretation, it is necessary to analyse agriculture and its functions in order to properly interpret the existence of productive and non-productive benefits it has to the society. Functions of agriculture can be divided into economic, environmental and social.

- *Economic function*, as the name implies, indicates production of food and raw materials for the manufacturing industry and the market. This enables food security and supplys market with food of appropriate quality at affordable prices.
- *Social function* deals with keeping the population in rural areas as well as the balanced development of all parts of the territory within the state. More precisely, agriculture is a generator of development in remote areas where there is no opportunity for employment of the population in manufacturing industry and tertiary sectors of the economy.
- *Environmental function* is reflected in the preservation of natural resources as well as the preservation of biodiversity functions but also the cultural heritage of rural areas.

European Special Committee on Agriculture in 1999 considered in its working documents (Commission of the European Communities, 1998) the concept of multifunctional agriculture in the context of food production, conservation of the area, environmental protection and land use planning. Emphasis is put on the fundamental difference between the European model and the competitors' model, which is in the multifunctional nature of European agriculture and the role it plays in the entire economic system, maintaining environmental standards in society as a whole and ultimately preserving the rural landscape.

Later interpretations add the corresponding functions to the concept of multifunctionality (agricultural production, environmental, cohesive, recreational, residential, cultural, etc.).

The UN FAO promoted the concept of multifunctional agriculture in several official documents. For example, in 1999 in the document *Cultivating Our Futures – Issues Paper: The Multifunctional Character of Agriculture and Land*, the basics of this concept were given.

Daugbjerg and Swinbank (2015) note that the process of reforms of the European agricultural policy has been continuous and constantly reforming for over thirty years.

The concept and characteristics of rural tourism

The concept of rural tourism is complex, because it stems from the fact that it touches on two important economic sectors (agriculture and tourism). The *Encyclopaedia of Tourism* (2005) points out that rural tourism draws its generic power

from rural areas. To date there have been more attempts to give a comprehensive definition of rural tourism both in the literature and by the relevant international organisations that monitor its development.

OECD (1994) accepted the attitude that due to the complexity of the problem it is necessary to adopt a working definition of rural tourism according to which it is:

- Located in rural area;
- Functionally rural, built upon the rural world's special features: small scale enterprise, open space, contact with nature and the natural world, heritage, "traditional" societies and "traditional" practices;
- Rural in scale – both in terms of buildings and settlements – and, therefore, usually small scale;
- Traditional in character, growing slowly and organically, and connected with local families. It will often be very largely controlled locally and developed for the long-term good of the area;
- Sustainable – in the sense that its development should help sustain the special rural character of an area, and in the sense that its development should be sustainable in its use of resources. Rural tourism should be seen as a potential tool for conservation and sustainability, rather than as an urbanising and development tool;
- Of many different kinds, representing the complex pattern of rural environment, economy, and history.

The UN FAO (2004; Scialabba, Williamson, 2004) distinguishes the following types of tourism that are taking place in rural areas: ecotourism, agro-tourism, agro-ecotourism and eco-organic tourism. The division is explained as follows: **Ecotourism** involves activities that support the preservation and improvement of quality of life resources.

Agro-tourism represents the symbiotic relationship between tourism and agriculture. It is a key element of an environmentally and socially responsible tourism in rural areas. Rural hospitality offers new employment and income generating opportunities for rural populations, including agro-tourism and it is an expression of cultural exchange of agricultural practices, artistic heritage and craftsmanship and culinary traditions. Agro-tourism may take several forms: holiday farms, farmhouse bed-and-breakfast, farm camping, mountain resorts, equestrian centres and other forms of rural accommodations. Such facilities are an innovative payment system for environmental services generated on and around agricultural lands.

Agro-ecotourism. While ecotourism is nature-based and agro-tourism is farm-based, agro-ecotourism is a combination of the two. The rural landscape, usually a combination of wild and agro-ecosystems, is the most important resource for tourism development. It is obvious that a diversified agricultural landscape, with

semi-natural habitats, has a greater aesthetic and recreational potential over uniform, degraded and/or polluted agricultural areas. In Europe, agri-environmental policies often promoted organic agricultural activities as a most effective means for landscape conservation. Agro-ecotourism in certain locations provides a strong economic incentive to small farmers to commit to biodiversity-friendly agriculture management.

Eco-organic tourism. When agro-ecotourism develops around an organic farm, it is referred to as eco-organic tourism. The valorisation of specific elements of the agro-ecosystem landscape offers an additional economic resource for environmental protection. Conversion to organic management in agricultural areas and the development of connected activities such as tourism are increasing. When farms are organically-managed, they increase the motivation for tourists' visits. New tourist expectations have enhanced the quality of the supply such as diversified farm landscape, environmentally sound farmhouse architecture and local/typical gastronomy.

The European Federation of Rural Tourism ("EuroGites"), at a general meeting held on 29 September 2005 in Yalta, Ukraine, adopted "general standards of rural tourism". Standards are, as pointed out, equal to the area of the whole of Europe and are valid for all members of the Federation to the present (table 2).

In the documents *Strategy for the Development Tourism in Serbia* (2005), *Strategy for Sustainable Rural Tourism Development in Serbia* (2011), *Master Plan for Sustainable Rural Tourism Development in Serbia* (2011), the term rural tourism involves a series of activities, services and other services that organise the rural population on family farms in order to attract tourists and create additional income while respecting the principle of sustainable development and conservation of natural resources.

Table 2. The criteria for defining the framework of rural tourism by the European Federation of Rural Tourism ("EUROGITES") from 2005

No.	Criterion	Explanation
1.	Position of the household in the natural environment, a village or small town.	Less than 5,000 residents in the village / town or in typical / traditional neighbourhoods.
2.	Rural area with emphasized characteristics of traditional agriculture and the outstanding natural values.	Outstanding natural values (natural park, etc.). Traditional agriculture excluded industry.
3.	Tourism is not the main or predominant activity or source of income in the surrounding area.	The ratio of the number of tourist beds and residents in rural areas should not exceed 1:1 ratio.
4.	Good environment, quiet and peaceful location, no noise and pollution.	Acceptable noise and odours that is characteristic of traditional agricultural production.

table 2 cont.

5.	Authentic accommodation and environment.	-
6.	Hospitality	Personal care host about the guest (tourists).
7.	Small capacity units	The upper limit capacity is 40 beds, if not legally designated or prescribed by internal standardisation by members.
8.	Respect the legal criteria for evaluation	Respect for standards adapted to evaluate quality.
9.	Social sustainability in the context of multifunctional activities in rural areas.	The application of the criteria of *Agenda 21* for tourism.*
10.	Connection with the local community and traditional culture.	Minimum integration activities within the communities in the region, guests have the opportunity to make contact with local realities if they want to.
11.	Local products and gastronomy.	Available in the environment.
12.	Culture (folklore, handicrafts, customs, heritage, etc.).	Available in the environment.
13.	Excluding criteria: – urban and industrial locality and their surroundings. – areas of extreme mass and developed tourism. – noise, pollution, etc.	-

*** Considering that tourism has simplified impact on economic and social development, it is reasonable to highlight the "social costs of tourism", as well as determining the consequences of its development. Many tourist places, adapting to the needs of tourism development are losing their originality and uniqueness. For this reason, it has developed a concept called "sustainable tourism". Sustainable tourism is defined as the positive approach that seeks to reduce tensions and frictions that arise from complex interactions between the tourism industry, visitors, the environment and society as a host. "Such a tourism including work for lasting quality of natural and human resources", which is particularly emphasized in the document *Agenda 21*.**

Source: Ružić (2009), *Rural tourism*. Institute for agriculture and tourism, Poreč, p. 16.

Analysis of the current state of rural tourism development in the Republic of Serbia

Rural areas occupy more than 80% of the territory of the Republic of Serbia (*Strategy for spatial development…,* 2009) and according to the results of 2011 Census of Population approximately 44% of the total population lives in these areas. Hence a conclusion about the importance of development issues in these areas to the overall economic and social life of the country.

In December 2015, Serbia made first steps on the road to the EU accession. By this act Serbia accepted all the conditions and development models expected by

the EU. Terms commonly used in the concept of the Common Agricultural Policy are: rural development, sustainable food, environmental protection, organic farming, rural tourism, etc.

A group of authors (Zdorov, 2009; Barlybaev, Akhmetov, Nasyrov, 2009), indicates the impact of rural tourism on rural development and suggests that rural tourism has developed in stages in most of the countries. Three stages of development are suggested: independent founding, purposeful development, arrangement of the unique agritourism complex.

The first stage termed independent founding in Serbia started in the 1970s. Soon after, the leading travel agencies started to match tourist offer in rural areas with the demand in urban city centres.

Milojevic (2004) states weaknesses and strengths characteristic for the period until 2000. The basic strengths in rural tourism development refer to: preservation and abundance of natural resources, rich cultural and historical heritage, abundance and diversity of rural communes, the richness of local traditions, traditional hospitality, diversification of the tourism product. Weaknesses are: inadequate rural infrastructure, "archaic" tourist product, undeveloped information system, unsatisfactory quality of accommodation and other services, lack of educational programmes (training) for farmers in order to provide adequate quality of service, lack of experience, lack of motivation, undeveloped awareness in rural areas of the economic and other benefits of rural tourism development.

The second phase termed purposeful development began in 2006. Namely, the Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia (*Анализа буџетске*…, 2009), in the period from 2006 to 2008, allocated a total of RSD 91,580,215 for rural tourism development and diversification of economic activities in rural areas. In 2008, there were 173 beneficiaries of these funds (141 registered agricultural producers, 23 associations of citizens, 7 legal persons and 2 cooperatives). The largest amount of funds was distributed to the regions of Western Serbia and Vojvodina, while among the districts, the largest amount was distributed to Zlatibor, and the lowest to the North Backa district. Analysis of the investment types indicates that 91% of allocated funds was directed to the restoration of traditional rural households (construction, extension and renovation of buildings, equipment, etc.), while 9% was allocated to promotional and educational activities.

Number of villages and municipalities engaged in rural tourism increased in 2009 (41 municipalities, 119 villages with 164 registered households, 570 rooms and 1,628 beds). The main weaknesses in the development of rural tourism until 2009

were lack of organisation and the absence of network structure of tourism operators (Штетић, Тодоровић, 2009).

According to the data presented in the *Master Plan for Sustainable Development of Rural Tourism in Serbia* (2011), which was made in cooperation between 106 local tourist organisations, rural tourism encompasses 2.7 million overnight stays, which stands for a total of 145,354[2] individual overnight stays in rural tourism and 2,556,128[3] of common tourist overnight stays usable for rural tourism. Rural tourism provides more than 32,000 beds (registered and unregistered), where 10,000 beds are located exclusively in the countryside. The total number of beds is estimated to bring more than RSD 5 billion annually in income and RSD 5 billion in direct income to the tourism sector. The income of RSD 10 billion does not include visitors who stay for a night or stay with their friends or relatives (although they also spend money on tourism and other services during their stay) and it does not include the indirect contribution to the local economy in terms of income and employment. The income of RSD 10 billion represents 16% of direct GDP from travel and tourism, as calculated by the World Council for Travel and Tourism in Serbia for 2010, which is RSD 62.4 billion (*Master Plan*…, 2011).

The weaknesses of the existing accommodation capacities in rural tourism in the second stage of development concern (Ђуровић, Цвејић, 2011):
– insufficient development of accommodation capacities and unsatisfactory quality of the existing ones;
– insufficient occupancy rate of the existing capacities;
– inadequate offer of basic tourist services;
– the economy of low volume and low prices;
– underdevelopment of additional services;
– small investment capacity of households and slow development.

Problems that burden further development of rural tourism in the Republic of Serbia are (Штетић, Тодоровић, 2009):
– insufficient education of interested rural households as to how to receive and host visitors / tourists;
– insufficient number of tourist points in the villages where this form of tourism exists and poor connection with municipal, regional and national tourism organisations (TOS);
– insufficient and inadequate social and road infrastructure.

[2] This data was taken from Local Tourist Organizations. As it was mentioned in this document "no central institution is responsible for the collection of data, unless the Council of each municipality or LTO", p. 15.

[3] The *Master Plan*... points out that "general tourist overnights used for rural tourism" means accommodation in rural areas that can be used by tourists who visit rural areas, but it is not called "rural households".

The objectives of rural tourism development within the concept of multifunctional agriculture and rural development – situation and conditions in the Republic of Serbia

The World Tourism Organization (UNWTO, 2002) gave the key objectives in developing rural tourism, correlated with the concept of multifunctional agriculture. These development goals are as follows:

1) **Economics**. Rural tourism offers an opportunity for income generation and job creation. It is, therefore, an activity that can help deliver additional economic activity in addition to replacing traditional rural economic activities now in decline (i.e. agriculture), and in so doing, arrest rural depopulation.
2) **Protection of the environment**. The environment is of central importance to rural tourism. Appropriate legislation, a balanced approach to planning, and the adoption of best practice approach to running rural tourism enterprises, are essential in order to ensure that the environment is protected.
3) **Legal framework**. The establishment of appropriate legislation and laws are a necessary pre-requisite to successful rural tourism. The support and involvement of a number of government departments is necessary.
4) **Quality of life**. The flow of visitors into rural areas can help maintain the viability of existing services (i.e. shops, etc.), thereby contributing to the overall quality of life of the host population.
5) **Preservation of culture and traditions**. Because of the importance of culture and local traditions to visitors, rural tourism can play a significant role in ensuring their long-term preservation.
6) **Transition to the market economy**. Because tourism is an economic activity, it can play an important role in facilitating the transition of former centrally planned economies, to market economies.

1) **Economy**. The process of transition in Serbia has not been implemented adequately and, therefore, it has negatively affected the agricultural sector. Furthermore, due to the well-known events of the 1990s rural areas are additionally burdened with economic problems. The decline in macroeconomic indicators, employment, migration of the working age population into urban city centres, etc., stand out as the most significant economic problems. Hence, the expectations that the overall economic environment in rural areas could be accelerated through the so-called diversified economic activities. The government of the Republic of Serbia has sought to reduce the current negative trends with the appropriate investments. Thus, for example, after the decision of the Ministry of Agriculture, Forestry and Water Management to allocate the funds for tourism development and diversification of economic activities, the region of Central Serbia experienced a significant expansion in the development of rural tourism. In this way, areas where rural tourism is developed have spread to the entire ter-

ritory of Serbia[4]. This decision has considerably increased the chances of eliminating the current negative trends in rural areas. Expectations are that by linking tourism and agriculture, the tertiary sector of the economy could develop as well as primarily trade, taking into account the favourable opportunities for the production of organically produced "healthy food" and the possibility for its placement through tourism. This would largely increase farmers' income.

2) **Environmental protection**. One of the basic prerequisites for the development of rural tourism is ecologically preserved rural ambience. In the Republic of Serbia, according to the Institute for Nature Conservation of Serbia, 10% of the territory consists of protected areas. From the aspect of quality of environment preservation, Serbia in general has a well preserved natural environment. Five national parks with their natural and anthropogenic values are the evidence of specific tourist significance (table 3).

Table 3. Protected natural resources in the Republic of Serbia

	SR SRBIJA	Central Serbia	AP Vojvodina	AP Kosovo and Metohija
Total	1,106			
National parks	5	3	1	1
Nature parks total	14	4	9	1
Landscapes	17	14	2	1
Landscapes of outstanding features	11	8	2	1
Reservations – total	73	45	21	7
Special nature reserves	15	4	11	-
General nature reserves	1	1	-	-
Monuments of nature – total	312	192	85	35
Monuments of nature of botanical character	257	152	83	22
Geological and natural monument of hydrological character	55	40	2	13
Areas of cultural and historical significance – total	43	32	6	5
Total protected natural goods	464			
Natural rarity plant species – total	215			
Natural rarity of species – total	427			

Source: the Institute for Nature Conservation of Serbia, website: http://www.zzps.rs/novo/index.php?jezik=en&strana=naslovna (21.01.2015).

However, the attitudes of Okech, Haghiri and George (2012) should be considered. They notice that the "top" tourist destinations are located in rural areas that are attractive in terms of nature, such as, for example, national parks, mountains, lakes, and cultural and historical heritage, e.g. old towns, forts, etc. For this reason, tourism in these areas today is an important driving force for development. However, tourism will never come to be completely dominant form of the econo-

[4] However, according to data released by the Tourism Organization of Serbia at Tourism Fair, which was held in Belgrade in 2009, to this moment the only region in which rural tourism has not developed was central Serbia.

my in rural areas. There are vast swatches of rural areas for which rural tourism is not relevant to economic development, at least not for the foreseeable future. These are the two extremes, because, on the one hand, we have destinations with natural attractions and a developed tourism industry and, on the other, we have poor rural areas. Between these two extremes are rural areas with some tourism potential, and there is an urgent need to develop tourism as an additional economic activity in order to prevent the current negative trends.

In order to put the environment in the function of rural tourism the *Master Plan for Sustainable Rural Tourism Development in Serbia* (2011), on the basis of a diagnostic report, suggests the following:
– Environmental strategy development;
– Strategy for protection and management of natural and cultural resources;
– Incorporation of rural areas into regional waste management system;
– Development and use of renewable energy sources;
– Minimisation and management of environmental risks;
– Social awareness and community involvement;
– Nature tourism development.

These strategy proposals are, at the same time, the demand and necessity facing rural tourism destination development if Serbia wants to become an attractive and internationally competitive tourist market. Suggestions for improving environmental quality are based on the requirements that must be met before accession to the EU.

3) **Legal framework**. In the Republic of Serbia, the issue of legal regulations regarding rural tourism are intensified and become actual in recent years, which is understandable, with regard to the transition process which influences all segments of society, and the fact that rural tourism has not developed adequately yet. Legal acts that regulate this sector are: legislations, ordinances, regulations, specific legal regulations. Secondary legislation is still not fully aligned with the recently adopted Law on Tourism. Expectations are that the process will continue, equally actual and intense in the future, considering the transition turbulences and the increasing demand for rural tourism.

A large number of other by-laws should be adopted that will closely and more precisely regulate the field of rural tourism in accordance with the new law, and consequently facilitate management in this business sector.

Poustie and associates (1998) suggest that there are twelve areas of business regulation in tourism: contracts, agency's operating, regulating the responsibility for tourism products, companies, criminal responsibility, employment, supplier obligations, food security, vacations, planning and environmental law, licensing, and discrimination.

In order to ensure the normal course of business in tourism it is necessary to regulate the rights and obligations of all parties, both of those who are in the "tourism offer chain", and of those who are on the side of the tourist demand (Baggio, 2008; Bonetti, Pertillo, Simoni, 2006; Farrell, Twining, 2004).

4 and 5) **Quality of life and preservation of culture and tradition**. Since the 1970s, when rural tourism started developing, the service sector has experienced a large expansion and has become the dominant sector in many economies. Over time, interest in the quality of service was growing, as studies have shown that it is a prerequisite for the success and survival of the company in a competitive environment. In other words, providing quality services to customers creates an opportunity for companies to gain a competitive advantage in the market (Ghobadian, Speller, Jones, 1994; Wang, Lo, Hui, 2003). In other words, since rural tourism concerns services provided by farmers, it is providing quality service to tourists that raises the quality of life at the very farms or in rural areas that become rural tourist destinations.

The management process at the "right place" to ensure that visitors experience a "special experience" or "a memorable travel experience" and to provide opportunities for the fulfilment of all tourist expectations or exceed them in a positive way and, at the same time, to benefit from it is business imperative (European Commission, 2000). For this reason, the European Commission (2000) drew attention to the necessity of integrated quality management (IQM) in rural tourism. A detailed view of the integral development model is presented in figure 1.

IQM has two basic objectives in rural tourism (European Commission, 2000):
1) Focusing on tourists / visitors, improving the product quality, satisfying their needs and influencing their activities, so that tourists / visitors wish to come back again or recommend the rural tourist destination to others.
2) Involvement of the local community and local tourism enterprises / entrepreneurs in the process of destination management as actual participants and tourists as consumers / customers, in order to improve the performance of a tourism destination.

Figure 1 illustrates the process of IQM in rural tourism with three key interest groups (local community, visitors and tourism enterprises / farms) and target results of the process (satisfied clients, improved enterprise performance, increased employment and income, community benefit without conflict). The process of IQM is designed as a comprehensive concept that refers to the internal, operational and management problems, while at the same time it solves wider problems (social, cultural and environmental impacts of tourism) (Youell, 2003).

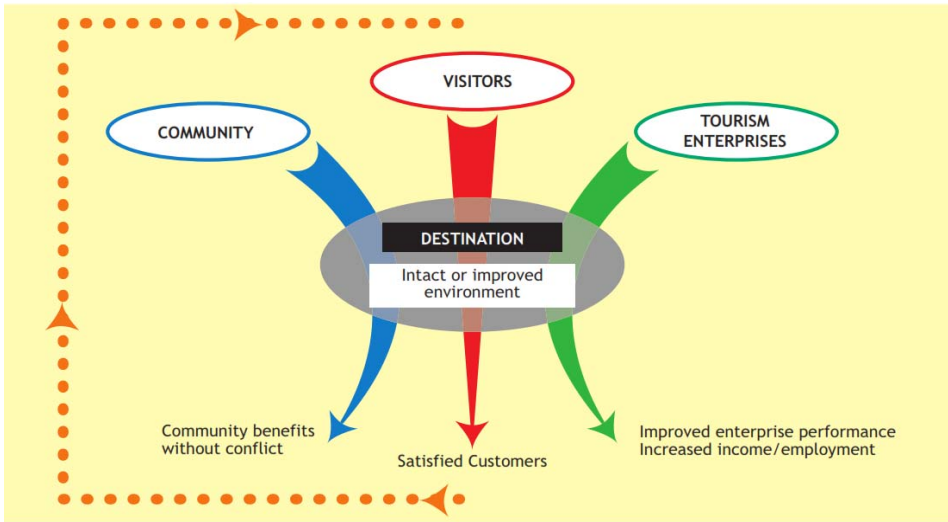

Figure 1. The process of integrated quality management in rural tourism

Source: European Commission (2000), *Towards quality rural tourism – Integrated quality management (IQM) of rural tourist destinations*, p. 11., Enterprise Directorate-General Tourism Unit, Brussels, 2000. Website: http://www.eceat-projects.org/tourism-manual/3-4%20Towards%20Quality%20Rural%20Tourism.pdf (as of 29.06.2014).

Conclusion

Due to a large number of negative effects of deep political, economic and social crisis that occurred during the 1990s, Serbia now has economically, socio-culturally and partly ecologically devastated rural areas. The model of multifunctional agriculture and rural development is suggested as a possible alternative development model that could reverse the current negative trends characterised by a decline of macroeconomic indicators, unemployment, migration of the working age population into urban city centres, depopulation, the process of accelerated aging of rural population, etc. This is also in accordance with generally proclaimed attitude regarding the accession of the Republic of Serbia to the European Union.

Considering the fact that Serbia is in the initial stage of the EU accession process, and that the first steps to it have already been made in December 2015, it is reasonable to expect compliance of Serbia's agricultural policy with the EU policy, which promotes the concept of multifunctional agriculture and rural development through CAP. Development of rural tourism is suggested as one of the promising ways which could in addition to other measures and models of agricultural policy help the development.

Serbia has respectable natural and human (anthropogenic) resources for the development of this economic activity. A large geographical diversity of rural areas, ecologically preserved natural environment, rich cultural and historical heritage, provide opportunities for the development of a wide variety of rural tourism products.

Expectations are that rural tourism could by its synergy effect to link economic with non-economic activities and by its famous multiplied effects (economic, social, cultural, environmental, etc.) have a positive impact on the development of rural areas.

Over the last decade Serbia has made some efforts to improve rural tourism by providing adequate subsidies and other forms of incentives to rural households interested in the development of rural tourism. Certain areas where rural tourism was previously undeveloped recognised the benefits of tourism and now tend to link their activities in the primary agricultural sector with tertiary sector, i.e. with rural tourism.

This approach is in line with the aspiration of the government of the Republic of Serbia concerning the development of small and medium-sized enterprises, and launching private entrepreneurship that could largely relieve the public sector of the economy, which is one of the main problems in the transition process.

Ministry of Agriculture, Forestry and Water Management is decisive in accepting the full responsibility for mobilizing the complete administration, all its resources and bodies and for providing support to the development of rural areas so they could retrieve the place and role belonging to them. All levels, regional (spatial), economic (industrial) and social should provide assistance.

To be able to measure the impacts and effects of appropriate measures in rural development it is essential to:
– Identify rural areas where appropriate measures will be applied, and some of them would definitely be oriented towards the development of rural tourism;
– Create specific development policies on the basis of existing rural characteristics;
– Define the indicators for assessing the effects of the applied development policy.

Considering the large number of problems in rural areas and experience of developed EU countries where a "bottom-up" approach is promoted, one should insist on this approach in Serbia, because it emphasizes the importance of local entrepreneurial and innovative potential for tourism development. At the same time, the country would in this way be obliged to develop links between key institutions and entrepreneurs who will start the development process. This means that local government has to share the resources, funds and risk with the business sector in order to establish a stable and sustainable growth path. This would raise

the very competitiveness of rural areas, which is also in line with the concept of local tourist destinations promoted by the World Tourism Organization in its business guidelines.

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Анализа буџетске подршке развоју сеоског туризма у Србији и диверсификација економских активности на селу, 2009. Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia – sector for rural development.

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Branko MIHAILOVIĆ

Institute of Agricultural Economics, Belgrade, Serbia, brankomih@neobee.net

Drago CVIJANOVIĆ

Faculty of Hotel Management and Tourism – Vrnjci Spa, University of Kragujevac, Serbia, dvcmmv@gmail.com

Transfer of Knowledge and Innovation as a Model of Rural Development of Smederevo Region in Serbia

Abstract: *Many factors affect low investments in Smederevo and among them, above all, are: high commercial and non-commercial risks, tardy economic transition and underdeveloped institutions, which guarantee in practice the rights deriving from the private property and contracts. Rural development in Smederevo requires that sources of competitiveness move toward high education, the efficient market and capability to earn on the existing technologies, i.e. the focus of agriculture should be moved from physical resources to knowledge, especially since agricultural enterprises in Smederevo have non-profitable business performances, which manifest through decline in the market share and profitability, increase in indebtedness, inadequate investments and the increased volume of new business ventures at the expense of the primary business. It is noticeable that the adequate entrepreneurial skills and the innovated managerial abilities and skills are necessary. Accordingly, exactly the development of innovation and transfer of innovative knowledge and technologies from the academic to agricultural sector are the most important form of activities, which stimulate development. In that sense, it is necessary to stimulate the common work of universities, research institutions and agriculture as well as to use the equipment and knowledge of everybody at universities and institutes by the companies and vice versa and the student projects and practice. The policies of labour market should increase the participation of additional education programmes and training in measures of an active employment policy, which comprises the different programmes of qualifications and trainings, re-trainings and additional trainings, functional primary education of adults. At the same time, the above-mentioned programmes should be directed to the most vulnerable groups in the labour market and individuals with multiple vulnerability factors, first of all, through strengthening capacities at the local level for improvement of educational development and trainings in the field of agriculture and rural development.*

Keywords: *knowledge, innovation, agriculture, competitiveness, rural development*

Introduction

Both in the economic theory and the modern practice, it is well known that: if a total capital, as a production potential is divided conditionally into natural (Kp) and created by man – physical and intellectual (Kh), it is necessary for the total capital stock (Kp+Kh) not to decrease during a specific time (Milanovic et al., 2008).

It is an obvious condition that there should be a certain level of substitution among the different forms of capital, i.e. that the inevitable decrease in the natural capital should be replaced by an increase in the available human and primarily the intellectual capital. Thus, this can only be achieved by increasing the application of already acquired and new knowledge and the best modern production practice, or by using resources of the total scientific-technical and cultural potential. That is to say, the transition of economy implies the significant application of knowledge, innovation and new technologies, which includes numerous reforms in the field of education, science, scientific-research institutions and consulting (Cvijanovic, 2009).

The essential contribution and the main role in meeting this condition belongs exactly to science, the profession, i.e. the adequate network of institutes and faculties, which should provide the necessary support to enterprises in managing the transformation processes, as well as in creating a new sector. Consequently, it is inevitable to have a decentralised and regional approach to education. In these conditions, the educational structure of population in the Republic of Serbia is a special challenge.

The problems regarding the educational approach have not been solved; the drop-out rate of children is present at all educational levels, and comparing most of the indicators, we are at the bottom of the European list. Still around 10% of population fails to graduate from the elementary school (whether they do not register in school at all or drop out during the elementary school).

Between 90% and 95% of those who graduate from elementary school registers in secondary schools (around 80% of a generation), and around 15% of those registered do not graduate from the secondary school (35% of a generation). Only 13% graduates from a college or a university. The situation is somewhat better if we look only at the active population, but the level is far lower than the EU average: 19% with the tertiary diploma against ca. 30% of the EU average (*Nacionalna strategija zapošljavanja za period 2011-2020 godine*).

Decreasing a number of persons who leave their education early and the increase in the share of highly educated population in the total population, which the EU has defined as one of its priorities, represents also a challenge for the Republic of Serbia.

Analysis of agricultural potentials in Smederevo

Since the beginning of the 21st century, the contribution of GDP declined, primarily as a consequence of faster activity growth in non-production sectors (first of all – trade). However, the share of agriculture in the GDP structure of economy of the Republic of Serbia is still very high. Compared to the average of the EU countries (27 Member States), the Republic of Serbia has significantly higher share of GDP from the agricultural sector in the total GDP, and significantly lower share of the sector of services (*Strategija poljoprivrede i ruralnog razvoja Republike Srbije za period 2014-2020 godine*).

In such conditions, the economy structure of the city of Smederevo can be analysed through the structure of employees. According to the data in table 1 a total of 76.2% of employees was registered in legal entities (companies, enterprises, institutions, cooperative associations and other organisations), while the remaining 23.8% were entrepreneurs and their employees (RZS, 2014).

The elementary sector (agriculture, forestry and fishery) employs 0.5% people and the secondary sector (industry, trade, tourism, catering industry, etc.) – 35.9%. The largest number of employees in the legal entities sector is engaged in the secondary sector, i.e. processing industry (34.5%).

Table 1. Structure of employees, 2013, annual average[1]

Employees in legal entities (companies, enterprises, institutions, cooperative associations and other organisations)[2]	Region, area, city – municipality			
	Danube area	Velika Plana	Smederevo	Smederevska Palanka
Total	100.00	100.00	100.00	100.00
Total	74.6	64.2	76.2	79.2
Agriculture, forestry and fishery	0.8	1.5	0.5	0.8
Mining	0.1	0.7	0.0	0.0
Processing industry	27.4	6.5	34.5	26.0
Power, gas and steam supply	1.1	1.0	1.2	0.9
Water supply and wastewater management	2.4	0.8	2.4	3.5
Construction	4.3	12.2	1.7	5.0
Wholesale and retail and repair of motor vehicles	7.3	15.3	5.4	5.7
Transportation and storage	3.9	4.7	4.0	2.9
Accommodation and food services	0.4	0.7	0.4	0.3
Information and communication	0.4	0.3	0.5	0.2
Financial activities and insurance activities	0.5	0.2	0.6	0.5
Real estate business	0.2	0.0	0.4	0.0

table 1 cont.

Professional, scientific, innovative and technological activities	1.6	1.1	1.6	2.0
Administrative and auxiliary service activities	0.4	0.9	0.3	0.3
State administration and compulsory social insurance	3.6	2.0	4.1	3.6
Education	9.2	9.7	8.4	11.0
Health insurance and social protection	9.5	5.6	8.5	15.4
Art entertainment and recreation	0.7	0.6	0.6	1.2
Other service activities	0.7	0.3	1.0	0.1
Private entrepreneurs and their employees	25.4	35.8	23.8	20.8

[1] Annual averages calculated on 31st March and 30th September.

[2] There were also employees in small companies (up to 50 employees), who had not been covered by a regular, half-yearly research, because of the assessment in the Survey for supplement of Half-Yearly Research on Employees.

Source: RZS, 2014, p 166.

Although there is a small number of employees engaged in agriculture (0.5%), the data refers only to the ones engaged in the legal entities sector. However, according to the data in table 2 there is a high percentage of the economically active population engaged in agriculture, i.e. 9.2% (RZS, 2011). In accordance with the Census of 2011, there are 2,843 persons who rank among farmers, foresters, fishermen and related occupations.

Table 2. Economically active population with occupation, according to age, sex and occupation, by municipalities/towns

Region Area *City*-municipality	Total	Occupation										
		Executives, senior officials and legislators	Experts and artists	Engineers, associates and technicians	Administrative officials	Service and sales workers	Farmers, foresters, fishermen	Trades, folk and related occupations	Machines operators, fitters and drivers	Primitive occupations	Military occupations	Unknown
Smederevo 3	0,794	642	3,524	4,801	2,133	5,240	2,843	5,498	2,949	2,586	260	318
15-24	1,894 8		50	204	137	523	148	356	157	237	38	36
25-34	7,526 1	32	906	1,064	563	1,678	399	1,304	752	524	128	76
35-44	8,643 1	83	1,020	1,372	583	1,568	587	1,561	885	702	83	99
45-54	8,039 1	99	950	1,550	630	1,101	551	1,473	832	667	11	75
55-64	4,307 1	19	587	607	218	364	846	799	320	417	-	30
65 and more 3	85	1	11	4	2	6	312	5	3	39	-	2

Source: RZS, 2011.

Prevailing production trends in agriculture of Smederevo are (*Strategija lokalnog ekonomskog razvoja period 2009-2014 godine*): crop farming, livestock breeding and vegetable growing (Morava area); fruit growing and viticulture (*Sumadija area*). Due to a mild continental climate, the Smederevo region has favourable conditions for successful growing of almost all fruit varieties and grape vine (*Strategija razvoja poljoprivrede na teritoriji grada Smedereva za period 2008-2013*). A dominant part of agricultural production in Smederevo is in family agricultural holdings. According to the Census of Agriculture of 2012, a total of 7,107 agricultural holdings was registered on the territory of Smederevo with 26,560 ha of utilised agricultural area. There were 7,075 family agricultural holdings, and only 32 legal entities with 92 employees. There are 3,886 of registered agricultural holdings, of which 99.51% are family agricultural holdings, and 0.49% are legal entities and entrepreneurs. In accordance with the data in tables 3 and 4 the structure of used agricultural land of holdings is: farmstead – 172 ha; plough land and gardens – 20,514 ha; meadows and pastures – 1,077 ha; orchards – 4,412 ha; vineyards – 381 ha; nursery beds – 3 ha; other – 1 ha.

Table 3. Used agricultural area of holdings by categories

Region Area City-municipality	AH	UAA total ha	Farmstead		Plough land and gardens		Meadows and pastures	
			PG	ha	PG	ha	PG	ha
Danube area	18,800	73,336	10,525	645	16,858	61,799	3,739	3,855
Velika Plana	5,225	18,994	3,344	210	4,860	17,481	423	777
Smederevo	6,877	26,560	3,149	172	5,708	20,514	1,008	1,077
Smederevska Palanka	6,698	27,782	4,032	262	6,290	23,803	2,308	2,001

Source: RZS, 2012a.

Table 4. Utilised agricultural area of holdings by categories

Region Area City-municipality	Steady plantations							
	orchards		vineyards		nursery beds		other	
	PG	ha	PG	ha	PG	ha	PG	ha
Danube area	6,813	6,294	3,198	729	10	8	11	6
Velika Plana	1,370	398	750	126	-	-	4	1
Smederevo	2,912	4,412	1,313	381	3	3	2	1
Smederevska Palanka	2,531	1,484	1,135	221	7	5	5	5

Source: RZS, 2012a.

The data in table 5 shows that in this category the most represented are: cereals (16,747 ha), forage crops (2,035 ha) and industrial crops (793 ha). Table 6 shows that in areas under cereals what dominated was grain maize (8,340 ha), wheat and spelt (7,202 ha) and barley (1,016 ha). On the other hand, table 7 shows that beans are registered as the most represented legume on 23 ha. Sunflowers grow on 568 ha, or even 71.63% of share in the total areas under industrial crops. In the structure of areas under vegetables, melons and strawberries stand out: pepper (59 ha), cabbage and kale (54 ha), tomato (38 ha), other fresh vegetables (35 ha), me-

lons (166 ha) and strawberries (63 ha). The areas under forage crops are 2,035 ha, and the most represented are lucerne (1,189 ha) and clover (750 ha). Table 8 shows that orchards occupy 4,412 ha, where there are plantation orchards (4,234 ha) and extensive orchards (178 ha). Vineyards occupy the area of 381 ha, of which: (1) varieties for wine with geographic origin on 27 ha; (2) other wine varieties on 204 ha; and (3) varieties for eating on 150 ha. Regarding areas under fruit species, the most represented are peaches (1,961 ha), apples (1,340 ha) and plums (333 ha) (RZS, 2012).

According to the analysis of the AESS (Agricultural Extension and Specialised Service), Smederevo shows a permanent upward trend in areas under fruit cultures. According to the situation on the ground it can be concluded that this production shows, more or less, an increasing trend of production areas depending on fruit species. However, the analysis shows the visibly continuous decrease in areas under vineyards on the territory of the city of Smederevo. As for the assortment of Smederevo vineyards, the most represented variety is Smederevka. There are also the following varieties: Italian Riesling, Zupljanka, Chardonnay, Eden Riesling, Sauvignon (white grape varieties), Vranac, Merlot, Muscat Hamburg, Cabernet Sauvignon (red grape varieties). It is inevitable zoning through the stimulating measures, first of all, subsidies. Sumadija region of Smederevo should stimulate: vine growing and stone fruits (peach-nectarine, apricot, etc.), and Morava region: strawberry, apple, plum, etc. Accordingly, it is necessary to invest in irrigation and infrastructure in the field of power supply.

Table 5. Plough land and gardens

Region Area City-municipality	AH	Plough land and gardens, ha										
		Total	Cereals	Legumes	Potatoes	Sugar beets	Industrial crops	Vegetable, melons and strawberries	Flowers and ornamental plants	Forage crops	Other crops	Fallow land
Danube area	16,858	61,799	48,681	120	105	3	2,257	760	5	8,904	31	931
Velika Plana	4,860	17,481	13,829	31	36	0	631	226	1	2,377	8	341
Smederevo	5,708	20,514	16,747	26	56	2	793	446	2	2,035	7	398
Smederevska Palanka	6,290	23,803	18,105	63	13	1	833	88	1	4,492	16	192

Source: RZS, 2012a.

Table 6. Areas under cereals

Region Area City-municipality	AH	Cereals, ha						
		total	wheat and spelt	rye	barley	oats	grain maize	Other cereals for grain maize
Danube area	15,607	48,681	20,487	73	3,564	696	23,553	307
Velika Plana	4,507	13,829	5,829	21	985	184	6,753	57
Smederevo	5,181	16,747	7,202	38	1,016	66	8,340	85
Smederevska Palanka	5,919	18,105	7,456	14	1,563	447	8,461	165

Source: RZS, 2012a.

Table 7. Areas under legumes

Region Area City-municipality	AH	Legumes, ha			
		total	peas	beans	other legumes
Danube area	469	120	53	52	15
Velika Plana	99	31	8	16	7
Smederevo	216	26	2	23	2
Smederevska Palanka	154	63	43	13	6

Source: RZS, 2012a.

Table 8. Orchards and vineyards

Region Area City-municipality	AH	Orchards, ha			AH	Vineyards, ha			
		total	plantation	extensive		Total	wine varieties with geographic origin	other wine varieties	varieties for eating
Danube area	6,813	6,294	5,488	806	3,198	729	50	414	265
Velika Plana	1,370	398	169	228	750	126	22	67	37
Smederevo	2,912	4,412	4,234	178	1,313	381	27	204	150
S.Palanka	2,531	1,484	1,085	399	1,135	221	1	143	77

Source: RZS, 2012a.

Once, the enterprise Godomin had been significant in the field of the primary agricultural production, as a carrier of fruit production in Smederevo, but now, the company is in bankruptcy. The export of fruit was dominantly oriented to the Russian market, through several brokerage companies. Before they exported, the products went through phytosanitary control, which includes a visual inspection of fruit to quarantine diseases caused by pests. During preparations of fruit for shipment, AESS Smederevo controls it and issues the phytosanitary certificates. In the field of livestock production, there is no export, though. The most represented cattle breed is Simmental. At the same time, bee keeping is the branch of livestock breeding where an increasing trend can be noticed. There is also an association of beekeepers.

As for agro-industry, the enterprise Godomin was also once significant. It was engaged in the production of wine and brandy. Today, a small number of enterprises have survived in this field. By their significance, the companies "Ishrana" and "Fruvita" single out. "Ishrana" is engaged in the production and sale of bakery products with the additional commercial range (https://ishrana-smederevo.ls.rs/rs/). "Fruvita" is the company dealing with fruit processing, the production of juices, nectar and non-alcoholic beverages with fruit juice (http://fruvita.com/o-kompaniji/fruvita-danas/). The company's headquarters are in Belgrade, and the "Fruvita" factory for juice production is in the village of Lunjevac (Smederevo). The company owns also the relocated section in the village of Kolari (Smederevo), where is the production line for fresh fruit processing and the production of squeezed juices. The

company in Smederevo employs around 80 workers, but this number varies depending on season and the need for fruit processing. In the Smederevo area, apple is the most purchased fruit. The company "Fruvita" exports its products to the markets of surrounding countries: Montenegro, Bosnia and Herzegovina and Macedonia. A number of subjects engaged in agricultural products processing, like wineries, slaughter houses, mills, etc. is registered in the sector of SMEs.

The important factor of agricultural production improvement in Smederevo is the Fund for Agricultural Development (Official Gazette of the City of Smederevo, no. 3/2014). It was founded in order to make conditions for motivation, preservation, improvement and development of agriculture on the territory of the city of Smederevo. The fund's resources use subsidies and credits for: (1) improvement and development of livestock, crop-vegetable, fruit-wine production; (2) construction and purchase of irrigation system; (3) purchase of agricultural means of mechanisation; (4) insurance of yields and crops; (5) construction of facilities and purchase of equipment for improvement of sale (cold storages and driers, storages) and other purposes. This creates the possibility that certain number of commercially development-oriented holdings grow into small- and medium-sized enterprises (the so-called SMEs sector). A small number of SMEs in the field of agriculture and processing reflects the unfavourable economic environment for the establishment and operation of this sector (high taxes, off-tax burdens, administrative taxes, reimbursements and other costs, etc.).

Consequently, the city of Smederevo can observe its further development through directing resources and support to agricultural producers in founding associations, cooperative associations, increasing the areas under fruit plantations, vineyards, vegetables and crops as well as through the stimulation of irrigation and the sale of consumer goods (*Strategija lokalnog ekonomskog razvoja period 2009-2014 godine*).

Transfer of knowledge and innovation

The current system of knowledge and innovation transfer is efficient and does not follow sufficiently the accelerated technical and technological changes. Knowledge does not treasure systematically and it is difficult to approach to adequate information at the local level. The quality of equipment and techniques for research in Serbia is considered to lag behind the European average. Although, the existing scientific and educational institutions have relatively high quality personnel, who achieved a series of internationally recognised results: new sorts and breeds, scientific papers and technical solutions (IPARD II programme for Serbia, 2014).

Accordingly, in Serbia the transfer of knowledge in the field of agriculture is conducted through the system of formal education at all levels (from secondary education to PhD studies), by different forms of trainings organised by the edu-

cational and research institutions and organisations, AESSs, private companies, project units, media, etc. (*Strategija poljoprivrede i ruralnog razvoja Republike Srbije za period 2014-2020 godine*). Smederevo, as the industrial town, is a town which wants to create a positive business climate and therefore to be recognisable in the region, and also wants to be the knowledge incubator and a part of Serbia, which changes its image (*Strategija lokalnog ekonomskog razvoja period 2009-2014 godine*).

In the sector of agri-business the education and consulting represent the significant factors of business modernisation. In support of this argument it should be mentioned that investing in consulting (and agricultural research) brings around 40% of the average earnings rate, which is "much more than other investments in agricultural development" (Van den Ban, Hawkins, 1996). Improving the managerial abilities and skills can be achieved by top quality training and education. A good training and advice to agricultural producers are some of the most useful models of support provided by the government.

The basic institutions in Smederevo for transfer of knowledge and innovation in agriculture are:
- Agricultural extension and specialised service Smederevo d.o.o. (in Kolari),
- Textile-technological and agricultural school "Despot Djuradj", Smederevo.

The agricultural extension and specialised service of Smederevo follows intensively 230 selected agricultural holdings, and 500 other agricultural holdings is involved in the consulting system in some other ways, mostly through participation in the group lessons and through occasional visits of consultants to agricultural holdings. This service does its activity in the area of four municipalities: Smederevo, Smedevska Palanka, Velika Plana and Grocka, which occupy the area of 1,537 ha, covering 73 settlements inhabited by ca. 286,903 people, who own 122,244 ha of agricultural land, of which 98,840 is plough land, 13,227 ha are orchards, 4,106 ha are vineyards and 6,071 ha are meadows (http://psss.rs). The agricultural specialised service has two organisational entities: Specialised Service with laboratories and the Specialised Service for administrative and financial activities. According to the same source, the basic tasks of the agricultural professional service are:
- Consulting activities aiming to raise the knowledge of agricultural producers in application of the appropriate technology in growing plants and breeding animals in selected agricultural holdings;
- Education of agricultural producers in the form of: direct or indirect recommendations and expert advices; organising and lecturing seminars, winter schools and workshops; issuing professional publications as well as other forms of public information (brochures, bulletins);
- Introduction of new varieties of hybrids of agricultural crops and breeds of domestic animals as well as the introduction of modern technology;

- Informing agricultural producers on the agrarian policy measures and the support in realisation of certain rights;
- Support in establishment and work of associations and rural social groups;
- Monitoring and reporting on the seasonal agricultural works;
- Forecasting and reporting activities.

There are 1,405 of holdings, which have used the services of the extension service in Smederevo (RZS, 2012b). By settlements, the holdings which used the extension services the most were registered in Mihajlovac (166), Drugovac (102), Suvodol (100) and Dobri Do (90). The transfer of knowledge and innovation would be probably better if farmers would use more computers and the Internet. That is to say, the data of the census showed that only 151 holdings were using the computer.

The textile-technological and agricultural school "Despot Djuradj" Smederevo is one of the youngest in the territory of the Republic of Serbia. The school was founded in 1991, and today it educates pupils within the three fields (http://www.despot.edu.rs):

- Agriculture, production and processing of food (veterinarian technician, agricultural technician, food technician, producer of food products, baker and butcher);
- Chemistry and non-metals (technician for the environment protection, chemical--technological technician);
- Textile and leather industry (technician – clothing model constructor, fashion tailor – experiment).

The research papers (projects and studies) can be used as an adequate substitute for evaluation of development of knowledge economy according to the sectors and the territory. The data in table 9, observed at the Republic of Serbia level, have shown that the highest value (in thousands of RSD) in 2012 had the research papers of applied character and then the fundamental and developmental papers. As for a number of scientific papers, there is a total of 11,493 papers, of which 6,413 are fundamental papers, 2,955 are applied papers and 2,085 are developmental papers.

In the region of South and East Serbia, the value of the total research papers is RSD 1,140,410 thousand, and it divides between RSD 11,268,009 thousands (fundamental), RSD 13,663,698 thousand (applied) and RSD 7,485,203 thousand (developmental). The confirmation of the knowledge economy requires more investments in the fundamental research. However, a long-term crisis of domestic economy has led to the reduction of accumulative capability of enterprises in the region of South and East Serbia, as well as in the Danube region and Smederevo. In these conditions, the country lacks both the critical mass of resources necessary for organising the research process and the readiness to overtake the financial

risks, associated with these processes. Unpretentious profitability of enterprises represents the reason for the reduced investments in the research-developmental activity. Consequently, there is a reduced ability of an enterprise to increase their own capital, based on the financial leverage, i.e. the difference between profit and interest rate.

Table 9. Research papers (projects and studies) according to sectors and territory, 2012

	Research papers (projects and studies) according to sectors and territory, 2012							
	Value of scientific papers, RSD				Number of scientific papers			
	total	fundamental	applied	develop-mental	total	fundamental	applied	develo pment al
REPUBLIC OF SERBIA	**32,416,910**	**11,268,009**	**13,663,698**	**7,485,203**	**11,493**	**6,413**	**2,995**	**2,085**
Non-financial sector	8,115,127	119,194	6,102,871	1,893,062	682	55	455	172
Government sector	9,259,614	4,045,768	3,508,770	1,705,076	3,763	2,219	958	586
High education	15,021,970	7,100,631	4,044,799	3,876,540	7,011	4,134	1,561	1,316
Non-profit sector	20,199	2,416	7,258	10,525	37	5	21	11
SERBIA-NORTH	**30,251,695**	**10,464,894**	**12,868,714**	**6,918,087**	**9,526**	**5,302**	**2,455**	**1,769**
Non-financial sector	7,835,778	117,919	5,993,782	1,724,077	513	54	319	140
Government sector	8,990,908	4,036,795	3,309,592	1,644,521	3,710	2,217	942	551
High education	13,404,810	6,307,764	3,558,082	3,538,964	5,266	3,026	1,173	1,067
Non-profit sector	20,199	2,416	7,258	10,525	37	5	21	11
Belgrade region	**24,387,641**	**8,066,683**	**10,509,696**	**5,811,262**	**7,285**	**4,486**	**1,661**	**1,138**
Non-financial sector	7,762,942	117,919	5,920,946	1,724,077	501	24	307	140
Government sector	8,413,738	4,010,970	2,802,151	1,600,617	3,546	2,207	805	534
High education	8,198,080	3,935,641	1,781,599	2,480,840	3,220	2,221	538	461
Non-profit sector	12,881	2,153	5,000	5,728	18	4	11	3
Vojvodina region	**5,864,054**	**2,398,211**	**2,359,018**	**1,106,825**	**2,241**	**813**	**794**	
Non-financial sector	72,836	-	72,836	-	12	-	12	-
Government sector	577,170	25,825	507,441	43,904	164	10	137	17
High education	5,206,730	2,372,123	1,776,483	1,058,124	2,046	805	635	606
Non-profit sector	7,318	263	2,258	4,797	19	1	10	8
SERBIA-SOUTH	**2,165,215**	**803,115**	**794,984**	**567,116**	**1,967**	**1,111**	**540**	**316**
Non-financial sector	279,349	1,275	109,089	168,985	169	1	136	32
Government sector	268,706	8,973	199,178	60,555	53	2	16	35
High education	1,617,160	792,867	486,717	337,576	1,745	1,108	388	249
Sumadija and West Serbia Region	**1,024,805**	**503,041**	**360,578**	**161,186**	**660**	**359**	**210**	**91**
Non-financial sector	100,907	-	72,072	28,835	140	-	123	17
Government sector	36,217	7,243	28,974	-	5	1	4	-
High education	887,681	495,798	259,532	132,351	515	358	83	74
SOUTH AND EAST SERBIA REGION	**1,140,410**	**300,074**	**434,406**	**405,930**	**1,307**	**752**	**330**	**225**
Non-financial sector	178,442	1,275	37,017	140,150	29	1	13	15
Government sector	232,489	1,730	170,204	60,555	48	1	12	35
High education	729,479	297,069	227,185	205,225	1,230	750	305	175
Region of Kosovo and Metohia	...	...	...	...	...	...	...	...

Source: RZS, 2013.

Improving the transfer of knowledge and innovation in agriculture of Smederevo requires the constitution of market-oriented enterprises with highly educated personnel, which implies a series of structural changes, directed to improvement of the business efficiency and adjustment to the market requirements. The structural changes within an enterprise are based on the internal orientation, which resulted from the improved efficiency or the external orientation focused on the effectiveness improvement. Successful positioning on the agricultural products' market requires timely information on changes in the environment, and first of all, in the market in order to reduce risk and

uncertainty. It is necessary to stimulate more important partnership between the public and the private sector, primarily in the form of intra-sector and inter-sector mobility of researchers, professors and consultants. Troubleshooting the existing business issues, regarding agricultural producers, enterprises and associations in Smederevo, requires the interdisciplinary approach, since there often appear the unstructured business problems, where the routine solutions cannot be applied. Consequently, it is inevitable to: (1) decentralize and (2) network educational, scientific-research and consulting capacities. The regional exchange of professors, researchers, consultants and other interested actors is inevitable. The regional exchange of experts in conditions of insufficient intellectual capital would lead to an optimal allocation of human resources of the neighbouring regions and municipalities.

It can be concluded that the existing structure and the system of knowledge transfer are not sufficiently efficient and do not manage to meet adequately the needs for more dynamic technical-technological restructuring of agricultural sector (*Strategija poljoprivrede i ruralnog razvoja Republike Srbije za period 2014--2020*). Also, the possibilities provided by the private-public partnerships within the purview of creating and transferring knowledge and technologies, as well as the greater involvement of other actors (cooperative associations, private consulting economic entities and agencies, NGO sector and others) have not been used (*Strategija poljoprivrede i ruralnog razvoja Republike Srbije za period 2014--2020 godine*). Transfer of knowledge and the information activities should not realise only in the form of traditional lectures, but they should adjust to the needs of subjects in rural areas. Therefore it should support the workshops, conferences, demonstration activities, information activities and the programmes of short-term exchange or visit to the agricultural holdings (Regulation, 1305/2013).

A need for creating the machinery rings in rural area of Smederevo

In the past few decades, rural population in Serbia differentiated and stratified, as a main carrier of agricultural production (RZS, 2012c). The above-mentioned research showed that there were some producers with more economic power, which enabled them to follow the modern technological achievements, regarding the use of the new equipment, and regarding the new technologies use. In the second group are those poorer, without sufficient resources for the serious change, and this is the majority in Serbia.

The problems of agricultural producers in Smederevo regarding the agricultural mechanisation are identical to those problems of agricultural producers in the area of the entire Republic of Serbia, and the most important of them are the following:

1. Unit strength, structure and lifetime of the current means of mechanisation in some branches of agricultural production are devastating. Technologically obsolete and unreliable, the current machinery park can seriously threaten this

branch, especially in protection of grown cultures in all forms of agricultural production (RZS, 2012c).
2. Very expensive bank loans (high interests) for purchase of new means of mechanisation.
3. Absence of cooperation among farmers in using the mutual means of mechanisation (underdeveloped the so-called machinery rings), by which the mechanisation costs would significantly reduce, and increase the economic effects.

The accelerated replacement of the current machinery is the only way to stabilise it and to increase yields per an area unit. Proper use of a new, and a good selection of agricultural technology, which follows from the modern scientific achievements contributes to the reduction of agro-technical deadlines for construction, but also reduces the energy inputs (RZS, 2012c). The modern agricultural production in Smederevo cannot be achieved without the productive machinery, and a basic condition for such machine use is to provide employment, good work organisation, training of operators and clearly defined relations. The machinery ring provides to its members all these advantages. In highly developed countries, the advantages of this type of organisation are used, and they encourage the work of machinery rings, while the related services are not taxable and they are considered as the arranged production.

This approach to the problem of land cultivation has led to division of farmers into two basic categories: (1) those who need services and (2) those who provide the services. Such differentiation has led to creation of groups of service providers, who are narrowly specialised only in specific operations, so the quality of provided services is high. At the same time, the price of the services provided in this way is lower, by maximum exploitation of means of mechanisation. On the other hand, the providers of services can devote themselves to some other problems in their agricultural production (inputs, sale of products), and not to be burdened by their "unused" means of mechanisation. Taking into consideration the dispersion of necessary equipment and mechanisation in Smederevo, by creating the machinery rings, there would be more efficient production due to more rational use of the existing resources, whereby it would simultaneously achieve economy of scale and economy of scope.

The network economy is the new entrepreneurial organisational-process model, which develops with support of the basic mass elements (information, innovation, communications, new technologies, etc.). It significantly changes the international trade performances and competition in general. Networking does not appear as a substitute of traditional hierarchical-bureaucratic organisational--management structure, but as a new management strategy, even a paradigm, used by many world (especially) global enterprises, which base their success and development on the modern structuring of business processes. The networking improves the abilities of adjustment to changes, innovativeness, modernisation

and training in regard to hierarchical-bureaucratic organisational structure. Besides, the strategic management of network organisations enables the reduction of costs, increase in profit and better reaction to the market conjuncture change. The practice has shown that networking of organisational structures, business processes, scientific-educational work results with the key knowledge, skills and other advantages, which valorise on the market as competitive. The networked partners in business processes more and more often use mutually their key competences, aiming to achieve faster, cheaper, more flexible, better quality results, by which the competitive advantage in the global market is made.

Restructuring of agricultural enterprises and creating a new sector in Smederevo

According to data of the Agricultural Extension and Specialised Service Smederevo, there are insufficient industrial capacities for processing of agricultural products, so it is of great importance to stimulate their foundation. Namely, in Smederevo only 9 companies operate in the agro-industry. On the other hand, there are 3,886 of registered agricultural holdings, of which only 0.49% is legal entities and entrepreneurs. Some of the well-known companies are AD "Ishrana" and "Fruvita".

AD "Ishrana" Smederevo was founded in 1950 as the independent enterprise and it is located in the centre. The basic activity of the enterprise is production and sale of bakery products with the additional commercial range (http://ishrana-smederevo.ls.rs/rs). Since 2000, "Ishrana" has introduced and maintained the system of quality management according to the requirements of the JUS ISO 9001:2001 standard, and since 2005 the HACCP food safety system (Hazard Analysis and Critical Control Point). The factory "Fruvita" is located in the village of Lunjevac, in the vicinity of Smederevo. The company owns also the relocated section in the neighbouring village of Kolari. "Fruvita" is the company which is engaged in fruit processing, production of juices, nectars and non-alcoholic beverages with fruit juice. It exports the products to the markets of surrounding countries: Montenegro, Bosnia and Herzegovina and Macedonia. After the bankruptcy of "Godomin", the processing industry in Smederevo has significantly lost in processing of grape and production of wine and brandy, so they should invest in fruit processing, mini-dryers, cold storages, in production of natural juices, homemade jams and dried fruits.

Insufficient number of small- and medium-sized enterprises and entrepreneurs in the field of agriculture and processing points out to still unfavourable business environment for establishment and work of this sector. In the sector of small- and medium-sized enterprises and entrepreneurs a number of subjects engaged in the processing of agricultural products, like wineries, slaughter houses, mills, etc., is registered. In the field of agricultural products processing, except the above-mentioned companies (Ishrana and Fruvita), there are the following processing capacities:

- Dairy JTL Zlatiborac DOO Mihajlovac has the main activity in the processing of milk and the production of cheeses. The most important products in the company's production range are: pasteurised milk, yoghurt and sour cream. "Imlek" and "Granice" cooperate with big milk producers on the territory of the city of Smederevo, i.e. they purchase milk from them.
- "Curan" slaughter house in Mihajlovac is engaged in the production and sale of meat and meat products.
- Chicken slaughter house "Bajan" in Mihajlovac processes poultry and it owns its own farms for breeding and fattening of poultry (http://bajan.co.rs). They also supply retail companies and shops and they plan to launch meat processing plants in the future.
- Slaughter house and meat industry "Nedeljkovic" in Sasinci produces fresh pork, beef, veal, mutton, as well as over fifty different types of durable and semi-durable top-quality meat products, by the most famous recipes (http://www.nedeljkovic.co.rs).
- Compost factory "UCA" d.o.o., using the modern equipment, produces today approximately 1,600,000 briquettes per year. The homogenous quality and quantity of compost in briquette provides good yields and good quality of champignons (http://ucadoo.com).
- "JAS Holding Kolari" – DOO for the production of refreshments, mineral water and other bottled water.
- "PTC Germany" is the company for fish processing – town hall built by the municipality Smederevo is rented out to the German firm "PTC Germany", engaged in the processing of saltwater fish and seafood.

Taking into consideration the insufficient industrial capacities for the processing of agricultural products, it is necessary to support development of new processing processes according to the disposable strategic raw materials and the market requirements. It can be achieved by investments in production, marketing and introduction of the quality system in accordance with the EU standards. It is inevitable to foresee working out of the production programme based on the modern technology application, which would comprise all phases of the reproduction totality, starting from the primary production, through the industrial processing and turnover to the consumption of all substantial agricultural products. As a result, it is necessary to support the investments directed to increase in small- and medium-sized enterprises in Smederevo with market-propulsive and export programmes of agricultural production.

Accordingly, the agricultural enterprises of Smederevo must make significant changes in order to get out of the economic crisis. Restructuring can be defined as an activity, which realises in an enterprise with decreasing performances, in order for an enterprise to survive and turn into the profitable business. Restructuring in our conditions must comprise all fields of enterprises' operations in Smederevo. It implies that it has to be realised as the ownership, market, organisational, busi-

ness and financial transformation. There is a large number of individual changes and interventions, which can be carried out in every enterprise, aiming to improve the business results. When the enterprises' performances cannot be evaluated as satisfying, some changes are necessary in organisation, composition of activities, assets of an enterprise and its financial structure, etc.

The need for restructuring makes a demand for staff that would be the carriers and actors of economic changes. A paradox called "the personnel paradox" appears in practice. That is to say, it is necessary to do the personnel restructuring in the most of enterprises in Smederevo, which mostly implies decreasing the number of employees, and simultaneously with insufficient professional personnel. At the same time, the employers would employ gladly the top-quality highly-educated personnel, because they know that the potential benefits of their engagement are far above the expenses for their salaries.

Creating the business-attractive enterprises initiates the need for the staff in the field of entrepreneurship and agriculture. The personnel is necessary to make a contribution to enterprises in realising their goals, solve the problems regarding business and management, identify and use new possibilities, increase their knowledge and apply the acquired knowledge practically. In domestic economy, there is a lack of knowledge in the field of business planning, which is inevitable for creating small- and medium-sized enterprises. We can define the essence of the necessary changes as a new entrepreneurial society, which encourages taking over the risks and making new entrepreneurial skills.

Every dimension of an enterprise's restructuring is specific and it requires the professional expertise and experience of the personnel (Mihailovic, 2007):

– Ownership restructuring represents the privatisation of domestic enterprises, which results in transformation of the national and public capital into the equity capital. In this phase of restructuring, the consultants are engaged in activities before and after the privatisation. In pre-privatisation activities, the focus is on the preparation of an enterprise to enter the privatisation process and to sell successfully. In after-privatisation activities, it is important to take account of the defence measures from taking over the privatised enterprises as well as the application of appropriate management concepts of joint-stock form of organisation.
– Market restructuring is redefining the market in which the enterprise appears, aiming to improve sale and business. For successful market restructuring, it is necessary to dispose with adequate information on changes in surroundings, and first of all, in order to decrease risk and uncertainty. Numerous enterprises in the Danube region treats the projects of market research as a great or unnecessary cost, since they consider that they already know their consumers' needs, i.e. they know well the market. However, the increasing number of enterprises is familiar with the increasing significance of market research and

they approach it with the scientific approach or they leave it to the specialised institutions (consulting houses, marketing agencies, institutes, etc.). The market research enables the enterprises to solve the business problems efficiently.
– Organisational restructuring represents change of an organisational model of enterprise and a conception of operation. It is necessary to make an analysis of organisation, create the intervention strategy, than to make a report, organise meetings, etc. Special teams of experts engage to give a state diagnosis in the organisation. Organisational restructuring is an interdisciplinary field. Consequently, the change agents, the organisation leaders, but primarily the managers and consultants, must have the skills in different fields, especially in human behaviour.
– Business restructuring results in significant changes in an enterprise's activities. The changes are mostly focused on the following fields: termination of one type of job and opening the others, fusion and merging of enterprises, making business plans, interventions in the field of production and technology. The goal of all interventions is to increase the economic value of a firm and to improve its negotiating power in the market. For successful business restructuring it is necessary to analyse different forms of market and products mix as the basic potentials for an enterprise growth. As regards, the market restructuring is the premise for business restructuring of enterprises.
– Financial restructuring implies the change in structure of capital, which changes the relationship between ownership and debt. Domestic enterprises have a disturbed financial balance, inadequate export structure of resources as well as a high indebtedness. In non-privatised companies, the financial restructuring refers to the share operations. In previous practice, the main subjects in these activities are: a candidate for emission, the Commission for Securities, warrantor (or investment bank), a certified auditor and various types of consultants.

In terms of the domestic accumulation, shortage and increasingly less inflow of foreign direct investments, due to the global financial crises, there is a natural and logical conclusion that the rural development in Smederevo should be based on self-employment and the so-called internal entrepreneurship. Consequently, by the diffusion of these skills in commercial agricultural holdings, there is the possibility of these holdings transformation into small- and medium-sized enterprises in the field of agri-business.

Conclusion

With profiling the expert staff in this field, the agriculture would provide a significant contribution to economic development of the Danube region. Due to its connection and impact on other sectors, it is very important for development of Serbia, considering that it employs, directly or indirectly, numerous people,

participates significantly in foreign trade, ensures food safety of population, and contributes to rural development and ecological equilibrium.

Agriculture in Serbia faces many problems, which cover, e.g., the results of the limitations existing in the conditions of economic environment and agrarian policy pursued in the period after the WWII until the SFRY breakdown, difficulties in the past 15 years and difficulties in adjustment to the market economy. The agriculture in Serbia has been encumbered by the consequences of the centrally planned economy as regards to ownership and land use. It is necessary for development policy, which can impact the increase of productivity by restructuring and investments, which implies clear proprietary rights and forming the efficient land market, credits and inputs necessary for agricultural enterprises.

Having in mind all natural predispositions and directions of further development of Smederevo, the need for education of highly-qualified personnel in the fields of entrepreneurship and agriculture has arisen. That is to say, the personnel significantly affects the pace of the economic growth and development as producers, consumers, but also recently as managers. An important component of a unique treatment of personnel is their participation in management, regarding their interest in better business results.

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Klaus WAGNER, Julia NIEDEMAYR

Federal Institute of Agricultural Economics, Vienna, Austria,
Klaus.Wagner@awi.bmlfuw.gv.at, Julia.Niedermayr@awi.bmlfuw.gv.at

Comparison of Structures, Development and Influence of Basic Conditions of Agriculture and Rural Development on Selected Alpine Regions

Abstract: *The specific conditions of mountain and especially Alpine farming require experienced and qualified farmers to guarantee sustainable agriculture in a sound ecological and economic environment. Beside natural-resource endowment, cultural, social and political conditions are important influencing factors. Based on a comprehensive study conducted by the authors in 2015, this paper compares the current structures, the development and basic conditions of selected Alpine NUTS III regions in Austria, Germany, Switzerland, France, Italy and Slovenia.*

Despite the common location in the Alpine space and – with the exception of Switzerland – the EU Common Agricultural Policy (CAP), the regions analysed show considerable variations in altitudes and climatic zones, regional demographic and economic contexts, different approaches in shaping the CAP as well as other basic socio-political conditions, for example taxation and rules of inheritance. Altogether these differences have led to very heterogeneous regional development paths and diverse effects on rural development in the area of conflicts between sustainability, resilience, competitiveness, preservation or innovation of structures, balancing or increasing regional disparities. Comparing these findings with the respective overall national characteristics may be decisive in understanding the necessities of mountain farming.

Keywords: *agricultural policy, rural development, mountain farming*

Introduction

Alpine and mountain farming in the area of the Alps, as defined in the Alpine Convention (Ruffini et al., 2004), is marked by continuous decline. In the last three decades (1980-2010), the number of farms in the whole Alpine Convention area has halved, and since 2000 has declined by 22% (Streifeneder et al., 2014). The closure rates vary, sometimes considerably, between the seven Alpine states: the number of farms has fallen most severely in the Italian and the French Alpine area, the most stable numbers have been in the Bavarian area, followed by the Slovenian and Austrian areas. The Swiss mountain farms are in the midfield. At the same time, abandonment of farms in the Austrian and Bavarian Alpine areas is less frequent than at the national level, whereas the reverse is true for Italy and France. In Switzerland and Slovenia, there is almost no difference between the Alpine area and the national level (Streifeneder et al., 2014).

Although general trends in agricultural development in the Alpine area can be documented, for example a rise in average farm size (Streifeneder, 2010; Mann, 2003; Flury et al., 2004), intensification of farming in favourable areas and extensive utilisation / abandonment of areas in lower-yield areas (Bätzing, 1996), or ageing in the agricultural sector and uncertain succession of farms (Vogel et al., 2007; Rossier, 2007), regionally these trends vary greatly and are decisively influenced by the respective socio-economic, agricultural and general politico-economic conditions (Baur, 1999; Mann, 2003; Juvaničič, 2006).

There is a great need for experience and training, particularly under the difficult conditions of the Alpine area. Therefore, in Austria, there has been increased emphasis on adult education, for some years now, in the field of Alpine pasture and mountain farming. As part of this study, a survey of the status quo in Alpine pasture and mountain farming in selected exemplary regions of Austria, Germany, France, Italy, Slovenia and Switzerland is to be conducted in order to provide a good overview of the starting position in Alpine and mountain farming and the educational situation in Austrian Alpine regions in comparison to similar neighbouring regions abroad.

The starting point was the basic information on natural and economic areas of the regions (NUTS III regions were considered the appropriate regional level). Agricultural structural and agri-economic data on the situation of the mountain-area economy in the regions are to provide more detailed information. Here the very different general agricultural policy conditions are very important and decisive for Alpine farming in the individual countries. Existing special educational provision for the Alpine farming production sector in the wider sense (e.g. also Alpine experience, nature education on the Alps) were presented in order to locate

possible deficiencies and possibilities for development or the need for action. On the one hand, the paper compares the status quo in the different countries, on the other hand, it discusses the different development trends and compares respective national averages in order to assess the possible effects of agricultural-policy measures. The necessary data come from various sources. As far as possible, the attempt has been made to refer to central sources (Eurostat, European Commission) and to draw on existing data from the literature in order to minimise problems of differing definitions and time frames. As part of this study, however, it was not possible to go into overall data-harmonisation aspects. Socio-economic data were largely taken from Eurostat, supplemented by national data and information from national experts. However, it was not possible to elicit data for all regions in comparable form.

The NUTS III regional unit was chosen in order to present the mountain area in greater detail and with the available agricultural and socio-economic secondary data. In consultation with the commissioner, representative NUTS III regions were chosen that lie completely within the Alpine area. The selected regions and their abbreviated description in the following graphics are presented in table 1, their location in figure 1.

Table 1. Name and abbreviation of selected regions

Country	Nuts III Code	Name	Abbreviation in the following figures
Austria	AT223	Eastern Upper Styria	ATÖO
	AT322	Pinzgau Pongau	ATPP
	AT333	East Tyrol	ATO
	AT341	Bludenz-Bregenzerwald	ATBB
Switzerland	CH056	Graubünden	CHG
Germany	DE13A	Waldshut	DEW
	DE21F	Miesbach	DEM
France	FR717	Savoy	FRS
	FR822	Hautes-Alpes	FRHA
Italy	ITC20	Valle d'Aosta	ITVA
	ITD10	Bolzano Province	ITBO
	ITD33	Belluno	ITBE
Slovenia	SI009	Gorenjska	SIG

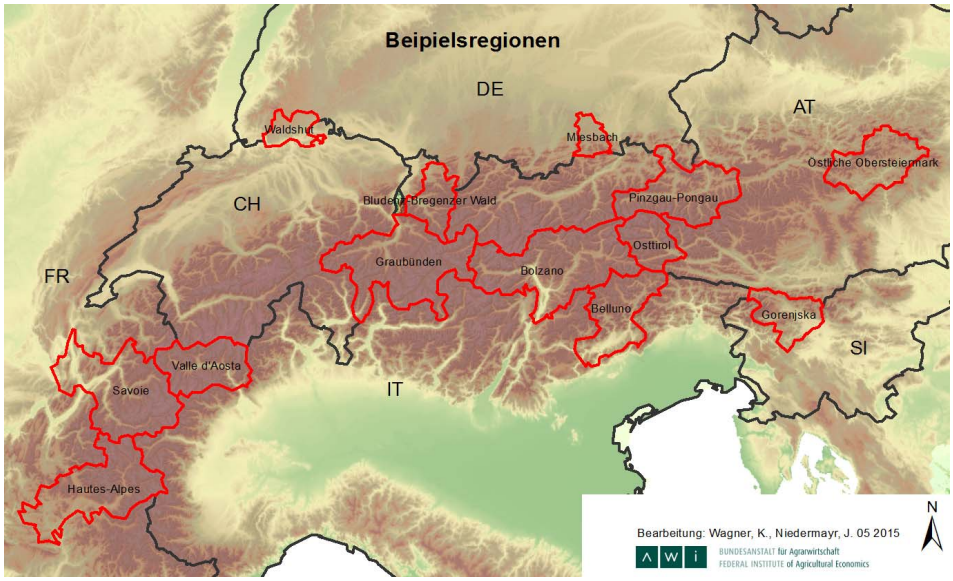

Figure 1. Selected NUTS III regions – overview
Source: Niedermayr, Wagner, 2015.

Natural conditions and general regional data

The difficult production conditions for agriculture are reflected, on the one hand, in the high average altitude, between 700 m (Waldshut) and 2,100 m (Valle d'Aosta) but also in the wide range between minimum and maximum altitude often exceeding 3,000 m. Climatic conditions differ widely as a result of the extreme differences in altitude of smallholdings, relief energy and exposure. In the Histalp project (ZAMG, 2015) at least four major zones are differentiated on the basis of long-term climate data analysis, whose north-south and east-west dividing lines intersect in the area of Salzburg/East Tyrol in Austria. In general, the average temperatures in the two northern zones are somewhat lower than in the southern zones. The precipitation in the northern and western zones is somewhat higher than in the eastern and southern zones.

In 2014, the selected NUTS III regions had populations between 49,000 (East Tyrol) and 516,000 (Bolzano province). The population density also varied greatly, between 24 and 145 people per square km. What the regions have in common, however, is the fact that the population densities are well below the respective national averages. However, measured against available long-term settlement area, the Alpine area is relatively densely populated (Tyrol Atlas, 2005). In a few areas there is a negative change in population as compared over decades (eastern Upper Styria, East Tyrol, Waldshut and Belluno). Only

in Austria is the change in population below the national average; in most other comparison areas the change is at or above the national average. In 2012, the migration balance was only negative in eastern Upper Styria, in East Tyrol, Bludenz-Bregenzerwald and in Gorenjska, and some regions, despite negative natural population growth, even registered an overall positive population development (Valle d'Aosta, Graubünden, Miesbach and Waldshut, figure 2). The age ratio (ratio of over 65 to the 15-65 age group) is above the respective national averages in many of the NUTS III regions selected. It is also usually high in places where there is a fall in population.

Figure 2. Demographic balance in per cent, 2002-2012

***plus statistical adjustment**

Source: own visualisation according to EUROSTAT, 2012.

Many of the regions are below the respective national averages for gross regional product. In 2011, the figure for East Tyrol, Waldshut, Miesbach, Hautes-Alpes and Belluno was EUR 26,000 per capita, Gorenjska below EUR 18,000. The ratio of the working population in the first sector of the economy is by far the highest in East Tyrol (13.9%), in most NUTS III regions this ratio is above the respective

national average. Only in Waldshut, Savoy and Belluno the ratio of the first sector of the economy is relatively low, at fewer than 2%. The third economic sector is heavily marked in the Swiss and French regions in particular. The number of guest beds, as an indicator of the importance of tourism, is the highest in absolute terms in Pinzgau-Pongau (124,000 guest beds), in Savoy and Bolzano province. At 764 guest beds per 1,000 inhabitants, Pinzgau-Pongau has the highest number of guest beds per inhabitant, and Bludenz-Bregenzer Wald (506) and Hautes--Alpes (685) also have very high ratios. Usually, this is above the respective national averages.

Agricultural structures

The number of farms in the NUTS III regions varies between around 1,000 in the German region of Miesbach and 20,000 in the province of Bolzano. Farm numbers are most stable in Pinzgau-Pongau in Austria, while the greatest reductions are recorded in Belluno; here there were two thirds fewer farms in 2010 than ten years previously. There are also considerable differences within the Alpine states, and with the exception of the regions of Graubünden, Belluno, Valle d'Aosta and Savoy farms in the regions studied in the Alpine area are more stable than the respective national averages.

The ratio of farms classed according to utilised agricultural area (UAA) is shown in figure 3. At just over 50%, the Italian regions have the highest ratio of small farms (<5 ha UAA). One reason for this is the relatively low, and regionally differing regional threshold values (<1 ha). In other regions this ratio is far lower (from 4% in Waldshut to a maximum of around 30% in Bludenz--Bregenzerwald). Hautes-Alpes and Savoy have a particularly high ratio of large farms (>50 ha UAA), followed by Waldshut. Between 2000 and 2010, all regions showed a relatively greater decline in small farms (<5 ha UAA) than in large farms (>50 ha UAA). Only in Gorenjska is the number of small farms stable. The decline in small farms is the lowest in the Austrian regions and the province of Bolzano. The greatest decline in the number of small farms is in the regions of Belluno, Savoy and Graubünden. A chronological and spatial comparison within this category is not significant for the German regions, as the survey limit of the agricultural census was raised to 5 ha in 2010. In comparison to the respective national averages, the number of small farms in the regions in Austria, in Gorenjska and the province of Bolzano is falling less steeply, while the regions of France, Valle d'Aosta and Belluno are significantly below the national figures, i.e. declining more sharply in the Alpine area than nationally. The large farms (>50 ha) are faring much better in these regions and their numbers are even increasing. Large farms in eastern Upper Styria, in the regions of Miesbach, Waldshut and Gorenjska are also stable or growing.

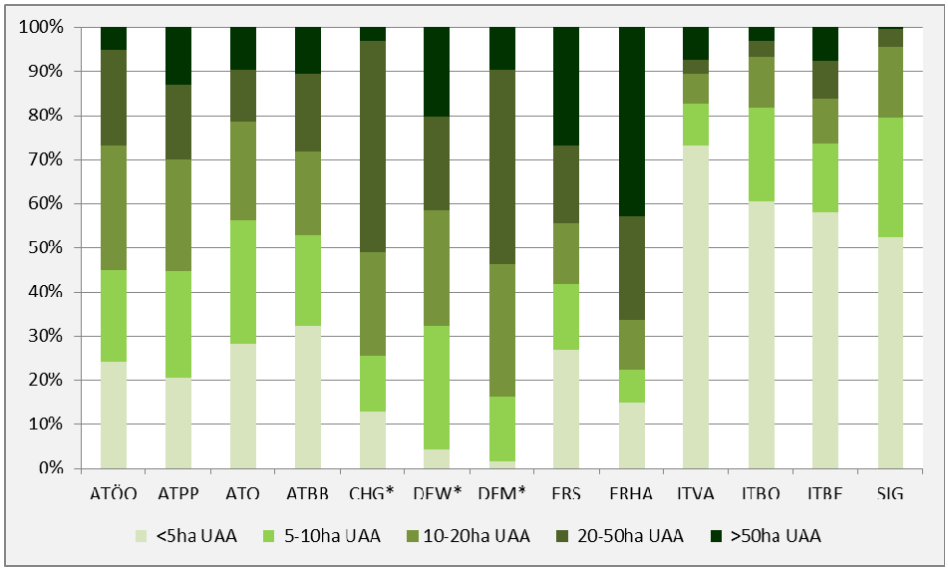

Figure 3. Share in farms by size classes of utilised agricultural area (UAA)

***please note the changed farm structure survey thresholds in Germany, from 2 ha until 2007 and 5 ha in 2010**

Source: EUROSTAT 2010; ISTAT 2010; DESTATIS 2010; BLW 2010; SI-STAT 2010.

The most frequent types of land use in the mountain area are, as would be expected, long-term grassland and forestry areas. Between 2000 and 2010, the agricultural and forestry area changed most sharply in the Italian and Austrian regions. Here the forestry areas are increasing and grassland is being lost – in particular in the Austrian regions.

Animal husbandry in the Alpine area is mainly marked by cattle farming, to a lesser extent also by sheep, goat and pig farming. The province of Bolzano has the largest animal stocks in these four categories (113,060 LU), and East Tyrol has the smallest (18,700 LU). Dairy-cow farming predominates in the province of Bolzano, Valle d'Aosta, Savoy, Miesbach and Bludenz-Bregenzerwald, while in the other Austrian regions, in Gorenjska, Graubünden and Waldshut other types of cattle farming (i.e. suckling cows and young cattle) predominate. Sheep and goat stocks play a role in the French Alpine area, particularly in Hautes-Alpes with a share of 49% (24,310 LU); sheep and goat stocks are much lower in Savoy (8%) and Graubünden (12%). In general, the livestock holdings in the NUTS III regions remained relatively stable between 2000 and 2010. According to livestock categories, numbers of suckling cows are falling most rapidly (exceptions are stable stocks in Savoy and Gorenjska), while other cattle in all Austrian regions and Graubünden have risen. The sheep and goat stocks remain largely stable

or are increasing (in particular in Belluno), but in the Hautes-Alpes, with the largest absolute number of livestock, they are falling most sharply.

The Austrian average for the number of workers per farm (figure 4) is 7.6 annual work units (AWU) and in the Austrian exemplary regions between 0.62 (East Tyrol) and 0.77 (Pinzgau-Pongau). In all other regions, the labour force per farm is significantly higher (between 0.85 and 1.48), being particularly high for the Swiss average (2.84).

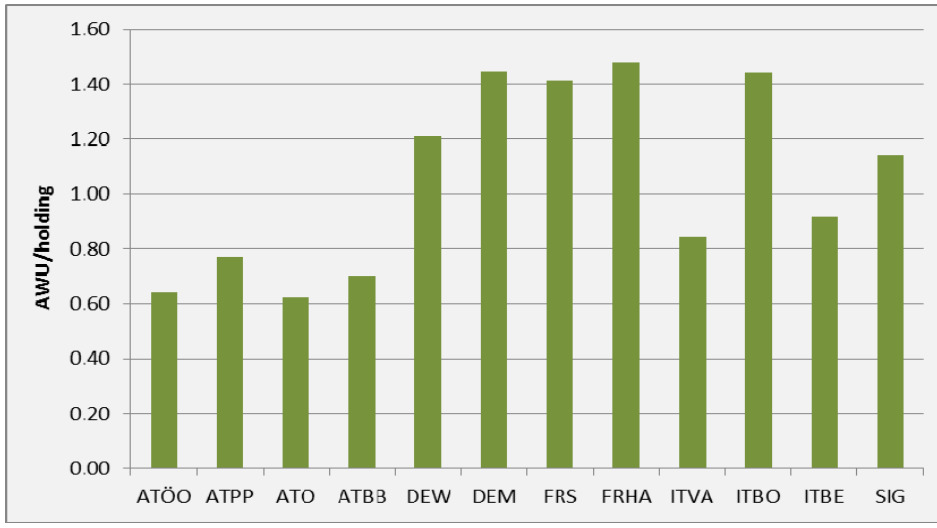

Figure 4. Agricultural work units (AWU) per holding, 2010; no data for Graubünden
Source: EUROSTAT, 2010.

Broken down according to age and working hours of the farm owners, in all regions for which data are available there are proportionally more farm owners aged over 55 than under 35, a distribution that is particularly pronounced in the Valle d'Aosta region. Apart from the Valle d'Aosta and Belluno regions, the numbers of young farmers are declining faster than older ones. Whereas in the Austrian regions the number of farmers with <50% working hours on the farm is mostly increasing and the number with >50% is falling, this ratio is precisely the reverse in the regions in the neighbouring countries.

The economic development of the agricultural sector is shown in the European Commission's Farm Accounting Data Network (FADN), in order to provide a viable basis for decision-making and to assess its impact. The most current data come from 2012; in order to reduce fluctuations, a three-year average was used for the assessment (DG Agri 2010, 2011, 2012). This shows, for example, that the two French regions have absolutely the highest input of workers per farm, at

the same time, the ratio of paid labour is the highest there. The lowest input of workers per farm is in the province of Bolzano, the region of Gorenjska has the lowest ratio of paid labour. The studied farms in the Austrian regions use work almost completely of non-paid labour (i.e. family members).

The economic size of the holdings is given in standard output (SO) and is shown in figure 5. The highest value of economic holding sizes are in the French Alpine regions (Savoy: EUR 79,523, Hautes-Alpes: EUR 74,903) and in Oberallgäu (EUR 72,310); in contrast, at ca. EUR 30,000/farm, the farms in the region of Valle d'Aosta, in Pinzgau-Pongau, East Tyrol and the province of Bolzano have the lowest values. In comparison with the 2007-2009 three-year average, the economic holding size in the region of Valle d'Aosta, in Pinzgau-Pongau and Hautes-Alpes has declined, in the other regions it has increased, in particular in Bludenz-Bregenzerwald and eastern Upper Styria.

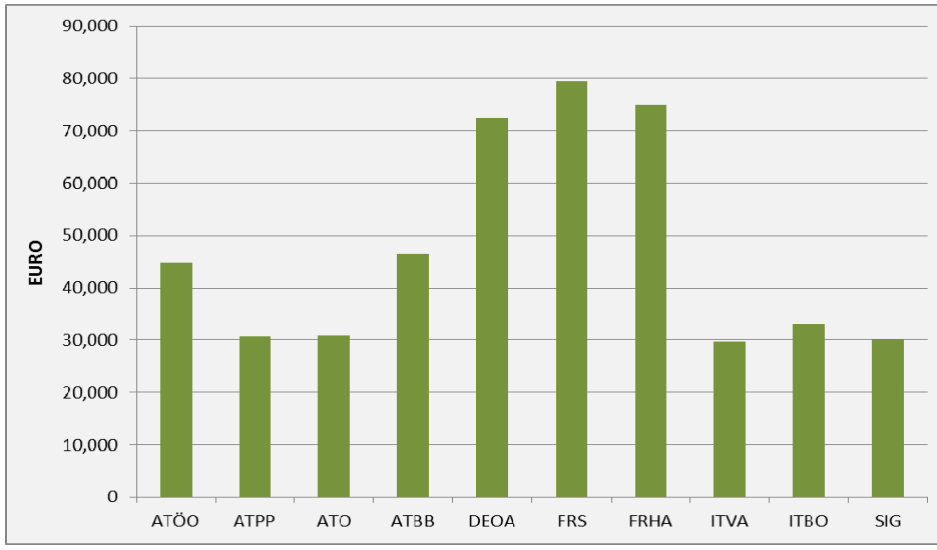

Figure 5. Average economic size of farm enterprises, three-year-average of 2010, 2011, 2012, in Euro; no data available for Graubünden, Miesbach and Waldshut, instead available for Oberallgäu, Bavaria (DEOA)

Source: DG Agri 2010, 2011, 2012.

Measured against the sum of gross domestic product and agri-policy payments, the Hautes-Alpes region has the highest ratio of agri-policy payments (around 40%). It thereby diverges relatively strongly from the national French average (15%), while Savoy, at 11%, is below it. Among the studied regions, the province of Bolzano (7%) has the lowest ratio. The regions also differ considerably when broken down according to the type of agri-policy payments received. In the Aus-

trian regions and the Italian regions of Valle d'Aosta and Belluno, the payments predominantly come from the second pillar of the CAP (above all, payments for disadvantaged areas and environmental measures), while in the German, French and Slovenian regions, the decoupled payments (pillar 1 of the CAP) also make up a considerable amount of the funding. In absolute terms, the enterprise taxes and duties (excluding personal taxes) are the highest in the province of Bolzano (EUR 2,777). At 0.66%, tax as a proportion of gross farm income is the lowest in the Slovenian region of Gorenjska and the highest in Bolzano, at 7.39%. In most Austrian regions it is relatively low – under 1%.

Agricultural policy and societal conditions

At current product prices, Alpine pasture and mountain farming cannot cover its costs. In the complex structure of economics, ecology and socio-culture, the most diverse functions of Alpine pasture and mountain farming are regarded as important (cf. BMLFUW, 2006), and therefore especially emphasised in agricultural policy. The measures mentioned here in international comparison as far as possible concern the 2014-2020 support period.

In pillar one of the CAP (market regulation and direct payments) there are fundamental differences between Austria and the neighbouring countries in the level of direct payments (average value from EUR 93 in France to EUR 875 per hectare in Switzerland). The additional rules for young farmers and coupled payments also differ. Some payments from pillar one in agricultural policy can only be claimed in connection with Alpine pasture farming. Thus, in Austria there are coupled supplements for Alpine pasturing of livestock. In France, Italy and Slovenia there is a supplement for suckling cows in mountain regions, but without special reference to the need for Alpine pasturing.

In pillar two of the CAP there are numerous different measures with very diverse payment structures that have an indirect effect on Alpine pasture farming, such as knowledge transfer especially for mountain areas in the province of Bolzano, quality regulations especially for mountain areas in Savoy, investment and development measures especially for farms in mountain areas in Hautes-Alpes, Savoy and the province of Bolzano. Under the basic services and village renewal measure, specific mountain-area measures are offered in Austria and the province of Bolzano. Special compensatory payments for natural disadvantages in mountain farms are offered in all countries, but at very different levels and with systems differentiated according to the degree of disadvantage and the difficulty of farming. In the province of Bolzano the Leader measures are conceived especially for mountain areas. The environmental measures contain multiple general measures for grassland farming, but also, to some extent, measures conceived especially for Alpine pasture farming: e.g. measures for farming mountain hay meadows in Austria, Graubünden Waldshut, the province of Bolzano, and Gorenjska, mea-

sures for Alpine pasturing and herding in Austria, Graubünden, Miesbach, the province of Bolzano, and Gorenjska.

In addition, further national and regional measures have a direct or indirect influence on Alpine pasture farming: e.g. there are provincial state contributions to Alpine farming in Salzburg and Vorarlberg, in Miesbach there are programmes for Alpine pasturing and improvement of working conditions of the Alpine workforce, in the region of Valle d'Aosta there are measures for maintaining Alpine huts. Not least, the subsidy for agri-diesel prices also plays a certain role. In Austria this has been abolished, in all neighbouring countries in the Alpine area there is compensation of about 20 to 50%.

Succession at the farms is also differently regulated in the countries in the Alpine area. Whereas in Austria there are detailed special regulations in inheritance and tax law, partly also at provincial level and also being taken account of in pension law, in most countries the general conditions also apply for succession at farms in agriculture. Exceptions to this, for example, are taking the yield value as a basis rather than the market value, when taking over farms in Graubünden. In Waldshut those giving up their inheritance are compensated according to the yield value. In the French areas and in the province of Bolzano there are tax and duty reliefs, but otherwise no special regulations. In Slovenia too, there are no special regulations for farm succession.

The special features of Alpine pasture farming with relation to the management of nature, logistics and also legal issues, demand particular experience and training. In order to maintain a continuous specialist and, as far as possible, economic Alpine pasture farming in the context of changing new challenges for farming and society, Austria, through the Rural Training Institute (LFI), offers a multifaceted range of trainings in various subject areas of Alpine pasture farming (LFI, 2013). These address those responsible in the Alps and the workforce. The curriculum ranges from basic training to issues for specific forms of utilisation (milk processing, suckling cow husbandry, pasture management) to technical, economic and legal issues, to diversification, tourism and nature issues. As per current information, private providers of special Alpine pasture training measures are not involved.

The provision in Austria's neighbouring countries in the Alpine area is far less extensive and varied. In Switzerland, for example, the public Plantahof advisory centre offers courses on the subjects of safety, Alpine herding, shepherd's huts and sheepdogs. In Bavaria, two-to-three-day practical courses are offered for Alpine-pasture staff and farmers in the Alpine farming associations and specialist centres as well as inspections of and educational excursions to Alpine pastures. In France, themes such as pasture management, diversification, tourism and sheepdog training are offered by public institutions, but issues such as pasture improvement and weed control are also covered by a private institution. In Italy, training measures on grassland farming are predominantly offered by public bodies; spe-

cial Alpine pasture farming measures are only known in South Tyrol. In Slovenia, there are no special training provisions for Alpine pasture farming.

Discussion and conclusions

Despite the shared features of location in the Alpine area and – with the exception of Switzerland – membership in the European Union with its Common Agricultural Policy, the regions display very different preconditions for farming. This causes different forms of farming, e.g. in dry areas more extensive farming, in wetter areas with better feed provision, more intensive forms of utilisation. The proportion of various altitudes and forms of relief in the regions also varies and affects the accessibility and length of use, with resulting effects on the forms of farming and livestock categories.

The interaction between socio-economic aspects and the agricultural structures are indicated by selected demographic aspects such as population growth and balance, economic performance and the regional labour market. The proximity to large, economically prosperous (job) centres or industrial areas creates a different web of relationships or also a different competitive or alternative situation between the economic sectors, and can, on the one hand, facilitate additional income for agriculture in the form of non-farming earnings (e.g. the province of Bolzano, Streifeneder, 2010). On the other hand, however, it can create a drain on the agricultural labour force (e.g. southern Belluno; Zanetti, 2013). In addition, the attractiveness of a region for tourism and the related opportunities for diversification has a particular structurally supportive effect on agriculture (Streifeneder, 2010; Weber and Seher, 2006) and for example can be seen in Pinzgau-Pongau, Bludenz-Bregenzerwald, South Tyrol and Hautes-Alpes. On the whole, the total regional economic structure thus determines developments in demography, with feedback effects on development possibilities in agriculture too. With a young population and high employment rate, as in Pinzgau-Pongau or Bludenz-Bregenzerwald for example, this will be more dynamic than in areas at risk of ageing, as for example in eastern Upper Styria, in Hautes-Alpes or Belluno.

The numbers and size structures of the farms reflect the structural change and the interventions by agricultural policy. In Austria, Italy and Slovenia, the proportion of small farms is very high. This is related, for instance, with historic developments in the agricultural structure (agricultural maximum in Slovenia, the gavelkind system (division of land among heirs) in the western Alpine areas), the economic orientation (small-scale permanent crop farms in the province of Bolzano, Valle d'Aosta) or the form of employment (secondary jobs) and the above-mentioned regional labour market (Streifender, 2010). In Switzerland, Germany and particularly in the French regions, the proportion of small farms is relatively low, both measured by hectare as well as by standard output categories. In the French regions, these are in Savoy, above all, intensive suckling-cow

farms and in Hautes-Alpes large-scale extensive sheep farming. Nevertheless, in particular in Savoy the rates of abandonment are higher than in the smaller-scale agricultural regions, which despite a well-advanced structural change in agriculture still indicates an extensive restructuring processes (greater reduction of small farms in relation to the medium and larger farms) (Noury and Girard, 2013). In most regions the numbers of young farm-owners are falling more rapidly than those of the older ones (exceptions Belluno and Valle d'Aosta); this contains dangers for the future development dynamics.

The utilised agricultural area (UAA) is falling faster, above all, in Austria than in the regions of the neighbouring countries; although, depending on the surveys, the chronological comparison is blurred. What is common to all regions is an increase in forested areas. In stockholding, above all the relationship between dairy-cows and other cattle, is determinant for the intensity of labour. In some regions (Graubünden, East Tyrol and particularly Hautes-Alpes), sheep and goat farming is already very significant and in most regions it is becoming more important. Likewise the generally rising numbers of other cattle in contrast to dairy cows indicate a trend to more extensive farming in Alpine pasture and mountain farming.

The economic situation of the farms and the labour-force situation – as far as data exist and are significant for this regional level – indicate that family labour predominates in the mountain regions in comparison to the national average, but here too the ratio of paid workers is generally rising. In regional comparison, the French regions have the highest number of workers per farm and also the highest ratio of paid workers, while the ratio of family labour is the highest in Austria and Slovenia. The gross total production per farm and the farm size according to standard output are also comparably very high in the French regions (above all Savoy).

The agri-policy payments in the mountain farming regions are spread widely and are very differently structured: while agri-environmental measures make up a large proportion in the Austrian regions, in German, French and Slovenian regions the decoupled payments are very high. The EU's Common Agricultural Policy establishes certain principles, the specific design in the selected exemplary regions, however, varies greatly. On the one hand, the pillar one measures of the CAP differ in the respective Member States, as do the equivalent measures in Switzerland, on the other hand, rural development programme measures – regionally determined in Germany, France and Italy, otherwise nationally – are nevertheless differently focused. Thus, there are considerable differences in the level of direct payments. In pillar two, rural development, special regulations in the support of less-favoured areas (Austria, France, Italy) and environmental measures, such as the farming of mountain pastures and payment for Alpine pasturing and herding (Austria, Germany, Italy, Slovenia), have a special effect on Alpine pasture and mountain farming. In addition, other measures independent of the EU agricultural policy influence agriculture to a lesser extent, such as different levels of agri-diesel

subsidy, differing farm succession regulations and individual measures at state or provincial level. The provision of training especially for Alpine pasture farming is by far the most extensive in Austria as compared to the neighbouring countries.

All in all, mountain and Alpine pasture farming in the Austrian regions is provided with comprehensive and multifaceted support and advice as compared to the neighbouring countries in the Alpine area, which together with a rather favourable regional economic environment, presumably also contributes to the comparatively limited fall in farm numbers. Nevertheless, a change in the utilisation structure towards extensive forms of farming, to afforestation and a secondary employment economy is to be noted, usually more strongly marked than in the regions of the neighbouring countries.

The selected aspects are intended to highlight the dimensions that are decisive for mountain farming and their embedding in the economic, social and ecological structures of rural regions. A comparison of the development paths in agriculture produced very divergent developments. How decisive the measurable influencing factors ultimately prove to be and what specific effects they have depends on less tangible, soft factors. These are, for example, the social, societal and institutional capital, cooperation and network formation and the readiness to innovate on the part of the regional players as well as a governance towards an integrated, territorial approach (Shucksmith et al., 2005).

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