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Introduction

This volume of the Rural areas and development series, published by European Rural Development Network (ERDN), comprises the papers presented at the fourteenth ERDN conference held in Budapest, Hungary on 3-5 October 2016. The conference was organised by the Research Institute of Agricultural Economics (AKI) in Budapest and was attended by around 70 researchers, practitioners and policy makers from Austria, the Czech Republic, France, Germany, Greece, Hungary, Italy, the Netherlands, Poland, Romania, Slovakia, Sweden and the United Kingdom. The papers explore several aspects of the topic Knowledge sharing and innovation in agriculture and rural areas, including setting the context for knowledge sharing and innovation; the potential for knowledge sharing and innovation; mechanisms/processes of innovation and knowledge sharing; the enabling environment for rural innovation; and impacts of knowledge sharing and innovation.

The rationale behind this conference was as follows. The European Union (EU) has introduced new policy instruments such as the European Innovation Partnership 'Agricultural Productivity and Sustainability' (EIP-Agri) and multi-actor partnerships in an attempt to stimulate innovation in agriculture. In addition, LEADER has been replaced by the multi-funded Community-Led Local Development approach. These initiatives are being implemented across the EU despite the great variety of agricultural and rural circumstances, and in particular the continuing differences between post-socialist Member States and other parts of the EU in terms of farm structure, social attitudes and so on. Can programmes that have primarily been developed from a western EU perspective ever be successfully implemented in the eastern EU Member States or is a different approach needed? Although it is still rather early to assess the degree of success in the implementation of the new approaches, the debate on the possible shape of EU innovation policy post-2020 has already started. Thus it is not too soon for researchers and policy makers in eastern central Europe to share their experiences and ideas on how knowledge sharing and innovation can best be encouraged in agriculture and rural areas of the eastern EU Member States, and in the V4 countries in particular, in order to influence the post-2020 agenda. The papers included in this volume make such a contribution.

A purely reactive approach to the agricultural, bioeconomy and rural policy and governance challenges of eastern central and south eastern Europe will no longer suffice. ERDN has now been established for over 15 years and represents a 'critical mass' of high-quality research expertise covering a broad range of disciplines including (but not only) agricultural production and competitiveness, environmental resource management, agri-food supply chain management, markets and marketing, international trade, econometrics, rural economic geography, rural economy and sociology. The Network is uniquely placed to influence the various policy agendas to ensure that the needs of farming, the agri-food supply chain, rural areas and researchers in the region are recognised fully. The annual ERDN conference is an opportunity for researchers in the region to 'showcase' their competences, not least to researchers in other parts of the EU, so that the region becomes fully integrated into the European Research Area.

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Changes in social and economic development of small farms in Poland

Abstract: *The article discusses the progress of changes in the area structure of individual farms and related to this changes in the number of workers in agriculture as well as the issue of unused labour resources in Poland. The research material are public statistics data (Polish Statistical Office – GUS) and the results of own research carried out at IAFE-NRI. A detailed analysis of the decline in the share of people working in agriculture among the total number of employed in our country indicates that in the recent period the scale of decline in the value of this indicator is accelerating. These tendencies were mainly the result of a much larger than before increase in the number of non-agricultural workers, especially among rural residents.*

Keywords: *family farms, individual agriculture, labour force, unemployment, Poland*

Introduction

Economic progress results, inter alia, in the diminishing importance of agricultural activity in the economy, which is reflected in the continuous decline of the agriculture's share in the creation of Gross Domestic Product (GDP). This universal development regularity does not automatically equals to economic marginalization, and especially to social marginalization of farming, as systematically decreasing production resources in the agricultural sector, as a rule should be accompanied by structural changes improving the efficiency of their use (Tomczak, 2004, Woś, 1999).

In Poland, the ability of agriculture to create GDP is also diminishing, while the economic importance of this economic sector is not associated with a proportionate decrease in its impact on the general economic situation. Poland, despite the declining role of agriculture in economic development, is still characterized by the relatively high importance of agriculture in employment and in sources of income of the rural population, especially people from family farms (Frenkel, 2013, Chmieliński, Karwat-Woźniak, 2015). A change in the situation in this area is connected with the necessity of pro-effective transformations of agricultural structures. This transformation will be associated with a decline in the number of people working in farming.

The main factor limiting the pace of change in agriculture is the large number of employees in this sector. Generally, this situation results in the lack of significant improvement in equipping farms with land and capital, which in turn is not conducive to the increase in labour productivity (Kowalski, 1998; Baer-Nawrocka, Poczta, 2014). Acceleration of the desired structural changes in agriculture requires the outflow of people working in farming to non-agricultural activities. The issue of reducing employment in agricultural activity and shifting labour resources from agriculture to non-agricultural sectors is an essential condition for improving the agrarian structure, increasing the efficiency of farming and ameliorating income situation not only of farmers, but also other rural residents. The process of population outflow from agriculture is also a factor in modernizing the entire economy (Potori, Chmieliński, Fieldsend, 2015; Sikorska et. al., 2009). Activating the process of diversification of professional activity of the agricultural population is hindered not only by macroeconomic conditions, especially the imbalance in the labour market, but also by the socio-demographic characteristics of this population.

Methodology

The article discusses the progress of changes in the area structure of individual farms and related to this changes in the number of workers in agriculture as well as the issue of unused labour resources in individual farms. The research material are public statistics data (Polish Statistical Office – GUS) and the results of own research carried out at IAFE-NRI.

Results

The analysis of available public statistics data shows that progress in rationalization of agricultural structures, professionalization of farms and commercialization of agricultural production takes place in an evolutionary way. This process creates opportunities for more efficient use of agricultural land and better use of economies of scale to improve the competitiveness of Polish farms. The pace of these changes is evidenced, inter alia, by the scale of the decline in the number of farms (Table 1).

Table 1. Number of farms in the 2011-2016

	Number of farms		Individual farms	
		of which		of which
Year	Total	> 1 ha UAA	Total	> 1 ha UAA
2011	1,656.7	1,618.5	1,653.1	1,614.9
2012	1,477.9	1,456.4	1,474.3	1,452.9
2013	1,429.0	1,394.6	1,425.4	1,391.1
2014	1,413.0	1,381.6	1,408.9	1,377.6
2015	1,409.6	1,382.0	1,405.5	1,377.9
2016*	1,407.7	1,381.2	1,403.7	1,377.2

* agricultural holdings with arable land

Source: (CSO, 2012ab, CSO, 2017)

According to CSO data, in 2016, there were 1,407,700 farms in Polish agriculture. (Table 1). The number was by 0.1% smaller than a year before, and by 0.4% compared to 2014. In 2011, there were 1,656,700 entities operating in the agricultural production sector. Thus, the number of farms in 2016 was by 15.0% lower than in 2011, so on average each year around 1.6% of holdings were liquidated.

Table 2. Dynamics of changes in the number of farms in 2011-2016 (previous year = 100)

	Index of changes in the number of farms (previous year = 100)			
		of which	Individual farms	
				of which
Year	Total	> 1 ha UAA	Total	> 1 ha UAA
2011	109.7	100.9	109.8	108.8
2012	89.2	90.0	89.1	90.0
2013	96.7	95.8	96.6	95.7
2014	98.9	99.1	98.8	99.0
2015	99.8	100.0	99.8	100.0
2016*	99.9	99.9	99.9	99.9

* agricultural holdings with arable land

Source: (CSO, 2012ab, CSO, 2017).

The comparison of the rate of decrease in the number of farms shows that in subsequent years in the period 2011-2016 the tendency to liquidate farms gradually weakened (Table 2). It was also lower than in the first decade of the 21st century.

Table 3. Changes in the number of farms by area groups

Specification	Year	Total	Farm size in ha UAA						
			>1	1-5	5-10	10-15	15-20	20-50	50+
Number of farms (in '000)	2011	1,656.7	38.2	922.8	338.0	159.0	74.5	97.7	26.5
	2012	1,477.9	21.5	758.9	349.4	143.8	73.7	101.4	29.2
	2013	1,429.0	34.4	732.9	315.2	141.3	70.2	103.2	31.8
	2014	1,413.0	31.4	719.0	309.6	147.3	70.1	102.5	33.1
	2015	1,409.6	27.6	707.0	322.6	145.9	71.4	102.3	32.9
	2016	1,407.7	26.5	718.6	314.3	142.7	70.2	102.3	33,1
Change indicator (previous year = 100.0)	2012	89.2	56.2	82.2	103.3	90.4	98.9	103.8	110,2
	2013	96.7	160.0	96.6	90.2	98.3	95.3	101.8	108,9
	2014	98.9	91.3	98.1	98.2	99.0	99.9	99.3	104,1
	2015	99.8	87.9	98.1	98.2	99.0	101.9	99.8	99,4
	2016	99.9	96.0	101.6	97.4	97.8	98.3	100.0	100,6
Change indicator in the period 2011-2016 (100 = 2011)		85.0	69.4	77.9	93.0	89.7	94.2	104.7	124.9

Source: (CSO, 2012, CSO, 2014b; CSO, 2017)

However, regardless of the analysed period, the universal regularity were very varied changes in the number of farms depending on the area of the farm (Table 3). In general, the number of farms with a relatively small area of up to 20 ha of UAA was decreasing. The strongest loss was noted in the group of entities with an area up to 5 UR, which, as a rule, could not provide work and support for the average farming family. Different processes became apparent in the group of relatively larger entities, i.e. with an area of at least 20 ha of UAA, and especially in the group operating on an area of 50 hectares and larger, which, according to research, are usually able to compete effectively on the market for agricultural products.

Table 4. Changes in the area structure of farms

Specification	Year	Total	Farm size in ha UAA						
			>1	1-5	5-10	10-15	15-20	20-50	50+
Farm structure	2011	100.0	2.3	55.7	20.4	9.6	4.5	5.9	1.6
	2012	100.0	1.5	51.3	23.6	9.7	5.0	6.9	2.0
	2013	100.0	2.4	51.3	22.1	9.9	4.9	7.2	2.2
	2014	100.0	2.2	50.9	21.9	10.4	5.0	7.3	2.3
	2015	100.0	2.0	50.2	22.9	10.3	5.1	7.2	2.3
	2016	100.0	1.9	51.0	22.3	10.1	5.0	7.3	2.4

Source: (CSO, 2012a, CSO, 2017).

Despite the differences in the direction and scale of changes in the number of farms in individual area groups, this transformation have not contributed to major changes in the structure of entities according to the area of agricultural land owned, as these processes are revealed only in longer time periods. However, in general, progress in the area structure of farms is more and more clearly visible. Despite the fact that the area structure of farms has improved (Table 4), farms up to 5 ha of UAA are still the most numerous. In 2016 they constituted 52.9% of all farms. At the same time, despite the dynamic growth in the number of larger entities, they still constitute a small group. In 2016, the percentage of farms with an area of at least 50 ha of UAA was 2.4%.

Changes in the number of employed in agriculture

Among the most important factors determining the rationalization of agricultural structures, the size of employment in this area of economic activity should be mentioned. In Polish agriculture, the trend of decreasing the number of employees is becoming more and more visible, and the process of desagrarisation is of a permanent and evolutionary character (Woś, 1999, Rudnicki, 2005). These changes are reflected in the systematic decrease in the share of employed in the agricultural sector in general employment in Poland. As a result, according to data from the Labour Force Survey (LFS), in 2014, 11.5% of all employed in Poland worked in agriculture (CSO, 2014a) (including 10.5% in private farming). In rural areas, 26.9% of rural inhabitants worked in agriculture (including individual farming – 25.0%).

When comparing the working population in 2014 with the earlier period, it should be stated that the process of outflow of labour from agricultural sector progressed. Despite the decline in the percentage of people working in Polish agriculture, it belongs to one of the highest among all EU countries (Baer-Nawrocka, Poczta, 2014) which is mainly associated with area fragmentation.

A detailed analysis of the decline in the share of people working in agriculture among the total number of employed in our country indicates that in the recent period the scale of decline in the value of this indicator is accelerating. These tendencies were mainly the result of a much larger than before increase in the number of non-agricultural workers, especially among rural residents (Frenkel, 2014).

The changes in the number of employed in Polish agriculture compared to the total number of employed persons were also a consequence of changes taking place directly in agricultural production, in particular the processes of diversification of their professional activity and changes in labour relations in individual farms.

The specifics of family farms leads to a situation where employment is provided not only to those whose work is needed but also those family members whose work for economic reasons is unnecessary. However, the involvement of this community in the work on the farm has very important social and psychological aspects, because it reduces the negative effects of exclusion. It also represents a significant reduction in the burden on public finances.

As mentioned before, the family nature of production organization in the majority of individual farms, in the aspect of work for family members, results in the fact that practically no one is out of work, because as a rule all people do something (Frenkiel. 2014), although their work is not necessary, that is, they represent a surplus of labour. For this reason, surplus labour force in private farming is mainly marked as hidden unemployment, and its effect is excessive employment (hidden unemployment). The reasons for the existence of hidden (latent) unemployment are most often attributed to the relatively low demand for labour of persons from families with a farm user in relation to supply. However, it may be conditioned by all factors that cause unemployment in general, and in particular also by structural mismatches in the labour market. At the same time, non-compliance in the demand-supply relationship of labour resources is a significant hindrance to improving the situation on the labour market (Boserup, 1965).

Generating hidden unemployment is characteristic mainly for rural areas, especially agriculture, which is why it is often called agrarian because with a dominant family organization of production in agriculture there is always a group of people who can leave the farm without any loss of production. Nevertheless, the fact of existence of unused labour resources in agriculture is not that important, as much more important is its scope. In a situation where the number of people unnecessary on family farms increases significantly and exceeds the level of so-called natural unemployment (Dasgupta, Ray, 1986), as a rule, problems with reconstruction and modernization of socio-economic systems in agriculture and in rural areas intensify. This is particularly important from the perspective of the dynamics of pro-efficiency processes of agricultural transformations in Poland and the income situation of farming families. However, under certain conditions a relatively strong link between an agricultural holding and the fate of the family and a relatively small mobility of economic structures in Polish agriculture may be useful, as this segment welcomes the unemployed and becomes a buffer for social tensions.

The analysis of data on the amount of work performed by people for whom the farm is the sole or main place of professional activity shows that unnecessary, from the point of view of agricultural activity, employees occur irrespective of the area size of the farm (Chmielinski, Karwat-Woźniak, 2015). Although this situation is most often observed in relatively small entities, along with the development of mechanization, the phenomenon of incomplete use of labour potential also affects farms which, as for Polish conditions, are relatively large in terms of the UAA occupied by them. Data from field studies of IAFE-NRI create possibilities for determining the characteristics of the group of redundant persons according to the subjective criterion (opinion of farm manager) as well as the objective one (AWU). Each method of determining unnecessary employees is burdened with certain imperfections, which result mainly from the complexity of the essence of unemployment in family farms. In determining this phenomenon, the criterion of unused working time was considered the most appropriate based on the survey material (Frenkel, 2013).

Table 5. Assessed hidden unemployment in Polish regions (as on 31.12.2015).

Region	Number of unemployed (in thousand)		Hidden unemployment (tousand inhab.)
	Rural population	Farming families	
Poland	596.4	37.0	489.8
Dolnośląskie	32.1	0.2	20.3
Kujawsko-pomorskie	44.6	0.7	39.5
Lubelskie	50.8	4.5	41.5
Lubuskie	13.7	0.04	34.1
Łódzkie	30.6	3.6	30.7
Małopolskie	50.0	2.9	34.6
Mazowieckie	86.6	6.9	51.6
Opolskie	14.4	0.2	11.1
Podkarpackie	66.4	9.8	45.2
Podlaskie	18.1	1.2	21.9
Pomorskie	27.5	0.2	19.3
Śląskie	27.1	1.3	18.4
Świętokrzyskie	32.2	4.3	31.9
Warmińsko-Mazurskie	35.0	0.3	49.1
Wielkopolskie	37.5	1.1	21.4
Zachodniopomorskie	26.6	0.03	19.2

Source: data of CSO, regional Labour Offices and IAFE-NRI survey, 2011.

According to this condition, based on the available CSO statistics and the results of empirical IAFE-NRI research on unused labour resources in private farming, it can be estimated that at the end of 2015, about 490,000 people in working age redundant from the perspective of the needs of the farm (which determines the estimated amount of hidden unemployment in the agricultural sector) and they accounted for almost 20% among those working during the year in agricultural activity at the age of statutory professional activity (Table 5).

Discussion

The overall socio-economic conditions in agriculture and the necessary structural changes in this sector of the economy, aimed at improving competitiveness and ensuring satisfactory income from agricultural activities are associated with a reduction in the number of employees in individual farms. The reduction in the number of employees in the sphere of agricultural production will largely be related to changes in the area structure and modernization of agricultural activity. In accordance with the current development tendencies, usually the diversification of professional activity precedes the area transformation (Van Huylenbroeck et al., 2008).

Taking into account the presented situation with regard to the competitiveness of our farms, also in the resource area, the number of people working in private farming should decrease by about 50%.

Taking into account the above-mentioned socio-economic situation of farmers and their family members, and aiming at creating conditions supporting those involved in farming in the process of finding employment outside of the agricultural sector must be associated with solving problems not only of the population related to faming but of the entire rural community. These issues should be considered, bearing in mind not only issues related to ensuring the competitiveness of agricultural activity and adequate income from work on farms, but also to ensuring the vitality of rural areas (Oberholtzer, Grow, 2003).

Rural areas and agriculture in Poland in the last decades, especially after the accession to the EU, have changed favourably. However, despite the progress being made, further significant changes are still needed in many aspects, as it is very difficult to remove large long-term negligence in rural and agriculture development. The distance that separates us from highly developed EU countries is still large. The elimination of these differences will be associated with professional diversification of the agricultural (rural) population and activation of multifunctional rural development processes (FAO,2003, Lewis, 1954).

The greatest opportunities in the present conditions for an increase in earnings outside agriculture are to be found in human capital, whose features are determined by bottom-up development initiatives, i.e. local development. Currently, in the aspect of demographic characteristics of rural residents, the situation should be considered satisfactory despite some symptoms of aging. Demographic forecasts show that in the next few (2-4) years, the number of people at the age of professional activity will continue to increase. This situation will result in an increase in the demand for non-agricultural workplaces. This imbalance in the rural labour market will also be intensified by development processes in agriculture, which are already characterized by high overcrowding. At the same time, within 5-10 years, a decline in the number of people in the statutory age of professional activity to increase the aging processes of the population, also in rural areas, is expected. This trend will require solving problems related to ensuring decent living conditions for older people, especially in terms of providing them with proper living conditions and medical care. In the situation of large negligence in this area, the necessary improvement in the state of care and treatment services is associated with relatively large investment spending. These signalled issues should be resolved in advance and in this area one should also look for opportunities to diversify the professional activity of persons from families with farm users, by creating conditions for taking up care services based on farm property.

The level of education of their inhabitants plays an important role in the process of development of rural areas and the growth of their de-agrarisation. When analysing the education level of the rural population (including agriculture), it should be recognized that despite significant improvement in this respect, large disparities still persist in comparison with urban residents. It can be concluded that people with higher and even secondary education in rural areas constitute a kind of "rare good". Most often such situations occur in areas located at a considerable distance from development centres (on the outskirts of voivodships). In these areas, various unfavourable conditions overlap, in particular the large distance to higher education institutions and the lack (deficiency) of secondary schools in place. In some situations, the quality of education is also low. In addition, young people, preferably educated, emigrate from these areas. In this situation, the crucial problem is the equalization of educational opportunities for children and youth in rural areas in relation to their peers from cities. One of the most important tasks is to ensure a comparable start in the education process by popularizing pre-school care in rural areas. It is also important to build a lifelong learning system whose offer would reflect the needs of the establishments creating the labour market for rural residents, thus contributing to the adjustment of the demand and supply side in the labour market. The possibility of retraining or further training would give a chance to those who, for various reasons, neglected education or whose qualifications meet with a reduced demand on the market.

In the diversification of the rural economy, it is right to see solutions to problems with the development of rural areas and small towns. The current tendencies of rapid development of several agglomerations and their closest environment, to some extent hinders the development of entrepreneurship in areas of inferior location. This situation should be combined with the fact that rural areas are deprived of service facilities and are characterized by an insufficiently qualified labour force and lack of industrial heritage. For this reason, some rural areas will be condemned to relatively slow development.

The acceleration of multifunctional development of rural areas is associated with the existence of many factors, in particular: individual entrepreneurship of residents, the activity of local authorities, good advice for business entities, adequate education of residents, comprehensive infrastructure development.

The increase in the professional diversification of members of faring families and the improvement of the use of labour force in agriculture should be combined with supporting the development of economic activity of rural residents. These activities largely depend on local authorities, which, shaping economic policy at the local level, and investment activities create conditions for the development of entrepreneurship, as well as affect the improvement of the quality of community life and strengthening the residential functions of rural areas.

In the context of the growing importance of non-agricultural professional activity of rural residents, the future of rural development in Poland will be closely related to the strengthening of the residential (housing) function of the village, the importance of which will grow with the development of transport and communal infrastructure that determines the quality of life in rural areas. Research shows that the size of the labour market will be limited not by distance but by travel time to the place of employment. The development of infrastructure not only inhibits the migration of rural residents to cities, but also intensifies the opposite tendencies – the flow of urban population to the countryside (but primarily to towns located near the agglomeration or on major transport routes) and increasing spatial mobility. The phenomenon of circular migration of rural residents will continue to spread as the level of education increases, while decisions about permanent migration will depend on the difference in the quality of life between the village and urban agglomerations. This is indicated by the process of alignment with the lifestyle of the inhabitants of these areas. Along with access to mass information, unification of life and consumption patterns, the aspirations of these groups become similar. As a result, the scope of needs considered basic is also changing. They include not only satisfying living needs (i.e. basic commercial and service infrastructure), but also access to cultural and entertainment offer, medical care and specialized services. Shortages in the development of rural infrastructure may be substituted by the development of road infrastructure and mass transport systems only to a certain extent. Infrastructure investments would allow to extend the range of impact of economic development centres (placed in urban agglomerations) and to mitigate the effects of structural unemployment in rural areas.

The increase in the professional diversification of persons from families with farm users and the improvement of the use of labour force in agriculture should be combined with supporting the development of economic activity of rural residents. These activities largely depend on local authorities, which, shaping economic policy at the local level, and investment activities create conditions for the development of entrepreneurship, as well as affect the improvement of the quality of community life and strengthen of the residential functions of rural areas.

References

Baer-Nawrocka, A., Poczta, W., 2014. *Przemiany w rolnictwie [Changes in agriculture]*. In: Polska wieś, 2014. Raport o stanie wsi [Polish contryside. rEport], Wydawnictwo Naukowe SCHOLAR, Warszawa.

Boserup, E., 1965. *The Conditions of Agricultural Growth. The Economics of Agrarian Change under Population Pressure*. Earthscan Publications, London.

Chmieliński, P., Karwat-Woźniak, B., 2015. *Changes in population and labour force in family farming in Poland*. Studies in Agricultural Economics 117(3), 140-146.

CSO, 2012a. *Pracujący w gospodarstwach rolnych* [*Population working in farms*]. PSR 2010, GUS, Warszawa.

CSO, 2012b. *Charakterystyka gospodarstw rolnych.* [*Characteristics of farms*]. Powszechny Spis Rolny2010, GUS, Warszawa 2012.

CSO, 2013. *Gospodarstwa rolne w Polsce na tle gospodarstw Unii Europejskiej – wpływ WPR* [*Farms in Poland and EU*]. Poczta (ed.), Powszechny Spis Rolny 2010, GUS, Warszawa.

CSO, 2014a. *Badanie Aktywności Ekonomicznej ludności (BAEL). [Economic Activity Syrvey]*. Warszawa.

CSO, 2014b. *Charakterystyka gospodarstw rolnych 2013* [*Characteristics of farms in 2013*]. GUS, Warszawa.

CSO, 2017. *Rolnictwo w 2016 roku* [*Agriculture in 2016*]. GUS, Warszawa.

Dasgupta, P., Ray, D., 1986. *Inequality as a determinant of malnutrition and unemployment: Theory*. Economic Journal, 96, 1011-1034.

FAO, 2003. *The State of Food Insecurity in the World 2003.* Food and Agriculture Organization of the UN, Rome.

Frenkel, I., 2013. *Zatrudnienie i struktura dochodów w gospodarstwach rolnych w latach 2005-2010*. IRWiR PAN, Warszawa 2013.

Frenkel, I., 2014. *Ludność wiejska, In: Polska wieś 2016. Raport o stanie wsi*. Wydawnictwo Naukowe SHOLAR, Warszawa 2016.

Kowalski, A., 1998. *Czynniki produkcji w agrobiznesie,* [*Production factors in agriculture*]. In: Encyklopedia Agrobiznesu, Fundacja Innowacja, Warszawa, 108-114.

Lewis, W.A., 1954. *Economic development with unlimited supplies of labor*. Manchester School of Economic and Social Studies 22, 139-191.

Oberholtzer, L., Grow, S., 2003. *Producer-only farmers' markets in the mid-atlantic region*. 2003Arlington, VAHenry A. Wallace Center for Agricultural and Environmental Policy at Winrock International.

Potori, N., Chmielinski, P., Fieldsend, AF., 2014. *Structural changes in Polish and Hungarian agriculture since EU accession: Lessons learned and implications for the design of future agricultural policies*. Budapest: Research Institute of Agricultural Economics.

Rudnicki, H., 2005. *Przemiany strukturalne w polskim rolnictwie w okresie transformacji systemowej*. In: Kwestia agrarna w Polsce i na świecie. [Structural changes in Polish agriculture in transformation period]. SGGW, Warszawa.

Sikorska, A., Kowalski, A., Karwat-Woźniak, B., Goraj, L., Chmieliński, P., 2009. *Instrumenty oddziaływania Państwa na kształtowanie struktury obszarowej gospodarstw rolnych w Polsce; rola systemu ubezpieczenia społecznego rolników w kształtowaniu tej struktury. Stan obecny i rekomendacje na przyszłość oraz propozycje nowych rozwiązań dotyczących tego obszaru dla systemu ubezpieczeń społecznych* [*Public intruments for shaping agricultural structures*]. Report for MARD, IERiGŻ-PIB, Warszawa.

Tomczak, F., 2004. *Od rolnictwa do agrobiznesu. Transformacja gospodarki rolniczo-żywnościowej Stanów Zjednoczonych Ameryki Północnej* [*Form agriculture to agribusiness. Transformation of agricultural sector in the US*]. SGH, Warszawa.

Van Huylenbroeck, G., Verbeke, W., Lauwers, L. (eds.), 2008. *Role of Institutions in Rural Policies and Agricultural Markets*. Emerald Group Publishing, Bingley C. Producer Only Farmers' Markets in the Mid-Atlantic Region: A Survey of Market Managers. Arlington, VA: Henry Wallace Center for Agricultural and Environmental Policy.

Woś, A., 1999. *Mechanizmy restrukturyzacji rolnictwa* [*Mechanisms of agricultural restructurisation*]. IERiGŻ, Warszawa.

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The characteristics of small farms and their development opportunities in Hungary

Abstract: *Small farms amount the largest group of agricultural holdings in Hungary, however their number significantly decreased by 36.4 per cent between 2005 and 2013. These predominantly subsistence or semi-subsistence farms are playing an important role by supplementing the rural household incomes and also producing the significant part of agricultural production. In our research, we examined the situation and future prospects of these small self-employed farms which are typically not engaged in market production and are not professional. The aim of the research was to present the major economic and social parameters of small farms, to identify their types, to border the circle of farms develop to market-oriented entities as well as to draw up development policy proposals.*

Keywords: *semi-subsistence farm, part-time farm, supplementary income, household consumption.*

Introduction

The number of small farms and their weight in agricultural production have decreased significantly due to the concentration processes taking place across Europe in recent decades, however, their role is very important in the protection of the natural landscape and in retaining the rural population. Small farms cannot be considered as a single and homogenous group due to significant differences and fragmentation. This fragmentation originates from the functional complexity of small-scale farming, while production targets, market embeddedness, agro-economic and sociological characteristics, and the nature of primary jobs may result in differences among small farms.

The literature distinguishes basically self-sufficient, occasionally producing goods to market, and specialised commodity-producing farms, based on the function of production activity (Fertő, 1999). Next to the small farms connected to local markets can be identified another group of small farms co-operating with large agricultural holdings and specialising in a determined activity based on the connection to the market (Juhász, 1998). Small farms in the European Union (EU) may serve social, self-care or hobby targets based on another classification, however, their economic function has continuously moderated due to the current status of agricultural development, its mechanisation and technological conditions (Burgerné, 2015).

Davidova *et al.* (2010) identified six groups of small farms based on a cluster analysis that covered five EU Member States[1]. Main aim of *low income part-time farmers* is to meet the food consumption needs of the household. Hobby farms belong to this category, where production activities are not compulsory but a consequence of lifestyle choices. A further group of small farms is the commercially oriented market constrained households and the commercially oriented market unconstrained households where the technological background of production and the production structure are similar. However, opportunities (land which can be involved and capital) for increasing the production volume and preferences are significantly different. Another group of small farms is the high-income part-time farms and commercially oriented externally constrained households. High-income part-time farms have an off-farm job which provides income that could be used on the farm. Finally, Davidova et al. (2010) also separated the subsistence oriented low-income households, majority of them are forced farms under the poverty line, have only limited production and have limited ability to increase.

Small-scale farms can be distinguished and thus examined statistically based on three different criteria. The criteria are as follows: the physical parameters of farms (utilised agricultural area, number of livestock or inputs used e.g. labour); the economic size of farms in terms of standard output; and the ratio of market participation (Davidova et al., 2010; EU, 2013). In our opinion, eco-

[1] Bulgaria, Romania, Hungary, Poland, Slovenia.

nomic size is the most suitable criterion for the identification of small farms in Hungary dealt with in this paper. In our research we considered small farms which do not reach EUR 4000 standard output (SO) as well as their leaders as small farm producers.

Although this group of farmers have the fastest decline within the whole group of farmers regards their number, in terms of longer trends, small farms in Hungary will play a key role not only in the income supplementation of rural households, but by the production of a significant part of agricultural production. In our research, we examined the situation and future prospects of these small, self-employed farms which are typically not engaged in market production and are not professional. We sought to answer to what economic parameters are currently characteristic of this group of farmers, are there any foreign examples to present their survival, which are the advantages and disadvantages of this production method compared to circle of farmers from the larger size category and, finally, what proportion of this group of farmers may be the subject of support programmes aimed to help them to become market-oriented entities in the near future.

Based on the available statistical data and different analysis connected to this topic, we draw up the following research hypotheses: (H1): Hungarian small farms play a key role in farmers' income supplementation and they have bigger weight in it compared to the other EU Member States that have more developed farm structures; (H2): The management of the small farms is basically determined by the nature of the economic activity and employment status of the farm leader; and (H3): Small farms did not typically have access to the rural development subsidies following Hungary's accession to the EU in 2004.

Methodology

Our research was based on three information databases. On the one hand, we used the general agricultural census (2010) from the Hungarian Central Statistical Office, which provides a complete and detailed sociological background of all agricultural holdings in Hungary (from their size, structure and market orientation). In addition, our research was based on the representative survey in 2013 of the Farm Accountancy Data Network (FADN) database, which examined the small farms between EUR 2000–4000 Standard Output (SO). The third source of our research data was structured in-depth interviews, which were made among small farmers in three NUTS 3 counties (Somogy, Tolna and Heves) of the country. We used descriptive methodology and simple statistical analysis as well as basic cost-income indicators to characterise the various types of farms. We carried out an analysis of documents of support programmes as well as tax and other legislation to present and evaluate the tools available for the facilitation and development of small farms.

Results

The role of agricultural small farms in the EU and in Hungary

In this chapter we examined the economic importance of small-scale agricultural farms in the EU Member States, their main economic indicators and their role in income generation, to check our first hypothesis based on statistical data.

Based on the data from the complete agricultural census in 2010, agriculture in the EU is increasingly moving towards a dual farm structure: most of the commodities are produced by large farms using a higher share of agricultural land; on the other hand, the substantial number of semi-subsistence small farms producing goods for local markets are playing a fundamental role in caring for the natural landscape by keeping the land in cultivation and maintaining the rural population.

In the EU-28, altogether 12 million agricultural holdings were registered in 2010 from which standard output (SO) of 7.3 million farms (60 per cent) did not reach EUR 4000. It can be revealed based on the grouping according to the SO that 5 per cent of the EU's strongest holdings produced 70 per cent of the gross production value in 2010, 20 per cent produced 90 per cent and 40 per cent produced 97 per cent. A further 60 per cent of the farms – those under EUR 4000 SO – produced only little more than 3 per cent of the gross production value in 2010 (Figure 1).

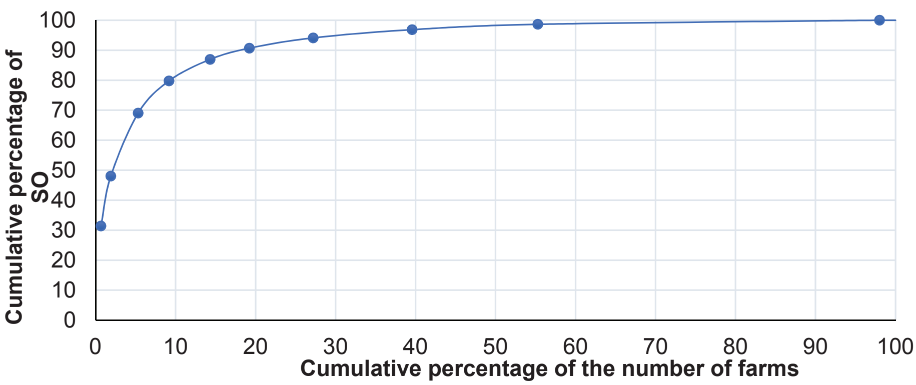

Figure 1. The concentration of the standard output of the agriculture in the EU-27, 2010

Data source: Eurostat, 2010.

A high proportion of farms under EUR 4000 SO occur in two groups of EU Member States according to the data. One group consists of the Mediterranean countries (Greece, Italy, Spain, Portugal) and the other group includes

Bulgaria, Croatia, Poland, Romania and Slovenia among the former socialist countries. Half of the farms or two thirds belong to the category under EUR 4000 SO on average in these countries. The proportion of small farms was higher than the average in Hungary, exceeding 80 per cent. The farm structure of Bulgaria and Romania was characterised by a higher share of small farms compared to Hungary (Table 1). Among the two groups of countries characterised by the predominance of small farms, there are minor differences in accordance to the production structure, but the purpose of the agricultural activities is nearly the same.

Table 1. Main data and proportion of farms producing less than EUR 4000 SO in the examined countries, 2010

Country	Number of farms		Agricultural workforce		Agricultural area		Livestock (LU)		Production value		Subsistence farms [a)]	
	thousand	%	Thousand AWU	%	thousand ha	%	thousand LU	%	million EUR	%	thou-sand	%
Greece	382	52.8	91	21.2	516	10.0	99	4.1	651	9.5	119	99.8
Italy	782	48.3	173	18.1	1,103	8.6	34	0.3	1,277	2.6	484	75.0
Spain	392	39.6	144	16.2	1,961	8.3	103	0.7	701	2.1	2	53.1
Portugal	191	62.6	171	47.2	421	11.5	99	4.5	328	7.1	51	88.6
Hungary	470	81.4	229	54.1	312	6.7	328	13.2	525	10.0	412	90.9
Bulgaria	315	84.9	270	66.3	263	5.9	337	29.3	386	15.2	173	97.6
Croatia	141	60.5	64	34.5	197	15.0	139	13.6	240	11.4	85	74.9
Poland	776	51.5	614	32.4	2,156	14.9	321	3.1	1,314	6.9	342	66.9
Romania	3,419	88.6	1,043	64.7	4,272	32.1	1,963	36.1	3,524	33.8	3,243	90.3
Slovenia	33	44.7	20	26.2	73	15.0	30	5.9	71	7.7	30	68.0

Note: a) The number and proportion of subsistence farms under EUR 4000 SO compared to the country's farms producing goods for their own consumption. The farm produces for own consumption if more than 50 per cent of the products produced are consumed by the owner and his/her family.
Data source: Eurostat, 2010.

In terms of labour use, small farms have the greatest significance in the analysed group of countries[2]. Among the Member States characterised by the predominance of small farms, in 2010 agricultural labour contracting was the highest in Romania and Bulgaria where two-thirds of the total agricultural labour use was forced to the small farms. In Hungary, as in Portugal, half of the sectorial labour use was connected to the small farms producing less than EUR 4000 SO. Small farms accounted for between 16 and 35 per cent the agricultural work in the other countries examined.

Small farms cultivate only 8-15 per cent of the agricultural land (typically 1-2 hectares) in the group of countries examined. A much higher share was found in Romania where in 2010 one third of the total utilised agricultural

[2] In order to measure the comparability of the agricultural work, annual work unit (AWU) is used which corresponds to the work performed by one person who is occupied on an agricultural holding on a full-time basis. 1,800 hours are taken to be the minimum annual working hours: equivalent to 225 working days of eight hours each based on the EU's recommendation.

area was connected to the small-scale farms. A negligible share of the livestock was kept by small farms in the majority of countries examined. There are only four countries where a higher share of small farms is considered: in Hungary and Croatia 13-14 per cent, in Bulgaria and Romania 30-36 per cent.

There are huge differences between the Mediterranean and post-communist countries in the land use and production structure due to the climate, habitat and economic history heritage. While in the Mediterranean countries, slightly more than one third of farms have agricultural land, in the former socialist countries at least two thirds of the farms own land. A higher proportion of small farms (14 per cent) set aside the land in the southern Member States and the share of the area set aside is higher (14 per cent) than in the former socialist countries (7 per cent). Kitchen garden was more common in the former socialist countries than in the Mediterranean countries in terms of the production structure but plantations were typical in all countries studied.

Our research examined the relationship between the yearly income poverty thresholds[3] published by EUROSTAT and the production value produced by the small farms to evaluate the importance of them in the income generation. There is a significant difference between the Mediterranean countries and the former socialist countries, characterised by the predominance of small farms based on the poverty thresholds. The value produced by the smallest farms in the Mediterranean countries covers at most only one third of a person's livelihood at the lowest level while its value is two thirds in the majority of the former socialist countries (excepted Croatia and Slovenia) (Table 2).

Table 2. Connection between the poverty thresholds and SO produced by the smallest farms in some countries, 2010

Country	Threshold of income poverty EUR thousand	Average SO per farm EUR thousand	Output of farm as a percentage of the poverty line
Greece	7,178	1,705	23.8
Italy	9,562	1,633	17.1
Spain	8,763	1,788	20.4
Portugal	5,207	1,716	33.0
Hungary	2,544	1,118	43.9
Bulgaria	1,810	1,226	67.7
Croatia	3,486	1,704	48.9
Poland	2,643	1,694	64.1
Romania	1,222	1,031	84.4
Slovenia	7,042	2,121	30.1

Data source: Eurostat, 2010.

The importance of small-scale farming by income generation is dominant especially in Portugal among the Mediterranean countries, where the farms belonging to the smallest economic size group produced one third of the poverty threshold on average in 2010. The smallest farms are able to contribute to the

[3] EUROSTAT methodology defines the income poverty threshold as 60 per cent of the median income.

livelihood especially in Romania among the former socialist countries, where 85 per cent of the poverty line was produced by small farms. Small farms in Bulgaria and Poland produced two thirds of the necessary amount of living. Small farms in Croatia produced roughly half of the necessary amount and the situation is similar in Hungary.

Based on our analysis it can be stated that farms producing less than EUR 4000 SO are not able to ensure a secure livelihood and they only provide an additional income for the farmers. However, this income supplement is much higher in the post-socialist countries than in the other EU Member States. In Western and Southern Europe, the maintenance of farms under EUR 4000 SO has a complementary manner and may be connected to hobby farming. Agricultural activity can be considered as a crucial element of a household's income which is difficult to replace through other activities in Central and South-Eastern Europe, including Hungary. These results are consistent with the finding of Davidova et al. (2009). Based on these statements, products produced by small farms have different functions in the livelihood of rural households per Member States and they contribute to the household income in different ways in this context.

Cost-income relationships in the management of small farms

We used a small-scale sample with 300 elements (farms in this case) from the FADN survey in 2013 for the purpose of examining the second hypothesis (H2) of our research. This research tries to answer the question what cost-income relationships are characteristics in small-scale farms between EUR 2000–4000 Standard Output (SO) economic size compared to the larger farms having a bigger farm size. Finally, we examine what does farming mean of small-scale households in terms of income.

The mentioned 300 small farms from the FADN sample between EUR 2000–4000 SO and using 1.86 hectares of land (mostly arable land) an average, mainly differ from the farms with larger farm size in relation to the animal husbandry and the labour use. Small farms keep 60 per cent more animal per unit area and use six times more labour compared to the commodity producer farms over EUR 8000 SO. This indicates that they deal with labour intensive activities and they replace the missing devices with additional work (Table 3).

Analysing cost-income relationships of farms according to accounting principles, it can be stated that the small farms operate with higher asset and labour use, and higher production value and expenses, but their labour, capital and cost efficiency as well as rate of profit are much lower. They do not find profit maximisation or profitability as the most important aims during their production. Their motivation is to ensure self-sufficiency and to satisfy the consumption needs of the households.

Table 3. The main indicators of farms with different economic sizes (2013)

Denomination	Unit	Size 2 EUR 2000–4000 SO	Size 3 EUR 4000–8000 SO	Size 4 above EUR 8000 SO
Agricultural area	hectare/farm	1.86	6.83	66.91
Average labour use	AWU/farm	0.35	0.51	2.14
Labour force	AWU/hectare	0.19	0.07	0.03
Livestock/labour use	livestock/AWU	2.56	2.44	8.93
Livestock/area	livestock/hectare UAA	0.48	0.18	0.29
Total assets	thousand HUF/hectare UAA	1,873.06	1,383.83	1,080.82
Gross investment	thousand HUF/hectare UAA	59.30	35.78	100.85
Net sales	thousand HUF/hectare UAA	555.35	307.19	454.34
Gross production value of agriculture	thousand HUF/hectare UAA	694.27	444.89	604.91
Gross production value of agriculture	thousand HUF/AWU	3,730.44	6,000.44	18,931.97
Material costs	thousand HUF/hectare UAA	399.55	223.82	362.49
Operating expenses in agriculture	thousand HUF/hectare UAA	613.94	351.05	489.87
Result before tax	thousand HUF/hectare UAA	80.11	93.60	112.19
Result before tax	thousand HUF/AWU	430.44	1,262.42	3,511.10
Return on total output	per cent	11.54	21.04	18.55

Note: UAA: utilised agricultural area.
Data source: AKI FADN Department, 2013.

In essence, this is also confirmed by the analysis of income data of small-scale households. Agricultural activity plays a relatively small role in the life of the affected households according to this analysis. It provides only 8 or 10 per cent of their income on average while it is able to generate one third of the food consumption (Table 4). All the while that the output per farm amounts to more than HUF 1 million, however, the income only amounts to HUF 100-200 thousand.

Table 4. Distribution (per cent) of net income of rural households belonging to economic size 2 by the type of farming (2013)

Denomination	Sum	Arable crop production	Livestock production	Mixed farms
Profit after taxes	8.01	13.54	13.58	−9.70
Income from self-employment	4.95	4.07	5.18	2.35
Income from real estate and capital utilisation	0.85	3.02	0.28	0.09
Income from agricultural employee work	6.78	9.41	7.54	15.03
Income from employee work outside the agriculture	50.6	39.3	40.7	67.3
Pension	23.1	23.8	26.9	16.6
Social benefits	3.18	4.43	3.81	7.25
Other income	2.58	2.48	2.07	1.09
Proportion of money spent on food (gross) and net income	27.9	27.2	28.0	40.7

Data source: AKI FADN Department, 2013.

The management features and income structure of the Hungarian small farms are mainly determined by the employment status/economic activity of the farm leader based on our research. Among the five group[4] formed on the basis of their economic activity, entrepreneurs predominantly deal with animal husbandry, agricultural employees and people living from social benefits rather operate a mixed farm, pensioners typically deal with animal husbandry or crop production while the non-agricultural workers might be classified into all three types of farming almost proportionally (Table 5).

Table 5. Main operational indicators based on the breakdown of other income types, 2013

Denomination	Unit	Self-employed	Agri-cultural employee	Non-agri-cultural worker	Pensioner	Living from social benefits
Number of farms in the sample	farm	4,144	4,745	34,567	24,198	2,471
from this:						
crop producers	per cent	15.03	25.31	25.03	36.82	25.66
animal husbandry	per cent	74.83	11.62	39.22	47.70	9.53
mixed farms	per cent	10.14	63.07	35.74	15.48	64.81
Average number of households	head/farm	2.80	2.32	2.89	2.02	2.11
Average age of the farm leader	year	41.86	40.30	44.95	67.44	55.88
Qualification of the farm leaders						
elementary	per cent	7.35	2.54	8.60	24.64	18.27
secondary	per cent	92.65	83.84	76.57	68.29	76.85
graduate	per cent	0.00	13.61	14.83	7.08	4.88
Agricultural area	hectare/farm	1.35	2.00	1.66	2.05	2.18
Average labour use	AWU/farm	0.29	0.41	0.29	0.37	0.37
Livestock/land area	LU/hectare	0.37	0.73	0.50	0.42	0.67
Total assets	thousand HUF/hectare	4,085.79	2,466.53	1,828.76	1,716.35	1,077.16
Total assets without the value of land and animals	thousand HUF/hectare	3,365.97	1,529.72	1,027.91	964.08	173.92
Gross investment	thousand HUF/hectare	2.68	183.52	85.97	25.04	19.11
Gross production value in agriculture	thousand HUF/hectare	1,204.09	574.68	736.65	643.60	495.79

Data source: AKI FADN Department.

[4] Self-employed entrepreneurs, agricultural employees, non-agricultural employees, pensioners, people living from social benefits

Based on the analysis of cost-income data it can be stated that the full-time entrepreneurs produce more significant income with high asset tying and expenses, with efficient work in a profit-oriented way, while agricultural and non-agricultural workers, pensioners and people living from social benefits produce lower production value and income with lower expenses and asset tying and with less efficient labour use. The socio-demographic background of farm leaders also shows notable differences in the five groups created on the basis of economic activity: people engaged in agricultural activity as an entrepreneur are in the most disadvantaged situation. Their average age is just 42 years and the majority of them (92.6 per cent) have at least secondary education. The socio-demographic background is the worst among those people who are living form social benefits and are the most indigent from additional revenues.

Based on the analysis of the FADN data, it can be stated that the importance of agricultural activities in the accounting sense is much higher in the life of households engaged in it, although it has only a supplementary role compared to the other income sources. Those households which receive social benefits or pensions, and without agricultural activity, would have had 30 per cent lower income which is very difficult to obtain from other activities (especially in the disadvantaged rural microregions). Agricultural activity is very important for the Hungarian small-scale farms, not only its value-adding (or wealth-generating) role in the moral sense (people are participating in shaping their income, not only others deciding the level of their income for them; they are spending their days actively), but it is essential from the subsistence and income points of view.

Support tools for small farms

There are many interventions that can help the activities of Hungarian agricultural small-scale farms. From these it is important to mention fiscal policy instruments that directly affect the circle of small farmers, the EU-funded subsidies for small farms to become market-oriented entities and furthermore those labour market and social policy programmes containing agricultural elements whose primary objectives are to promote the livelihood and the labour market reintegration of disadvantaged members of the rural population.

Those Hungarian farmers whose annual revenue from primary production activities does not exceed HUF 600 thousand do not have to prepare a tax return and pay tax on revenue. There are further personal income tax benefits affecting primary producers in the case of those who select an itemised cost report or choose a 10 per cent cost ratio. Based on the amount of tax from their income from these activities they are entitled to claim (or use) farmers' tax allowance (maximum HUF 100 thousand). In addition to the personal income tax contributions, small farmers enjoy contribution allowances as well.

Small farms typically did not have access to investment subsidies for technological development from the rural development subsidies of the EU (funded from the EAGGF[5] before 2007, and since 2007 funded in the frame of the EAFRD) due to their (farm or economic) size. Therefore, the EU tries to help with targeted rural development measures within the framework of Pillar II of the Common Agricultural Policy for the development of this farm group and for them to become market-oriented entities.

Following Hungary's accession to the EU, a measure named 'Support for semi-subsistence farms undergoing restructuring' was launched from the EAGGF funds under the National Rural Development Plan 2004-2006, which gave support for small farms between ESU 2-5 economic size. The annual amount of subsidy was equivalent to EUR 1000. Only 1,140 applications were submitted instead of the planned 12 thousand (Respect, 2009). The reasons for the lack of applications were disproportions between the complex, performance-based eligibility criteria (appropriate farm size, secondary vocational education as well as 50 per cent performance increase be achieved in the fifth year of the support) and the low amount of the subsidy based on the evaluators' opinion. This measure was part of the national rural development programme in the period 2007-2013; however, the measure was not finally launched within the framework of the New Hungary Rural Development Programme.

EAFRD regulation 1305/2013/EU stated that in the 2014-2020 programming period the development of potentially economically viable small farms should be especially encouraged. The sub-measure called '6.3. Support for the development of small farms' in the Rural Development Programme offered a remarkable subsidy for small-scale farmers in Hungary in this planning period. The measure aimed firstly to strengthen those farms that are producing goods partly to market, that do not yet ensure a secure level of livelihood but have ability to develop (economic size EUR 3000-6000 SO) and, secondly, aimed to cover a secure livelihood at least for one person. In addition, other supports (or sub-measures) are available for small farms within the Rural Development Programme such as '6.2.1. Support to launch non-agricultural activities' and '6.4.1. Development of non-agricultural activities'.

Small farmers may receive support from the EAGGF in addition to the EAFRD through the small farmers support scheme, which is a substitute flat-rate subsidy of the single area payment scheme. This scheme was set up as an alternative to direct payments for those farmers cultivating a smaller area and offers a transparent and predictable form of subsidy with less bureaucracy. The support rate is EUR 500 (per year) at least and EUR 1250 per year at most. Simplified support for small farms under EUR 4000 SO may result in clear income growth by each of them and may increase the single area payment per farm nearly two-fold.

[5] European Agricultural Guidance and Guarantee Found

Table 6. Main features of social policy and labour market programmes containing agricultural elements

Denomination	Start date	Geographical area	Source	Results, main impacts
Social land programme	1992	The most disadvantaged regions	Governmental support	Seasonal supplementary income; accumulation of knowledge and experience are directly usable in agricultural production.
Support for entrepreneurship	2007	National	Governmental support	To become self-employed (90 per cent).
Life changing – Life shaping programme	2008	Southern Transdanubian region	Governmental support	Temporary employment opportunities; accumulation of knowledge and experience that are directly usable in agricultural production.
Backyard programme	2013	National	Governmental support	Contribution to meeting domestic consumption needs.
'All the children live in well' Foundation	2011	National	Private capital; additional governmental support	Contribution to meeting domestic consumption needs.
'Kiút-program'	2009	Borsod-Abaúj-Zemplén, Szabolcs-Szatmár-Bereg counties, Budapest	Private capital; EU support; additional governmental support	Development of sustainable businesses in the long term for half of the customers.
'Nyúl-unk a munkáért' programme	2011	Baranya, Tolna, Somogy counties	Private capital; additional governmental support	Build up a small-scale network able to produce goods to market.

Source: own compilation.

In addition to the supports appearing in the rural development programmes, a number of small-scale programmes have started in Hungary over the past two decades which were realised mostly from domestic, rarely from EU tender sources and partly through private investments (Table 6). The target groups of these programmes are those social groups which are living in rural areas, are permanently excluded from the labour market and have low income. Based on the philosophy of programmes wishing to catching up by promoting agricultural production, the active social policy or labour market policy instruments serve more effectively the convergence to the labour market compared to the passive services (e.g. unemployment benefits, regular social assistance), in view of the fact that they are half-way between employment forms subsidised centrally and the market-based work. It can be stated, based on the evaluation of the implemented programmes, that they have only modest impact on the reintegration of the labour market. However, they contribute to the increase in the level of income, and to raise the capital and knowledge to some degree without exception.

The small-scale and combined initiatives with other measures are mainly effective between the implemented programmes. Sustainable results can be demonstrated in programmes in which external operators were involved and in which the management was credible for the local community and provided all organisational and animation activities which reproduces the necessary financial resources for the continuous operation as far as possible (Czene et al., 2010). Additional effects such as participants becoming taxpayers, the mitigation of social costs at the municipal level and the reduction of the black economy, appear in those programmes where the opportunities to access the market and the production resources are established.

Discussion

Several conclusions may be drawn about agricultural small farms:

An analysis of the international trends has justified Hypothesis 1 that small farms with Standard Output (SO) below EUR 4000 in the EU Mediterranean Member States as well as in several post-socialist Member States (including Hungary) play significant roles in output, labour use and animal husbandry. There is a notable difference in comparison to Mediterranean Member States that – not independently of the low wage levels in Eastern Central Europe – income on small farms is of more significance in post-socialist countries (e.g. Poland, Hungary, Romania, Bulgaria, Croatia and Slovenia) than in the 'old' EU Member States. However, this income is still not enough to provide an independent existence to small farmers.

In Hungary, according to the analysis of certain production size categories from the economic point of view, farms with SO over EUR 8000 typically provide sufficient income for full-time activity, while below this size category agricultural production can only be carried out as a subsistence activity. This is especially true for small farms with SO below EUR 4000 which, in addition to meeting family consumption needs, start to have the realisation of a low level of income for subsistence as the primary aim of production.

In this article, Hypothesis 2 has also been confirmed, according to which the management of small farms is mainly determined by the economic activity / employment status of the farm leader. Full-time entrepreneurs earn significant income by carrying out profit-oriented, efficient work with high asset utilisation and inputs, while agricultural and non-agricultural employees, pensioners and people living on social allowances produce less and earn less income through lower asset utilisation, lower inputs and less efficient labour use.

Hypothesis 3 also seems to be verified: a very few Hungarian small farms had access to the EU rural development subsidies until 2015 because they were mostly eligible for using supports to promote to become market-oriented entities due to their farm (economic) size. This measure, however, was unsuccessful due to the disproportionate and strict application conditions in the period 2004-2007, it is not even implemented between 2007 and 2013.

Based on a detailed analysis of the management of small farms, it can be stated that only a few small farms with SO below EUR 4000 – with younger, educated farmers with an entrepreneurial background and production experience – may be potential targets of rural development programmes which provide support to become full-time commodity producers. The majority of small farmers are not capable of commodity production due to age, existential reasons and the lack of a business-profit-oriented attitude.

In the 2014-2020 programming period, in order to ensure the success of support for market-oriented farming the programme should involve favourable credit arrangements, and the application for rural development support should be widely available as nearly twice the amount of resources that are indicated in the rural development programme measures for supporting small farms would be needed in order to establish full-time, efficient commodity producer farms with sufficient assets.

An increase in the number of small farms that cannot be developed for market-oriented production is necessary from the social policy and rural policy perspectives, but this can only be envisaged within the framework of complex programmes supporting market entry by production co-ordination which, in addition to current assets, also deliver knowledge and secure full-time income in addition to supplement activities, as agricultural activity itself may not become the main source of income in the case of such a small farm size.

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References

Burgerné Gimes, A., 2015. *A kis (családi) gazdaságok helyzete az Európai Unióban* [The situation of small (family) farms in the European Union]. Gazdálkodás 59(1), 3-19.

Czene, Zs., Horkay, N., Péti, M., Ricz, J., Sain, M., 2010. *Helyi gazdaságfejlesztés. Ötletadó megoldások, jó gyakorlato*k. [Local economic development. Inspiring solutions and best practices]. Területfejlesztési füzetek 2. Budapest: VÁTI.

Davidova, S., Fredriksson, L., Bailey, A., 2009. *Subsistence and semi-subsistence farming in selected EU new member states.* Working Paper. School of Economics discussion papers, No. 09, 20.

Davidova, S., Gorton, M., Fredriksson, L., 2010. *Semi-subsistence farming in Europe: Concepts and key issues.* Background paper prepared for the seminar ‘Semi-subsistence farming in the EU: Current situation and future prospects’.

EC, 2013. *Regulation (EU) No 1305/2013 of the European Parliament and of the Council of 17 December 2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) No 1698/2005*. Official Journal of the European Union 56, 487-549.

EU, 2013. *Rural Development in the EU. Statistical and Economic Information Report 201*3. Brussel: European Union.

Fertő, I., 1999. A *magyar mezőgazdaság strukturális problémái az Európai Unióhoz való csatlakozás tükrében*. (Structural problems of the Hungarian agriculture in the light of the accession to the EU.) Magyar Tudományos Akadémia Közgazdaságtudományi Kutatóközpont, KTK/IE Műhelytanulmányok 1999/2.

Juhász, P., 1998. *Leckéink a mezőgazdaság új rendje érdekében* [Lessons in favour of the new order of agriculture]. Szociológiai Szemle 2.

Respect, 2009. *Nemzeti Vidékfejlesztési Terv 2004-2006 ex-post értékelése, zárójelentés* [Ex-post evaluation of the National Rural Development Plan 2004-2006 – final report). Respect Tanácsadó és Szolgáltató Kft.

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Profitability and risk of crop and livestock production in Slovak farms

Abstract: *The paper focuses on profitability and risk of crop and livestock production based on an analysis of farms operating in the Slovak Republic. Risk in agriculture has been a matter of worldwide concern since 1933, when the concept of risk analysis was introduced. Agriculture is a sector facing particularly large risks, resulting mainly from natural factors outside the control of farmers. The resulting variations in farm output, combined with a relatively low price responsiveness of supply and demand, also cause agricultural markets to be rather volatile. The sources of risks that are relevant in agriculture have different characteristics, and can be classified in very different ways. Sources of risk include biological nature of production, dependency on climatic conditions, seasonality, animal and plant health, prices instability, policy regulations, and a range of macroeconomic factors.*

Keywords: *profitability, risk, crop production, livestock production, portfolio.*

Introduction

Before 1989, Slovak farming consisted of cooperatives and large state farms but after 1989 the sector was transformed from a centrally planned economy to a market economy. The adoption of the Common Agricultural Policy (CAP) has led to a number of big changes in Slovakia that have ultimately impacted on economic development in the agricultural sector and the priorities of farmers.

In this paper we analyse the profitability of farms divided into groups based on the type of production into crop and livestock farms (according to the share in sales from crop or livestock production). Using descriptive statistics and Markowitz portfolio theory we simulate the total farm profitability and volatility of livestock and crop production in Slovakia. Farms focused on livestock production only are efficient and profitable, but the profitability is lower in comparison with crop farms. The results of livestock farms are less volatile than those of crop farms. Large farms tend to produce with lower value added and can generate enough profit for the owner. But production with lower value added has significantly less positive impact on rural development and job creation in rural areas. Therefore, policy measures at the farm level should be applied to motivate individual farmers with large UAA to increase the value added of their production.

The agricultural sector in general has faced tumultuous development in recent years. Price volatility has increased, with sharp swings in product and input prices. Markets have been affected by macro-economic disturbances, disease outbreaks and adverse weather events such as floods and droughts, as well as more frequent climate changes. With agricultural policies that are more decoupled from production and prices, farmers are now more exposed to market forces than in the past (Antón et al., 2011). Risk management in agriculture plays a key role nowadays, as an essential tool for farmers to anticipate, avoid and react to shocks, potential losses and increasing volatility of incomes (OECD, 2011).

As agricultural risk can be a difficult concept to recognise, there has not been universal agreement on how to define and measure risk (Hardaker et al, 2004; Tangermann, 2011). Generally, risk refers to deviation of the evaluated variable (income, price, production etc.), and its level depends on the volatility over a certain period. The smaller the deviation, the tighter the distribution and the lower the risk. In the risk assessment some authors focused on the stand-alone agricultural risk of individual farms, while others took into account the whole market level (Just and Pope, 2003; El Benni and Finger, 2013). One useful way of measuring risk in agriculture, counting with several individual farms of the agricultural sector at once, is the Markowitz portfolio theory approach. Portfolio theory significantly improved the ability to analyse and identify optimal choices under risk by extension of the analysis to include variability, as well as expected returns (Barkley and Peterson, 2008).

The application of Modern portfolio theory in the analysis of agricultural risk can be found in the work of many authors. Robinson and Brake (1979) conducted a literature review about the application of portfolio theory in agriculture and agricultural finance, Barkley and Porter (1996) analysed Kansas wheat producer variety selection decisions, Peterson and Leuthold (1987) used the portfolio approach to examine the cattle feeding problem, Cox et al. (2004) used the portfolio theory to provide evidence that cultivar mixtures can increase yield and reduce yield variability, Turvey and Driver (1987) used principles of portfolio theory to study the systematic and non-systematic risk of Canadian agriculture. More recently, Nyikal and Kosura (2005) used quadratic programming (QP) to solve for the efficient mean-variance frontier to better understand farming decisions in Kenyan agriculture. In another application of portfolio theory, Figge (2002) summarised the literature on how portfolio theory has been applied to biodiversity, while Sanchirico et al. (2005) used portfolio theory to develop optimal management of fisheries. The research in risk in agriculture is supposed to begin with the identification of risk and its assessment (measurement). The ability to assess the risk and return of Slovak agricultural companies has been a focus of our research in recent years (Tóth et al., 2014). In this paper we examine the portfolio risk and return of Slovak agricultural companies, divided on the basis of their production orientation.

Methodology

The data used for the analysis are from the database of Ministry of Agriculture and Rural Development of the Slovak Republic (MoA), over the period 2004--2014. Data were selected according to the production orientation to the subset of crop farms and livestock farms. The selecting criterion was the share of livestock production based on sales. We created eight portfolios of farms: one for all farms and seven based on share of livestock production ranging from 0 to 100 per cent. For calculation of five-year moving averages were used for two periods: 2004-2008 and 2010-2014. From the dataset the following farms were excluded: farms that started or quitted during each observed five-year period and farms with negative equity (liabilities exceeding total assets) over the observed period.

The modified Markowitz portfolio theory approach was used to estimates the total risk of eight portfolios. Markowitz portfolio theory refers to the mean-variance analysis, with 'mean' used interchangeably with average or expected return, and 'variance' used to denote risk (Markowitz, 1952). The portfolio of stocks represents the equity securities. The measure of variability uses the deviation of the return on stock which reflects simply the return on equity invested into the business. Based on the principles and methods of risk estimation in Markowitz model the Simple index theory was created (Sharpe, 1963), which involves the accounting variables implication to the model. Because the majority of agricultural companies belong to the unlisted companies, the use of accounting fundamentals seems to be a necessity. The return on stock, from the original model, might be replaced with the return on equity of the farm, for the needs of estimating the portfolio risk and return of unlisted agricultural farms. Several different accounting variables have been used in other studies. Gempesaw et al. (1988) applied the SIM approach using the gross and net returns, Baginski and Wahlen, (2003) measured farm volatility using the farm equity returns, and Fama and French (1995) opted for the book to market ratios. In our study we measured the market risk of unlisted farms using the return on equity ratio ROE.

We assumed that the return of the investor is based on the profit of the farm and the equity invested. Therefore, we considered return on equity ROEi (Equation 1) to be equivalent to the return on stocks, generally used in the case of quoted companies. Measuring volatility of return in the Markowitz portfolio theory is based on the average return over the observed period for each investment. We calculated the average return on equity EROEi (Equation 2) for each individual farm:

$$ROE_i = \frac{Earnings\ \ After\ \ Taxes}{Shareshold\ ers\ \ Equity} \tag{1}$$

$$EROE_i = \sum\nolimits_{i=1}^{t} ROE_i \cdot d_i \tag{2}$$

where ROEi is return on equity of farm i, di is a weight of ROEi over the observed period (five years, $d_i = 0.20$), t is number of years in observed period. The individual risk of each farm σ_i is calculated using the standard deviation:

$$\sigma_i = \sqrt{\sum\nolimits_{i=1}^{t} (ROE_i - EROE_i)^2 \cdot d_i} \tag{3}$$

where σ_i is standard deviation of the individual return on equity (individual farm risk), ROE_i is individual return on equity, $EROE_i$ is average individual return on equity.

The portfolio risk (σ_p is determined by three variables: weight of the individual investment in portfolio (wi), standard deviation of the individual investment – individual risk (σ_i), and covariance (σ_{ij}), relation between the ROE_i and ROE_j (return on equity of farm j). To take into account market portfolio of all agricultural farms, the weight w_i of each farm is determined by farm market share, which is the share of the farm's equity on the total equity of all farms. The covariance represents the relationship between returns on equity of farms (Equation 4) and Σ covariance matrix (Equation 5). The portfolio risk is then measured according to Equation 6:

$$\sigma_{ij} = \frac{1}{n}\sum\nolimits_{i=1}^{n} (ROE_i - EROE_i)(ROE_j - EROE_j) \tag{4}$$

$$\Sigma = \begin{bmatrix} \sigma_{11}\ \sigma_{12} & \sigma_{13} & \dots & \sigma_{1k} \\ \sigma_{21}\ \sigma_{22} & \sigma_{23} & \dots & \sigma_{2k} \\ \sigma_{31}\ \sigma_{32} & \sigma_{33} & \dots & \sigma_{3k} \\ & \dots & & \\ \sigma_{k1}\ \sigma_{k2} & \sigma_{k3} & \dots & \sigma_{kk} \end{bmatrix} \tag{5}$$

$$\sigma_p = \sqrt{\sum\nolimits_{i=1}^{n} w_i^2 \cdot \sigma_i^2 + \sum\nolimits_{i=1}^{n} \sum\nolimits_{j=1}^{n} w_i \cdot w_j \cdot \sigma_{ij}} \tag{6}$$

where wi is an individual weight of i-farm (farm's equity) in a portfolio (total equity of all farms) and n is the number of farms.

The expected return on equity of portfolio is estimated by the multiplication of k x 1 vector of individual weights of portfolio (w) and k x 1 vector of corresponding individual expected returns on equity (the sum of multiplication of each farm´s expected ROE and its share in the market portfolio):

$$EROE_p = \sum_{i=1}^{n} EROE_i \cdot w_i \tag{7}$$

where $EROE_p$ is expected portfolio return on equity and EROEi is the average return on equity of an individual farm.

Results

Structure of Slovak agriculture

In 2014 there were 17,708 farms registered for subsidies in Slovakia, which together operated on 1,883,220 ha of utilised agricultural area (UAA). In terms of farm size (UAA), the farms structure in Slovakia is different from the European Union (EU) average. This results from the historical development of agriculture in the former Czechoslovakia before 1989. In 2014, 74.6 per cent of UAA was cultivated by farms with over 500 hectares (Table 1), while the average UAA per farm in the EU is much lower. Therefore, the measures implemented through the CAP also result different in Slovakia. As regards ownership of the land, 43.5 per cent is owned by individuals, 4.5 per cent own firms and 4.0 per cent are state-owned. Forty-eight per cent of UAA is owned by unknown owners and this UAA is temporally administrated by the Slovak Land Fund (SPF) and the users of the land have to pay a rent (data for 2014).

Table 1. Utilised agricultural area (ha) per farm as a percentage of total area

Year	0-5	5-10	10-50	50-100	100-250	250-500	over 500
2010	0.99	0.94	3.43	2.91	6.80	7.91	77.74
2011	0.99	0.95	3.75	2.95	6.42	8.20	76.75
2012	0.99	0.98	3.97	2.94	6.60	8.28	76.24
2013	1.01	1.04	4.23	2.97	7.04	8.21	75.49
2014	1.04	1.09	4.52	3.10	7.07	8.55	74,64

Data source: Agricultural Paying Agency of Slovakia, 2015.

As a result of privatisation, the number of independent farmers increased rapidly in the first years after 1989 and then stabilised. The share of cooperatives has decreased and the number of business companies has increased. In 2010 there were 1,419 private companies (consisting of 1,310 limited liability companies and 109 joint stock companies) and 579 cooperatives. From then until 2014 there was a 2.25 per cent decrease in the share of cooperatives, a 9.17 per cent increase in the share of joint stock companies and a 50.23 per cent increase in the share of limited liability companies. A minority of farms (2,653 = 15.0 per cent) owned most (1.4 million hectares = 80.2 per cent) of the agricultural land in 2014. This distribution of the land, with a few large farms owning most of the UAA and many small farms sharing a low percentage of UAA, has a significant impact on the land and rent prices. Moreover, this phenomenon has not been changing in recent years. In 2010 12.5 per cent of farms owned 80.4 per cent of UAA, while in 2007 only 11.2 per cent of farms owned 81.0 per cent of UAA.

Table 2. Size structure of Slovak farms

	Number of farms		Index	UAA 2014		
Legal form	**2010**	**2014**	**Change (%)**	**Land (ha)**	**Land per farm**	**Share on all farms (%)**
Joint stock co.	109	119	9.17	13,272	1,113	0.67
Cooperative	579	566	-2.25	691,054	1,221	3.20
Small family farm	9,020	9,785	8.48	53,291	5	55.26
Limited liability co.	1,310	1,968	50.23	687,429	349	11.11
Farmers	4,774	5,046	5.70	303,867	60	28.50
Other	146	160	9.59	12,383	n.a.	0.97
Total farms	15,938	17,708	11.11	1,883,220	n.a.	100

Data source: Agricultural Paying Agency of Slovakia, 2015.

Impact of integration and globalisation on farm performance

Under the CAP, Slovakia opted for single area payment scheme (SAPS). This form of support is in combination with large farms in Slovakia changing the performance of farms. Since 2004 Farmers have been continually decreasing their livestock production in favour of crop production. EU subsidies are decoupled from production which means that farmers are not motivated to produce and the intensity of support is increasing. Subsidies per hectare increased after adoption of the CAP (Tables 3 and 4). Large farms in combination with improved technology have resulted in a decrease in farm employment in Slovakia.

There are differences in the performance of farms based on the type of production. Generally, agriculture in Slovakia has very low profitability. On average this did not change when comparing the two periods 2004-2008 and 2010--2014. Also the risk measured as a farm portfolio ROE volatility is constant and changed from 1.00 per cent in 2004-2008 to 1.95 per cent in 2010-2014.

Profitability of farms differs based on the share of livestock production. In the period 2004-2008 the most profitable farms measured by ROE were those with 0-20 per cent share of livestock production and farms specialised in livestock production only were generating losses over 7 per cent. The situation did change in the period 2010-2014. The most profitable farms have no livestock production. Also the farms specialised in livestock production only are profitable now. Mixed farms with a share of livestock production from 60-80 per cent are generating losses. The integration and globalisation of Slovak agriculture is resulting in specialisation of farms and farms are reducing livestock production to limit their losses.

Table 3. Situation in Slovak agriculture in the period 2004-2008

	All farms	Share of livestock production in total production (%)						
		0	0-20	20-40	40-60	60-80	80-100	100
Average profitability (ROE) (%)	1.83	6.47	9.48	2.53	1.14	0.08	2.05	-7.18
Risk (%)	1.00	3.60	3.45	1.45	1.78	0.87	0.73	8.74
Share of number of farms	100.0	15.2	10.4	13.8	18.0	17.6	21.2	3.8
Number of farms	874	133	91	121	157	154	185	33
Subsidies per ha (EUR)	241	204	206	209	221	256	299	315
Hectares per employee	28.7	31.0	50.3	31.1	25.8	26.6	27.8	21.8
Income per hectare (EUR)	26.4	83.5	54.0	31.5	17.8	8.9	28.8	-86.1
Income per employee (EUR)	756	2,593	2,716	979	459	237	801	-1,877
Subsidies on total sales (%)	0.30	0.22	0.40	0.25	0.24	0.32	0.49	0.23
Sales per employee (EUR)	22,665	29,032	26,046	25,768	23,846	21,010	17,017	30,294

Data source: MoA

Table 4. Situation in Slovak agriculture in the period 2010-2014

	All farms	Share of livestock production in total production (%)						
		0	0-20	20-40	40-60	60-80	80-100	100
Average profitability (ROE) (%)	1.60	7.33	2.76	1.70	1.32	-1.14	-0.26	0.18
Risk (%)	1.95	4.92	5.31	2.81	4.34	1.58	0.97	1.77
Share of number of farms	100.0	21.0	16.7	14.1	13.5	11.7	16.5	6.5
Number of farms	922	194	154	130	124	108	152	60
Subsidies per ha (EUR)	289	220	247	270	293	324	365	371
Hectares per employee	39.8	58.7	55.3	39.1	33.4	35.2	34.3	31.8
Income per hectare (EUR)	26.2	120.5	40.2	33.6	-6.4	-10.7	5.1	10.4
Income per employee (EUR)	1,043	7,071	2,222	1,310	-213	-376	174	331
Subsidies on total sales (%)	0.34	0.22	0.35	0.29	0.32	0.42	0.50	0.46
Sales per employee (EUR)	33,309	59,526	38,560	36,307	30,267	27,150	24,995	25,414

Data source: MoA

Increased competition caused by globalisation and integration resulted in increased productivity. Sales per employee increased from EUR 22,665 per year in the first period to EUR 33,309 per year in the second period. Also the income (profit) per employee did increase from EUR 756 to EUR 1,043 per year (Tables 3 and 4).

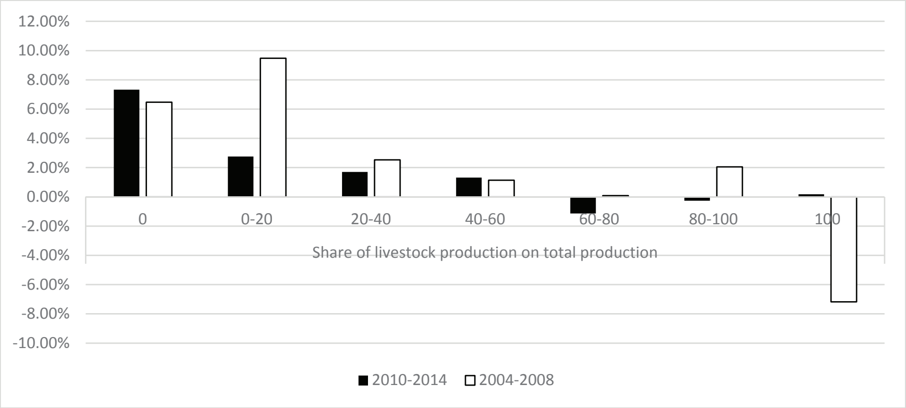

Figure 1. Average profitability of farms based on the share of livestock production in total production

Data source: Tables 3 and 4.

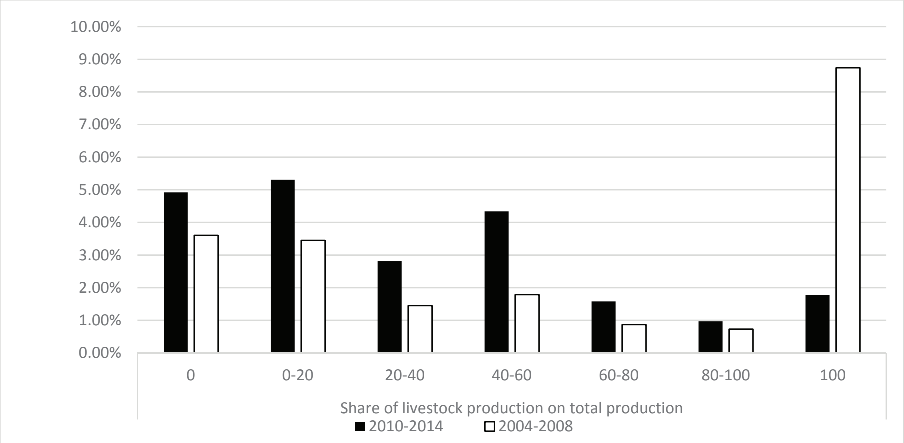

Figure 2: Risk of farms based on the share of livestock production in total production

Data source: Tables 3 and 4.

Livestock farms used to be risky and majority of the risk was systematic. The most profitable farms are the riskiest. Generally, livestock production be less risky than crop production. The situation in 2010-2014 in Slovakia is in line with this assumption (Figure 2).

The change to SAPS in 2004 is changing also the structure of farms. In the period 2004-2014 the share of livestock production decreased. In the first period farms with more than 50 per cent of livestock production were dominant. Now crop production is more profitable and therefore farms focus more and more on crop production. The share of specialised crop farms and farms with crop production less than 20 per cent increased by more than 5 per cent each.

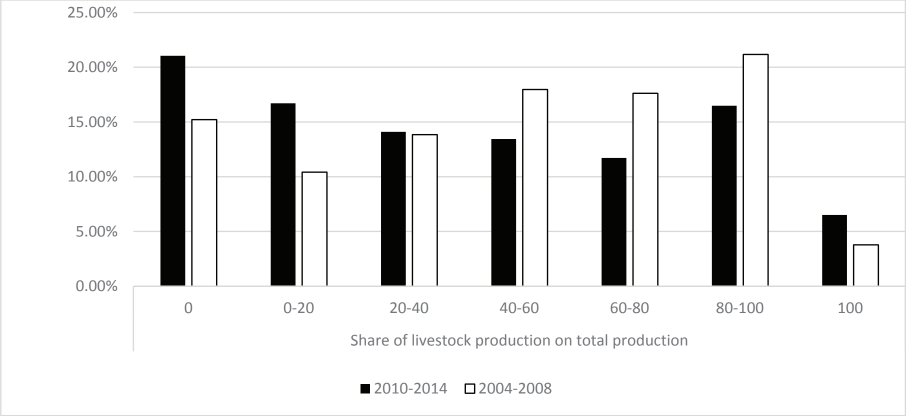

Figure 3. Share of farms based on the share of livestock production in total number of farms

Data source: Tables 3 and 4.

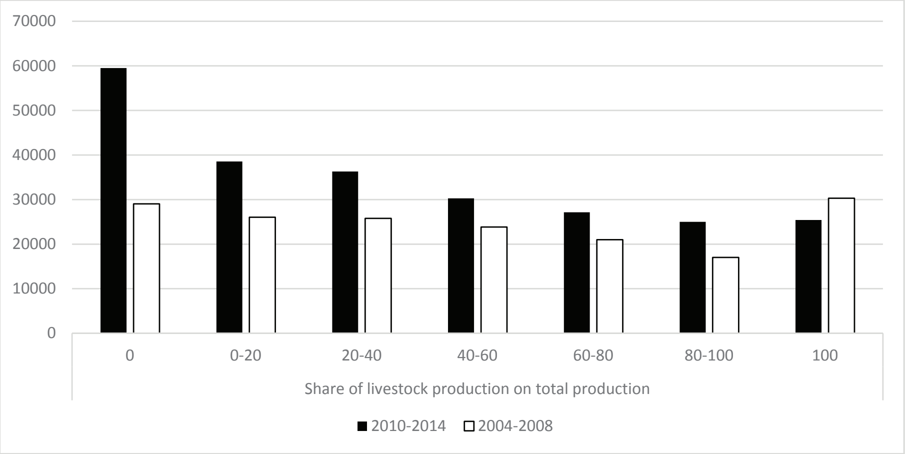

Figure 4: Sales per employee based on the share of livestock production on total production

Data source: Tables 3 and 4.

The productivity of farms did increase. Crop farms are more productive than livestock farms. Specialised crop farms did increase the productivity by

100 per cent. Other farms have lower productivity than specialised crop farms. The productivity of livestock farms is lower. The higher the share of livestock production on total farm production the lower the productivity. This is due to the fact that livestock production is more labour demanding.

Discussion

The paper shows how farms with large UAA contribute to different extents to rural development and employment based on the production focus. Livestock farms create value added and increase employment more than crop farms. In addition, the improvement in technology leads to a decrease in employment in big farms much more than on small farms. We conclude the productivity of farms increasd. Crop farms are more productive than livestock farms. Profitability of farms differs based on the share of livestock production. The most profitable farms have no livestock production. Mixed farms with share of livestock production from 60-80 per cent are generating losses. In the long run, crop farms are profitable and profit from crop production is used to cover the losses from livestock production in mixed farms. The most profitable farms are the riskiest. Generally, livestock production is less risky than crop production.

In conclusion, the integration and globalisation of Slovak agriculture is resulting in specialisation of farms and farms are reducing livestock production to limit the losses. Sustainable agriculture should always be a combination of livestock and crop production. These two types of production are complementary and important for rural development and environmentally-friendly agricultural production.

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References

Antón, J., Kimura, S., Martini, R., 2011. *Risk management in agriculture in Canada*. OECD Food, Agriculture and Fisheries Papers No. 40. Paris: OECD Publishing.

Baginski, S.P., Wahlen, J.M., 2003. *Residual income risk, intrinsic values, and share prices*. The Accounting Review 78(1), 327-351. https://doi.org/10.2308/accr.2003.78.1.327

Barkley, A., Peterson, H.H., 2008. *Wheat variety selection: an application of portfolio theory to improve returns*. Proceedings of the NCCC-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management, 21-22.

Barkley, A.P., Porter, L.L., 1996. *The Determinants of Wheat Variety Selection in Kansas, 1974-199*3. American Journal of Agricultural Economics 78, 202-211. https://doi.org/10.2307/1243791

Cox, C.M., Garrett, K.A., Bowden, R.L., Fritz, A.K., Dendy, S.P., Heer, W.F., 2004. *Cultivar Mixtures for the Simultaneous Management of Multiple Diseases: Tan Spot and Leaf Rust of Wheat*. Phytopathology 94, 961-969. https://doi.org/10.1094/PHYTO.2004.94.9.961

El Benni, N., Finger, R., 2013, *Gross revenue risk in Swiss dairy farming*. Journal of Dairy Science 96(2), 936-948. https://doi.org/10.3168/jds.2012-5695

Fama, E.F., French, K.R., 1995. *Size and book-to-market factors in earnings and returns*. The Journal of Finance 50(1), 131-155. https://doi.org/10.1111/j.1540-6261.1995.tb05169.x

Figge, F., 2004. *Bio-folio: Applying Portfolio Theory to Biodiversity. Biodiversity and Conservation* 13, 822-849. https://doi.org/10.1023/B:BIOC.0000011729.93889.34

Gempesaw, C.M., Tambe, A.M., Nayga, R.M., Toensmeyer, U., 1988. *The Single Index Market Model in Agriculture*. Northeast Journal of Agricultural and Resource Economics 17(2), 147-155.

Hardaker, J., Huirne, R., Anderson, J., Lien, G., 2004. *Coping with risk in agriculture*. CABI Publishing. 140-156. https://doi.org/10.1079/9780851998312.0000

Just, R.E., Pope, R.D., 2003. *Agricultural risk analysis: adequacy of models, data, and issues*. American Journal of Agricultural Economics 85(5), 1249-1256. https://doi.org/10.1111/j.0092-5853.2003.00538.x

Markowitz, H.M., 1952. *Portfolio Selection*. Journal of Finance 7(1), 77-91. https://doi.org/10.1111/j.1540-6261.1952.tb01525.x

Nyikal, R.A., Kosura. W.O., 2005. *Risk Preference and Optimal Enterprise Combinations in Kahuro Division of Murang'a District, Kenya*. Agricultural Econoomics 32, 131-140. https://doi.org/10.1111/j.0169-5150.2005.00012.x

OECD, 2011. *Managing Risk in Agriculture, Policy Assessment and Design*. (1st edition). Paris: OECD Publishing.

Peterson, P.E., Leuthold, R.M., 1987. *A portfolio approach to optimal hedging for a commercial cattle feedlot*. Journal of Futures Markets 7(4), 443-457. https://doi.org/10.1002/fut.3990070407

Robinson, L.J., Brake, J.R., 1979. *Application of Portfolio Theory to Farmer and Lender Behavior*. American Journal of Agricultural Economics. 61, 158-164. https://doi.org/10.2307/1239520

Sanchirico, J.N., Smith, M.D., Lipton, D.W., 2005. *Ecosystem Portfolios: A Finance-Based Approach to Ecosystem Management*. Paper presented at the AERE Workshop 2005: Natural Resources at Risk, Jackson, Wyoming.

Sharpe, W.F., 1963. A simplified model for portfolio analysis. Management Science 9(2), 277-293. https://doi.org/10.1287/mnsc.9.2.277

Tangermann, S., 2011. *Risk management in Agriculture and the Future of the EU's Common Agricultural Policy*. ICTSD, Issue Paper 34.

Tóth, M., Lančarič, D., Piterková, A., Savov, R., Rábek, T., 2014. *Measuring systematic risk of unquoted agricultural farms*. Review of Agricultural and Applied Economics 17(1), 31-34. https://doi.org/10.15414/raae.2014.17.01.31-34

Turvey, C.G., Driver, H.C., 1987. *Systematic and nonsystematic risks in agriculture*. Canadian Journal of Agricultural Economics 35(2), 387-401. https://doi.org/10.1111/j.1744-7976.1987.tb02236.x

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Human resources in Slovak agriculture: impact of selected factors

Abstract: *This study examines the impact of selected factors on employment in agriculture in Slovakia. Slovakia was known as an agricultural country, but employment in this sector has declined in the last two decades. The research is based on firm-level data from the database of the Slovak Ministry of Agriculture and Rural Development for the years 1997, 2001, 2005, 2009 and 2013. The results show that wages and agricultural utilised area are the most significant factors that influence the number of employees in agriculture in Slovakia. Other factors such as production type (crop or livestock) and productivity were found to be less significant factors that influence employment in agriculture*

Keywords: *employment, wages, agricultural utilised area, productivity, production type.*

Introduction

Agriculture as a strategic employer in Slovak history

Agriculture has been a source of livelihood as well as one of the major employers from the beginning of human society (Grim, 1916; Kjeldsen-Kragh, 2007). Slovakia is historically an agriculturally specialised area. Unfortunately, there is a lack of historical statistical data on the number of employees in Slovak agriculture. Especially, data before World War I are not consistent (Bogaerts et al., 2002). It was a period when individual (mainly small family) farmers prevailed. The first agricultural cooperatives in Slovakia were established in 1845. These were devoted mainly to milk and basic food production. According to the available data, there were 845,421 people working in agriculture in 1869 (80.6 per cent). At that time, it was almost the only employment opportunity for the rural population. In 1900, there were 648,862 workers (68.3 per cent) in agriculture (Petráš, 2011). This means that it was a period in which agriculture employed almost all rural residents.

The turning point came in 1948, when state begin to withdraw utilised land from inactive owners and big owners (over 50 hectares). It was established by Law no. 46/1948, which sets the sale of land by the State. In fact, owners never received their payments and nowadays we term this process as confiscation (Námerová, 1997). In consequence of this, cooperative farming was seen as aggression and the reason for the destruction of the traditional rural way of life in Slovakia. Subsequently, poor economic results of these cooperatives and an exodus to the cities were recorded (Slavkovský, 2009). Slovakia, at that time part of the Czechoslovak Republic, belonged to the 'Eastern Bloc' and was under the leftist Communist dictatorship. During this period, agriculture still employed more than 60 per cent of the population. In 1949 the Comecon was founded as an apparatus of the economic development of the socialist countries. According to Law no. 69/1949, the creating of collective farming was started. Incurred collective farms were agricultural firms which did not have the legal form of a cooperative. In the 1980s the association of these collective farms was began. This decision was made by the Communist Party and it allowed no choice for individuals. (Sira, 2013). This period of central control was characterised by zero competitiveness. As the main source of food security and employment, agriculture was declared as a strong priority. Moreover, the policy of 100 per cent employment meant that agriculture employed people irrespective of efficiency or effectivity. The large farms were created during this period of over-employment and collectivisation. They farmed hundreds, in some cases thousands of hectares. Consequently, farms in Slovakia are actually among the largest in European Union (EU) (Tóth et al., 2015).

After 1989 the centralised economy was transformed to a market one. After a series of political, economic and other structural changes, the process of restitution (Law no. 229/1991) and decollectivisation (Law No. 42/1992) began. Confiscated land was returned to the owners and large farms were restructured into cooperatives or trading companies (Jeleček, 1995). Some were broken down into smaller entities, but mostly one large entity was preserved and just small areas are utilised by private owners – small family farmers (Bandlerová and Marišová, 2003). Having established ownership, it was intended that owners could remove their land from cooperatives or continue to lease their land to the new cooperatives of owners (in compliance with new Civil Code and new Code of Commerce) or to any entrepreneur. Those who removed their land might establish their own farms, convert the land to non-agricultural use, sell the land, or attempt to lease the land (Duke et al., 2004). Large farms retain their dominant position in agriculture, even if their share of the total area has decreased. In 1993, an independent Slovak Republic was established. The transition to a market economy was also connected with the sharp decline in employment, especially in agriculture. State support has declined and farmers have had to deal with competition (Lerman et al., 2002; Csaki and Nucifora, 2002). Unemployment increased and has become one of the biggest problems of the rural population. Realised land reform should individualise land use and privatise agricultural land but many 'new' landowners were urban dwellers, not interested in agriculture (Mathijs and Swinnen, 1998). Nowadays, there are only 33,797 employees in Slovak agriculture (2.86 per cent). According to Slovak Ministry of Agriculture and Rural Development (MoARD) data from 2015, the farms are mostly limited legal entities (969 farms) and 503 of them are joint stock companies (JSC).

Methodology

Data

The article evaluates the impact of selected factors (total farm return, sales of crop and animal production, personal costs and total area) on employment at Slovak subjects in primary agricultural production. We used data of individual Slovak farms from the MoARD database the period 1997–2013. Data submission is obligatory for all Slovak agricultural farms. The database includes complete balance sheets and income statements. We included only active farmers (enterprises generating sales from farming) in the statistical evaluation. Data were available for production cooperatives and companies (Ltd., JSC). After the data selection some adjustments were necessary. We excluded farms without market production as well as farms for which the data seemed to be amiss (due to errors in completing the forms).

Methods

For evaluation of significant differences in the period 1997–2013 we used t-test and ANOVA. For evaluation of the impact of selected factors we used linear regression. The statistical software IBM SPSS v.20 was used for calculations. The paper focuses on the employment on Slovak farms. With respect to this, the dependent variable was the number of employees. Independent variables were: productivity measured by sales per employee, type of production measured by sales of crop and livestock production, wages measured by personal costs and utilised agricultural area (UAA). These variables are commonly used to evaluate managerial and aspects of agricultural entities (Adamišin and Kotulič, 2013; Rábek et al., 2014; Giannakis and Bruggeman, 2015; Polák et al., 2015).

Hypotheses

From the literature and previous research, we formulated following research hypotheses, namely that the number of employees in Slovak agriculture:

- H1: is influenced by the wage in agriculture;
- H2: depends on the type of production in agricultural entities;
- H3: depends on UAA;
- H4: depends on productivity of farms.

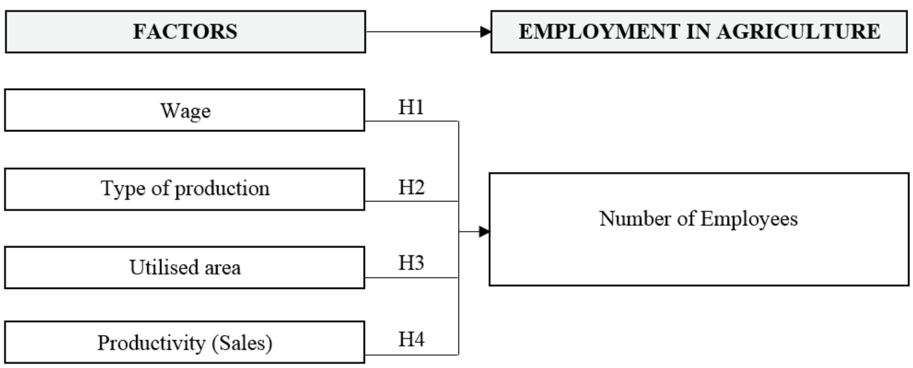

Figure 1. Factors influencing the number of employees in Slovakian agriculture
Source: own composition.

Characteristics of the sample

Table 1. Selected descriptive characteristics of the sample

Year	Number	Average number of employees	Average UAA per employee in ha	Average personal costs per employee per year (EUR)	Average sales per employee (EUR)
1997	1232	92.1	26.6	3,009	11,854
2001	1232	61.5	41.0	4,081	17,231
2005	1352	40.2	58.4	5,032	26,722
2009	1331	32.0	71.9	6,669	31,082
2013	1398	25.7	77.5	7,670	43,605

Data source: MoARD.

The average number of employees in companies and cooperatives in Slovak agriculture decreased from 92.1 in 1997 to 25.7 in 2013 (Table 1). The logical consequence of this development was the increasing amount of UAA per employee (26.5 ha in 1997; 77.5 ha in 2013) and increase in average sales per employee (EUR 11,854 in 1997; EUR 43,605 in 2013). The average yearly wage increased from EUR 3,009 in 1997 to EUR 7670 in 2013. However, it is still well below the national industry average.

Results

Development of employment in agriculture in Slovakia

Employment in Slovak agriculture is characterised by big decreases in the last two decades. The number of employees in Slovak agriculture has decreased about 75 per cent in this period (Figure 2). The main changes in the structure of employees were recorded (according to MoARD) in the category of craftsmen and servicemen where there is nowadays less than half of workers (45 per cent) compared to 2005. The smallest change was recorded in the category of workers in crop production where 67 per cent of workers stayed. The number of employees in livestock production has decreased by 43 per cent, and managerial and administrative staff by 39 per cent. All these changes are highly connected with the changes of production structure in agricultural companies in recent years.

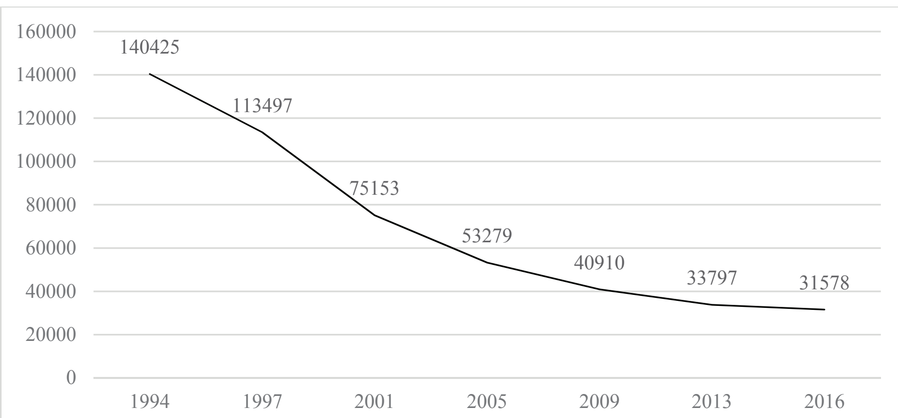

Figure 2. Development of employment in agriculture in Slovakia

Data source: MoARD.

There is a big difference between Slovakia and other countries of EU in the structure of labour force. Slovakia and Czech Republic have big share of paid non-family labour force. There is only 20-25 per cent share of family labour force and other share goes to regular non-family labour force. When compared to Poland (95 per cent share of family labour force, Croatia 90 per cent, Austria 86 per cent) we can conclude the share of family labour force is much smaller in Slovakia. This fact is connected to the size of utilised agricultural areas per company in Slovakia (which is much larger than EU average) and the type of production (usually not specialised crop production). The small number of employees influences also the efficiency of the farm.

The main factors influencing employment in Slovak agriculture

The first important factor which influenced employment in agriculture in Slovakia is socio-economic development after 1989. The character of the economy has rapidly changed. There was a shift from agriculture to different types of industries. Slovakia is nowadays known as the Detroit of the EU, since it produces a high number of cars per citizen and it is an important part of the car industry in Europe. In recent years Volkswagen, Kia, Citroen Peugeot and Jaguar Land Rover invested in Slovakia. The index of employment in agriculture, according to the Statistical Office of Slovakia, was 50 per cent in 1952, 17 per cent in 1977 and 10 per cent in 1994. In recent years it further decreased to 3 per cent. In the 1990s there were many changes regarding the ownership of the farms. Over 90 per cent of farms were transformed into corporations with private ownership, a process connected with the priority of higher efficiency and lowering costs, usually connected with labour force. This change impacted the employment in agriculture in Slovakia in a negative way.

The second factor is wages in agriculture. The gap between wages in agriculture and in the economy is increasing (Figure 3). In 1997 the gap was 22 per cent, now it 29 per cent. We assume it is one the reasons why work in agriculture is not attractive and young people do not look for employment in agriculture.

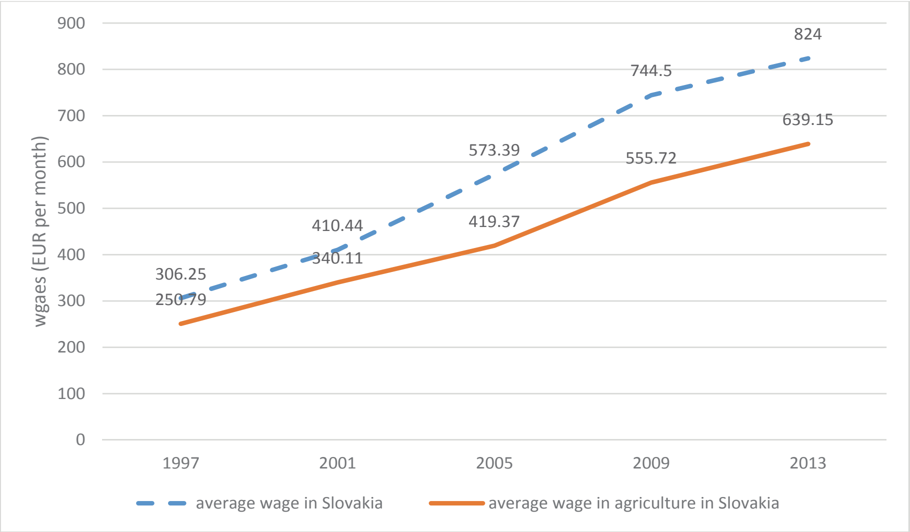

Figure 3. The gap between wages in agriculture and in the economy of Slovakia
Data source: Statistical Office of Slovakia.

We assumed that the number of employees in Slovak agriculture is influenced by wage, type of agricultural production and UAA. We observed five periods (1997; 2001; 2005; 2009 and 2013). The wage was measured by staff costs. The type of production was measured by the sales generated by crop production and livestock production. These variables measured the productivity of farms as well.

The results show the number of employees is influenced by the wage and UAA (Table 2). The influence of the type of agricultural production and the productivity of farms varies. We conclude the hypotheses H1 and H3 were confirmed and hypotheses H2 and H4 could not be confirmed.

Table 2. Regression: sales, personal costs, UAA 1997, 2001, 2005, 2009, 2013

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	Std. Err.	Beta		
1997	(Constant)	2.4765	1.0739		2.3062	0.0213*
	Sales crop_p	0.0000	0.0000	-0.0580	-5.4434	0.0000**
	Sales livestock_p	0.0000	0.0000	0.0268	2.0189	0.0437*
	Staff cost	0.0003	0.0000	0.8910	39.7652	0.0000**
	UAA	0.0000	0.0000	-0.0390	-5.1556	0.0000**
2001	(Constant)	1.6523	0.8532		1.9365	0.0531
	Sales crop_p	0.0000	0.0000	-0.0532	-4.7471	0.0000**
	Sales livestock_p	0.0000	0.0000	0.0144	0.8912	0.3730
	Staff cost	0.0002	0.0000	0.8931	45.7955	0.0000**
	UAA	0.0000	0.0000	-0.0536	-6.5683	0.0000**
2005	(Constant)	1.3212	1.4415		0.9166	0.3633
	Sales crop_p	0.0000	0.0000	0.1733	2.5959	0.0120*
	Sales livestock_p	0.0000	0.0000	-0.1923	-3.3813	0.0013**
	Staff cost	0.0002	0.0000	0.8133	11.5976	0.0000**
	UAA	0.0000	0.0000	-0.0653	-1.8544	0.0489*
2009	(Constant)	1.2604	0.6646		1.8964	0.0583
	Sales crop_p	0.0000	0.0000	-0.0101	-0.1886	0.8504
	Sales livestock_p	0.0000	0.0000	0.1793	2.1585	0.0312*
	Staff cost	0.0001	0.0000	0.8237	40.6408	0.0000**
	UAA	0.0000	0.0000	-0.0576	-4.7923	0.0000**
2013	(Constant)	0.7094	0.6189		1.1462	0.2521
	Sales crop_p	0.0000	0.0000	0.1626	0.7160	0.4742
	Sales livestock_p	0.0000	0.0000	0.5006	1.2241	0.2213
	Staff cost	0.0001	0.0000	0.8164	37.1802	0.0000**
	UAA	0.0000	0.0000	-0.0551	-4.2598	0.0000**

Note: * statistically significant at 0.05 significance level; ** statistically significant at 0.01 significance level.
Source: own calculations.

Discussion

The main findings are summarised in Table 3. The most important factors influencing employment in agriculture are wages and UAA. The less important factors were productivity and type of production.

The wage in agriculture is below the average in national industry in Slovakia. Therefore, young people are looking for work in other industries. This development results in a steadily decreasing number of employees in agriculture and in an increase in their average age. The average age of employees in agriculture is relatively high (over 50). One of the biggest challenges agriculture will face in near future seems to be attracting young, highly qualified labour force and providing an attractive wage to keep them working in agriculture rather than switching to different, better paying industries.

Table 3. Summary of the main findings

Year	Sales Crop_p	Sales Livestock_p	Wage	UAA
1997	x	x	x	x
2001	x	o	x	x
2005	x	x	x	x
2009	o	x	x	x
2013	o	o	x	x

Note: x-statistically significant factor; **o-statistically not significant factor
Source: own calculations.

Slovakia is a country characterised with big farms according to land area. Slovakia with 80.7 hectares of UAA per farm belongs with Czech Republic (133 hectares per holding) and the UK (96.3 hectares per holding) to the countries with the largest average area per holding. This number is still increasing in Slovakia. In 2010 it was 77.5 and in 2013 it was 80.7 hectares per holding. Countries with the lowest UAA per hectare in EU are: Malta (1.2), Cyprus (3.1), Romania (3.6), Slovenia (6.7) and Greece (6.8). UAA per employee also rising in Slovakia (Figure 4).

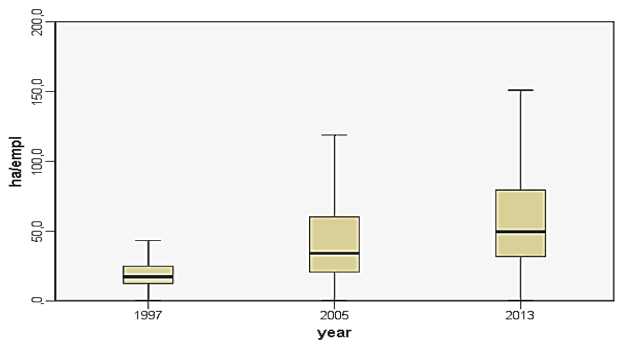

Figure 4. Utilised area per employee
Data source: MoARD.

This said, the main type of agricultural production in Slovakia is crop production. Agricultural production in Slovakia has undergone a massive restructuring. About one fifth of all workers were employed in sideline production in the past, but sideline production was ended. Restructuring is also connected with the focus on crop production due to better economic results compared to livestock production. As it is generally known, the livestock production requires more labour force than crop production. Slovakia with 0.35 livestock units (LSU) per hectare belongs to the countries with the lowest LSU per hectare. There are only four countries in the EU below this number: Bulgaria 0.25, Latvia 0.25, Lithuania 0.31 and Estonia 0.32. In other EU Member States, LSU per hectare is much higher: Netherlands 3.63, Belgium 2.90, Denmark 1.88, and Cyprus 1.84. The number of cows in Slovakia fell from 500.000 in 1990 to 150.000 in 2015, a decrease of more than 70 per cent.

Another factor influencing employment identified in the literature is higher focus on efficiency and productivity because companies want to be more competitive. Productivity measured by sales per employee is increasing in Slovakia. This productivity in 2013 increased threefold when compared to 1997 (Figure 5).

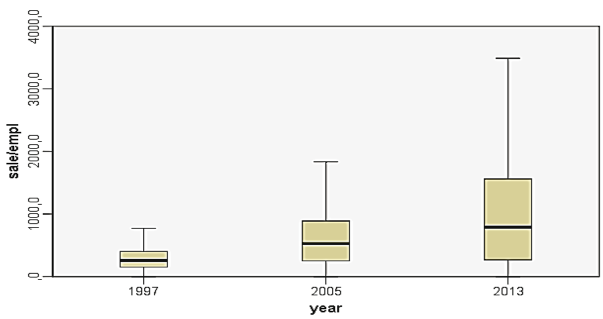

Figure 5. Sales per employee
Data source: MoARD.

There are a number of factors influencing employment in agriculture, which should be examined in the future. Self-employment is one of them (the number of employees decreased from 92.8 per cent in 2005 to 86.8 per cent in 2014; on the other hand, the share of entrepreneurs increased from 7.4 per cent in 2005 to 12.1 in 2014). Yet another important factor is the EU policy. The Common Agricultural Policy (CAP) brings only indirect support for employment in agriculture. For example, the CAP helps farmers to adopt sustainable farming methods, helps young people set up in farming, lays the foundations for a strong farming industry, helps farmers to be more productive and to improve their technical skills, and assists farmers to become economically competitive.

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References

Adamišin, P., Kotulič, R., 2013. *Evaluation of the agrarian businesses results according to their legal form*. Agricultural Economics – Czech; 59(9), 396-402.

Bandlerová, A., Marišová, E., 2003. *Significance of ownership and lease of agricultural land in Slovakia in preaccession period*. Agricultural Economics – Czech 49(5), 213-216.

Bogaerts, T.; Williamson, P., Fendel, M., 2002. *The role of land administration in the accession of Central European countries to the European Unio*n. Land Use Policy 19, 29-46. https://doi.org/10.1016/S0264-8377(01)00041-2

Csaki, C., Nucifora, A., 2002. *The Agrarian Economies of Central-Eastern Europe and the Commonwealth of Independent States: An Update on Status and Progress–2001*. ECSSD Working Paper No. 36. Washington DC: World Bank.

Duke, J.M., Marišová, E., Bandlerová, A., Slovinska, J., 2004. *Price repression in the Slovak agricultural land market*. Land Use Policy 21(1), 59-69. https://doi.org/10.1016/j.landusepol.2003.04.001

Giannakis, E., Bruggeman, A., 2015. *The highly variable economic performance of European agriculture*. Land Use Policy (45), 26-35. https://doi.org/10.1016/j.landusepol.2014.12.009

Grim, J.S., 2007. *Elementary Agriculture.* Allyn and Bacon, 1916. Online: https://books.google.sk/books?id=3ftEAAAAIAAJ&q=agriculture&dq=agriculture&hl=sk&sa=X&redir_esc=y.

Jeleček, L., 1995. *Changes in the production and techniques in the agriculture of Bohemia 1870–1945*. In: Havinden, M.A., Collins, E.J.T. (Eds.), Agriculture in the Industrial State. Reading: University of Reading, Rural History Centre, 126-145.

Kjeldsen-Kragh, S., 2007. *The role of agriculture in economic development*. Köbnhavn: Copenhagen Business School Press.

Lerman, Z., Csaki, C., Feder, G., 2002. *Land Policies and Evolving Farm Structures in Transition Countrie*s. Policy Research Working Paper 2794. Washington DC: World Bank.

Mathijs, E., Swinen, J.F.M., 1998. *The economics of agricultural decollectivization in East Central Europe and the former Soviet Union*. Economic Development and Cultural Change 47, 1-26. https://doi.org/10.1086/452384

Námerová, I., 1997. *Contemporary Slovak Society and Agrarian Reform*. Human Affairs 7(1), 77-85.

Petráš, M., 2011. *The analysis of employment in agriculture of Europe and Slovakia before and after 198*9. Bachelor thesis. Bratislava: Univerzita Komenského v Bratislave.

Polák, P., Prístavka, M., Kollárová, K., 2015. *Evaluating the effectiveness of production process using pareto analysis*. Acta technologica agriculturae 18, 18-21.

Rábek, T., Serenčéš, P., Tóth, M., Čierna, Z., Piterková, A., 2014. *Size of utilized area and financial indicators in Slovak primarily agricultural production*. Business Trends 4(4), 20-28.

Sira, E., 2013. *Analysis of Slovak agricultural position from the perspective of selected indicators and Slovak regions*. Polish Journal of Management Studies 8, 230-242.

Slavkovský, P., 2009. *World leaving. The traditional agrarian culture of Slovaks in central and southern Europe*. Bratislava: VEDA.

Tóth, M., Lančarič, D., Munk, M., Savov, R., Piterková, A., 2015. *Measuring agency costs in agriculture*. Agrarian Perspectives XXIV, 471-478.

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What kind of new solutions do we need to increase efficiency of land usage? – case studies from Poland and Hungary (who wins?)

Abstract: *To find and adopt those farming activities, solutions and technologies that are suitable for effective production, ensuring the viability for the farmers by the product chain is one of the basic tasks of a sustainable economy. The limited area of arable land is one of our key resources in agriculture and in the life of rural areas as well. The aim of the study is to discuss the new paradigm of 'degrowth' along the potential alternative farming strategies focusing on the land question, based on thoughts of Serge Latouche. The new values (Réévaluer – reappraise) suggest the intent of preserving nature at least in the current condition. Both precision agriculture and herb plantations or organic production are tools in this and allow the efficient use of natural resources (Restructurer – restructuring factors of production). Each farming strategy in which the farmers' cooperation is the base of an efficient machinery use (Restructurer – restructuring of social relationships), each technology that reduces the human-health risk (Réduire – reduction) shows into the direction of degrowth. We believe that it will not be possible to maintain a sustainable economy without strengthening the rural areas, helping farmers to find successful ways/strategies for development, being innovative and to cooperate with each other. Values, attitudes, networks, trust and openness are important to both individual and social utility coincidence that promotes the sustainability of being viable, competitive in wider meaning: future orientation, ability to renew (development, imitation, synthesis), economic/social cooperation.*

Keywords: *sustainable economy, farming strategies, glocalisation, coopetition.*

Introduction

The aim of the paper is to highlight the idea of 'degrowth' theory from the point of view of sustainable land use with particular reference to Poland and Hungary. These two countries have different agricultural backgrounds and history of property structure but similarities can be observed. All participants of the agricultural product chain must find the optimal solution and strategy concerning the main principles of sustainability. Based on the literature and on our own research results, a content analysis was carried out and logical modelling was used to apply the theory to agriculture. Thus, the paper begins by discussing the topic of sustainability in agriculture. Then, we explore the concept of 'degrowth' and business in the context of the thoughts of Serge Latouche (2007). Then, in some case studies from the two countries, some new farming strategies are examined from the point of view of sustainable economic behaviour, to summarise and define the characteristics of 'degrowth'. Finally, we discuss some possible implications of the new theory from the point of view of agricultural SMEs.

The concept of sustainability in agriculture

Arable land is one of the key resources in agriculture and in the life of rural areas as well. Without going deeply into the question of resource limitation, here should be highlighted the need for increased efficiency of land use. From one point of view, efficiency has a technical meaning: yield efficiency for the given land, soil and climatic conditions. The other is production efficiency, a term that is closer to economic efficiency and includes the questions of market (demand, price, subsidies etc.), farm facilities (property, ownership, size, market connections, memberships, geographical localisation, level of capital and machinery, management skills etc.). There are different explanations of efficient land use, from organic production to intensive, integrated plant production systems based on up-to-date technologies and using chemicals. The different technologies vary widely concerning the types and the level of inputs, the applied results of research and development and innovation took part in recent decades in agriculture.

But who knows what is the real efficient use of arable land? From the wider aspect, land use cannot be set apart from the territorial, rural questions. The important role of small agricultural enterprises, not only in the economy, in employment and in rural development, ensuring viability for local habitants and sustainable rural life is frequently mentioned (e.g. Tocco et al., 2014; Tudor, 2015). To reach these goals, all individual farms should operate in an efficient way, that means at least to be of a viable size, so that revenue covers all the costs – including the personal/family income at the average social level – and ensures the necessary investments. By 'viable size', we mean that farming size (at certain production structure and yield level) when the given economic environment allows at least such income to be reached that covers all the production costs, including the necessity investment and ensuring the satisfactory standard of living for the farmer (Takácsné, 1994).

By 'efficiency' we will consider the economic meaning that is connected to the question of sustainability. The principle of sustainability was brought to our attention – again – by Brown (1981). Harmony must be achieved between the needs of society, population growth, the natural resources and environmental pollution in a sustainable society by the limitation of consumption, thrift in the use of inputs (materials, energy etc.). The definition of sustainability of the environment comes from the Brundtland Report (WCED, 1987). Pearce and Atkinson's (1995) understanding is that the natural resources and human-made capital are complementary to each other in the production process, so that natural resources are creating the limiting factors to increasing production and, at the same time, they should be used rationally during production. By the turn of the millennium, sustainability has a broader interpretation:

- Protection of natural resources;
- Food production (fitting to the increasing demand);
- Maintenance of viable rural communities;
- Improvement of human and animal health (conditions);
- Environment protection ('polluter pays' principle);
- Suitable subsidy system(s);
- Diversity of land use;
- Less harmful territorial usage;
- Local solutions in territorial land (resource) usage;
- More efficient institutional background to ensure the multifunctional territorial usage ('territorial cohesion policy').

During recent decades, the new paradigm of agricultural research and development has been built on the interaction of three factors: ecological sustainability, economic efficiency paired with equal opportunities, and mutual assistance of governmental and non-governmental sectors in order to improve the performance and profitability of farming systems. From this aspect, sustainable land use should be combined with the concept of land use pyramid (see diagram in Ángyán, 2003, p.17). At the top of the pyramid there is the land that should be protected (nature conservancy land, important from the aspect of biodiversity, special soil and water protection is needed etc.), where no arable land use is allowed. The second part includes land under other protection (isolation, buffer zones), where special agricultural technologies are allowed with strict limitations (on chemical use or with machinery use forbidden in certain parts of the year). Below this is land where agricultural production is allowed but with restrictions (organic production, conventional, diversified production structure, semi-extensive production, with limitation of chemical use in ingredients). The wide base represents the arable land – depending on the real agro-eco potential, soil conditions – where intensive (or rather semi-intensive) production using all the new technologies and innovations are allowed. Here both the size of the land and the level of intensity of production will depend on and the fact characteristics of the region where the land is, the capacity of agriculture, environment capacity and the resilience of the environment, too.

As sustainable land use is linked with environment protection, all agricultural land use should focus on these aspects and requirements. Where land can and should be used as the main, limited natural resource with medium or high input use, economic efficiency, as defined above, is the criterion of land use. Agricultural production with medium input usage should meet the restrictions, regulations and here some provisions with the aim of environmental protection have to be implemented. The economic benefits can be increased by sparing and protecting natural resources, with no (or at least only at a low level (i.e. can be renewed)) pollution in the environment, in the frame of the system of sustainable development. The main characteristics of such agriculture are:

- Reduced use of water (precision irrigation);
- Energy saving systems;
- Optimisation of chemical use (precision farming, site-specific);
- Appropriate technologies (to the given circumstances);
- Harmonised with the environment;
- Focus on quality production (including the questions of safety food);
- Importance of human capital, human skills.

In other words, to be genuinely sustainable, land use should be sustainable from the point of view of land, soil, water, biodiversity (environment), from the economic point of view (how to be viable, competitive, giving enough income for the farmers, for the rural communities) and also sustainable in terms of social aspects ('Feed the world') (Figure 1).

The term 'sustainable development' includes the current and long-term sustainable production and the controversies of environmental protection that assurance the right quality of life, and difficult to prevent, but rather tolerated conflicts. (Chilinsky, 1998; Behnassi et al., 2011; Turek, 2013; Valkó et al., 2013). Social sustainability includes the necessary food production and industrially-based energy production, and also from the farmer's point of view, compliance with the profitability criteria, and the responsibility of sustaining the environment (Figure 1). Without economic sustainability, environmental and social sustainability cannot be realised. So, the question for the farms is how to operate efficiently, over the viable size. The responsible behaviour of all participants (producer, consumer and society) has to find a degree of intensity and technology of production matched with a form of farming technology that is appropriate for the environment (such as organic, conventional, integrated and precision (a further developed form of integrated) farming strategies (Mawapanga and Debertin, 1996; Caffey et al., 2001; Stull, 2004; Takács-György and Takács, 2011) To find the new ways of agricultural development and innovation it is also important to focus on sustainable economy that is nothing else than social sustainability.

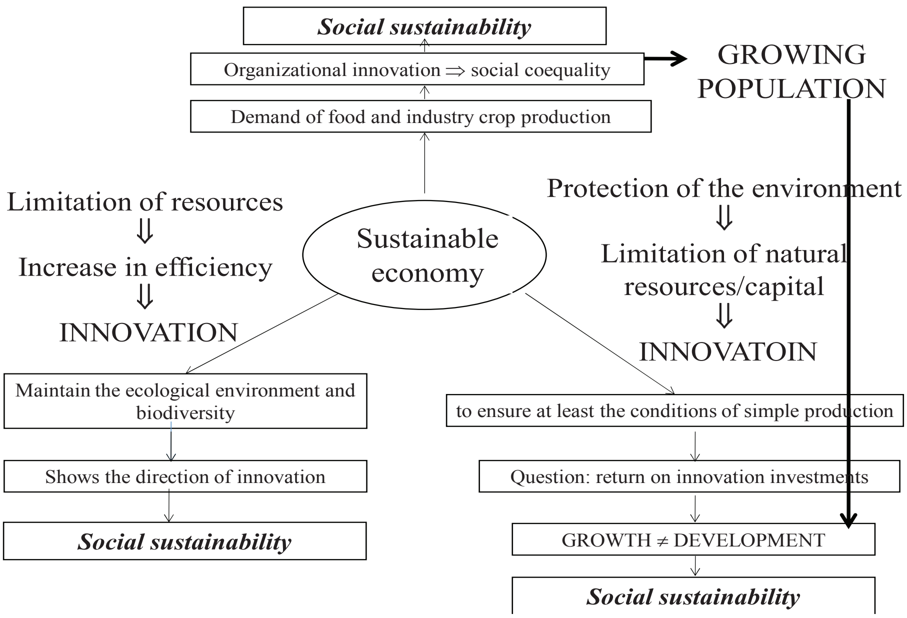

Figure 1. Sustainable economy in the context of innovation
Source: own construction, based on several source documents.

Sustainable development in agriculture means that we should speak about development, new technologies (innovations) and human capital, solutions for the questions mentioned above. It includes both current and long-term sustainable production. The literature background of the question of limited natural resources and the growth is very wide: the scientists, economists and politicians are not on the same platform. Two opposite groups can be differentiated. One can be considered as pessimists (most of the ecologists, those scientists and economists who do not believe that the earth can support more people. They are convinced that the global population exceeds the capacity of earth, see the concept of footprint, waterprint and somehow the question of embodied energy also belongs to here). Others believe in innovation in positive future development. They think that humanity is adult enough to develop and implement new technologies, new market incentives and appropriate policies, to change costumer habits (less consumption, share resources), to use substitute products, to re-use waste, to innovate into new technologies. In their opinion the present need can be satisfied without depleting the future's demand for limited resources. Here appears the role of innovation for sustainable development. (Caffey et al., 2001; Kerekes and Szlávik, 2001; Mensah and Castro, 2004; Behnassi et al., 2011).

Theory of 'degrowth' and business

The wide expanded interpretation of sustainability and has strong connection to the new paradigm: 'degrowth'. This new theory connected to the question of a sustainable future in the economy came to mind at the very beginning of the 21st century. The main meaning of 'degrowth' is not unknown for society, it is a movement towards a sustainable future, combining ecological economics, anti-consumerist and somehow anti-capitalist thoughts. The roots of the movement go back to the antecedents: the Club of Rome report of 1971 entitled 'Limits to Growth'. Estimates suggest the population will exceed 9.2 billion in 2050 and this is projected to increase demand for food by 50-70 per cent, while the internal structure of consumption is evolving towards high quality food. The Earth's growing population generates increasing demand not only for the limited natural and artificial resources, especially food, energy, drinking water, but also for the liveable areas. To this must be added the question of migration due to climate change. For agriculture the main task is not only to ensure food safety but safe food and viable rural areas as well. In maintaining the above-mentioned aims the economy, agriculture and environmental management all have a significant role. (Ryden, 2008; Mészáros, 2011; Popp et al., 2013; Takács-György and Takács, 2016).

Decades before the (re)appearance of the moral economists, an etologist, Konrad Lorenz (1973), wrote his novel Die acht Todsünden der zivilisierten Menscheit (in English (1974): Civilised man's eight deadly sins). The environmental, ecological and social processes the author is referring to have some economic consequences for business life: degradation of biodiversity, decreases in agricultural and rural areas have huge effects on individual enterprises, on production structure, technology, direction of innovation etc. To be successful participants of business life they need to give appropriate answers, trying to reach their optimal behaviour. On the other hand, the increase in consumption (the over-consumption itself) can be a leading force of economic development, but the question is: why increase the use of limited resources, what is the limit of the current usage? The limitation will increase the production cost, so many enterprises will leave the market if they will not meet the acceptance of the consumers. To be accepted, to keep them, trust is also an important factor. Business must change some moral attitudes (such as being altruist, paying more attention to environment and social responsibility etc.). All the thoughts and questions are beyond themselves and in strong connection with innovation, with the capability to be renewed.

Serge Latouche (2007) summarised the principles of degrowth in his book Petit traité de la décroissance sereine (in English: Farewell to growth). According to these principles, population growth is not the only cause of environmental problems. The allusion of this hides the ethical and moral questions which need common society action. In the view of Latouche, a revolution in culture and behaviour is need to degrowth. Some of the latest economic trends content to these principles. The necessary steps for degrowth are the following:

Re-evaluate: in our age the individualist megalomania, a rejection of morality, a liking for comfort, and egoism is agreed and we feel it normal. (Belpomme, 2007 p. 220) It is necessary to go back to the old 'bourgeois' values of honour, public service, the transmission of knowledge, 'a good job well done', frankness and mutual trust, the respects for human rights, and nature and society. It is necessary to re-evaluate the idea of poor or rich and developing or developed.

Reconceptualise: 'We must for instance and redefine the concepts of wealth and poverty; deconstructing the infernal couple of scarcity/abundance on which the economic imaginary is based, is a matter of urgency' (Latouche, 2007).

Restructure: adapt the productive apparatus and social relations to changing values. Make equitable policies in production tools and social sources. For example, some car factories need to be converted to make products for recuperating energy through cogeneration. The question is how much does it cost and who will pay for it.

Redistribute: it means the redistribution of access of natural heritage at the global, social, generational and individual levels. Direct effects of redistribution weaken the power of 'world consumer class' and especially the power and wealth of the big predators (Latouche, 2007). It helps to solve the problem of distribution between North and South and pay back the earlier ecological debt. Thanks to the redistribution the developed countries can give an example and avoid the resistance of 'North' countries.

Relocalise: producing on a local basis. Relocalisation is an economic, political and cultural issue. Fortunately, there are more and more positive examples for growth of local economies. For example: direct marketing, short supply chains and local service nets. The free movement of ideas are not restricted but it is necessary to minimise the movement of physical resources. All production needs should be carried out at the local level (Latouche, 2007). The 'Think global – Act local' philosophy is equivalent to the relocalise principle.

Reduce: Reduce our habitual overconsumption and the incredible amount of waste. Think the products which goes together a social demand and artificial enkindle needs. Need to reduce the health risk and the prevention need to be placed in the foreground. Recommended to change the 'mass tourism' to regional travel.

Re-use: we have to reduce conspicuous waste, fight the built-in obsolescence of appliances and recycle waste that cannot be re-used directly. The Olympic Basketball Stadium in London (2012) is a good example because it was the biggest temporary building and after the Olympic Games it was dismantled and sub-divided for reuse elsewhere.

Recycle: recycling is part of our everyday life. There are many good examples of it. For example, the parts refurbishing programme for Peugeot. In this programme the parts are renewed so that the price of service will be low but the quality is the same. Another example is the waste cloth which made from waste paper. The secondary use of biomass energy is also a good example.

These principles could lead our life to another society where free cooperation and self-imposed rules are not a utopia. Re-evaluation is emphasised because this is the basis for the other seven principles. Co-operation should be exchanged for the competitive methods in the business and everyday life too. Latouche does not use the term 'coopetion' but his idea is equivalent to this. Egoism needs to be exchanged for altruism, and hedonism needs to be replaced by chivalry. It is necessary to change the aim of our life. The new aim will be the share of assets and not the getting of property. The tone could be on the social links and not on the consumption. To realise degrowth it is very important to reduce consumption, recapture reasonable production and increase free time (and intelligent activities in the free time). According to Latouche, localisation is a very important issue. His aim is to spread the ideology of local production and local consumption all over the world. Owing to the limitation, the concept of 'Consume less, share more' is only mentioned, without any discussion.

The main conclusions of the First International Conference on Economic Degrowth for Ecological Sustainability and Social Equity in Paris in 2008 and the so-called Barcelona Conference of 2010 must be added to the question of 'degrowth'. At the first event the financial, social, cultural, demographic, environmental crisis caused by the deficiencies of capitalism, and the main principles of 'degrowth' were discussed, At the second, the main focus was how to implement the 'degrowth' theory in society, in daily life. Some practical solutions are the following (not all are listed): promotion of local currencies, reforms of interest; transition to non-profit and small-scale companies; increase of local commons and support of participative approaches in decision-making; reusing empty housing and co-housing; elimination of mega infrastructures, transition from a car-based system to a more local, biking, walking-based one. Some suggestions have become practice, such as the solutions of the sharing economy (Uber, Airbnb etc.), local currencies (including Soproni Kékfrankos and Balatoni Korona in Hungary) or the increase of local communities, but the conclusion of the conference after six years is that society has not had a big influence on the responsible economists and politicians.

Other authors (Fukuyama, 1995; Sedlaček, 2012) highlight the importance of learning the new principles of economic cooperation. The basis of cooperation is moral economy instead of benefit economy (Georgescu-Roegen, 1972, Daly, 1991; Tóth, 2014). Transition from the economy of even more to the economy of enough is of the utmost necessity. The role of cooperation, to share resources, strengthen the market position with concentrated products is an important element of current agriculture and farming. In those countries where a fragmented farm structure is characteristic (not only the concept of local production – local consumption) should be implemented, but is cooperation needed. The need for cooperation and of trust among the business participants is sector-neutral, but has an important role in agribusiness (Wilson, 2000; Andersson et al., 2005; Szabó, 2010; Takács, 2012; Baranyai et al., 2014).

Efficient land use: good examples

Efficient land use cannot be attributed to one meaning. It will depend on several facts, such as the individual farming circumstances, level of limitation, the need for food production etc. Taking into consideration the limitation of land (i.e. arable land) the new solutions cover both the old cultivation methods preserving biodiversity (crop rotation, biological plant protection, antagonists etc.) and the newest, up-to-date technologies (site-specific plant production, irrigation, tolerant species etc.). There is no conflict between the results of innovation in agriculture and the traditional farming systems, including animal husbandry; both can meet the requirements of efficient land use, but what is common between them is, the higher the level of tacit and learned knowledge, the better are the farming and managerial skills. The role of farmers, inhabitants is also important, the question is: Do we really adopt better solutions? It depends on the farmers' attitudes to changes, novelty and attitudes to sharing something, to cooperation.

The following farming examples come from Polish and Hungarian agricultural practices. There is a commonality in the case studies that all the farms are operating in an efficient way, they exceed the viable farms size of their categories, and are able to realise positive income.

Herb plantation (PL)

Poland ranks third place in the production of herbs in Europe, going to western markets ~ 80 per cent of herb raw materials, ~ 20 per cent of herb raw materials are derived from natural, the rest from plantations. People having a small area of land can invest in herb production, the customers are usually companies specialising in pharmaceutical products, food production or cosmetics, EUR 0.5–2.0 per kg of dried popular herbal plants. There are niche species that include, among others: zubrovka (Hierochloe odorata (L.) P. Beauv.), medical verbena, cornflower bluebottle and nettle. The list of herbs is substantial, herbs, which are in demand: chamomile, nettle, thyme, soaps, marshmallow, lemon balm, yarrow, calendula and sage. The average revenue per grower of 1 ha of herbs ranges from EUR 1.5-2.3 thousand; expenditure accounts for 75-80 per cent of the revenue; median income is about EUR 300-565 per ha planted herb. The way of more efficient land use was to turn into a 'niche' market, but the high, value added processing is missing as is the way to increase the resource efficiency. The example farm is situated in one of the less developed areas of Poland, in Małopolska (Galicja) where fragmented land is a key problem. The farmer made the decision to make more effective his farming based on his opinion "it is better to have 5 acres of ginseng than 10 hectares of the wheat".

Dairy farm – from 1998 (PL)

The farmer started with 4 ha of land and 16 dairy cows in an old barn in 1998, in Małopolska (Galicja). Since then development has been continuous: a new cowshed was constructed in 2007, the work and putting feed is mechanised; the feeding is individual (equivalent to precision); there is a milking stall for 10 cows. In 2016 they were keeping 100 dairy cows and about 50 young animals on 21 ha of their own, and 60 ha of leased land. In this example the development follows a 'traditional way', increase of farming size with the increase in dairy intensity gave the chance for the farmer to became a supplier of one of the biggest milk companies. The way of more efficient land use was the realisation of the real market need: to offer higher quantity of product (i.e. milk), fitting all the requirements of the milk industry (food safety).

Safe food and food security – the role of precision farming (HU)

Site-specific crop production (precision farming) is an innovation in agriculture. Traceability of this technology guarantees food safety from farm to fork. Materials and products flow must be linked with the professional information flow along the entire chain providing the localisation of a potential problem, the individual responsibility, and creating preventive safety at the same time. Precision agriculture can give a good base to fit the data gathering, recognising and provisions. Documentation of precision technology creates the follow-up, food safety, which is also expected of the agricultural and food products for customers delivering. The maintenance of food security would be inconceivable without modern varieties and factors of production, including labour-efficient, productive enhancing technological solutions. The reduction of yield uncertainty (decision variables; predetermined variables; variables of yield uncertainty), the environmentally-friendly use of inputs (by management zones) allows the economic viability of farmers, but the adoption of new technologies is needed, the results of innovation is a compulsory movement for farmers (to be viable, to be competitive). That is a part of social sustainability. Its application requires more skills, better work discipline; however, it does not require special equipment investment. Its application requires less managerial and employee commitment and precision, but also requires necessary relevant skills. One comment on the question of necessary investments: the thought of machinery rings, sharing usage and bought services instead of privately-owned machinery should be spread more widely among small and medium sized farmers.

The farm is situated in South-North Region, where the property and farm size are fragmented, but it is a medium sized, plant producing farm. By implementing more elements of the technology (sowing, guiding system, site specific nutrition and weed management, VRA) at the very beginning of the diffusion phase of the technology, they have good farming experiences. As the size of the farm is over 600 hectares, all the necessary, up-to-date machines they own and focus on optimisation of all resources (land, species, mechanisation, etc.). The new technology allows higher efficiency: i.e. higher gross margin / ha, not only due to yield increase, the changes of both sides (inputs, outputs) must be taken into consideration. The focus should be the optimisation by management zones. For this farm – as they are above the semi self-consuming farm size – the strategy was to follow the new innovation directions, use all the resources in as efficient way as is possible by investing not only capital, but also human capital into farming.

Renewal of exploiting opportunities of cooperation – medium-scale potato plant (HU)

The medium-sized potato farm operates on approximately 1,500 hectares of rented land, with irrigation settled plant and dairy sector. The main activity is the potato industry, with grain storage and advanced packaging. They produce potatoes within the framework of integrated producing technology. They developed integrated pest management technology based on forecasting against potato blight, together with a Hungarian potato research centre and other university knowledge centres. The size of the production, the development of processing-storage enabled them to become a supplier for major food retail chains. Also the farm is the integrator of the potato producers organising over 200 farms (raw materials and post-harvest activity and selling). The management highlights the personnel, human factors, the development of a long-term incentive scheme, maintenance of inspiring, creative atmosphere renewal and the approach, which considers the value of knowledge. The way to increase land use efficiency is not only the direction to apply the newest results, innovation in agriculture (species, irrigation, mechanisation etc.), but also to organise the producers, sharing the knowledge and of course, the resource use with the integrated partners. By this they expand the virtual farm size with all economic advantages.

Discussion

To be competitive in the agricultural market, the individual participants (i.e. the farms) have to be efficient from several point of view. It is necessary to find and keep the consumers for the future, adopt new methods and solutions, and apply up-to-date technologies. The role of knowledge in improving – both the technical and economic – efficiency, strengthening the market and social connections, networks is high, but the success depends on the positive attitudes to changes, the novelty of the people.

Answering the question in the title: “Who wins?” it can be stated that for all participants of the economy the sustainable operation means today: appropriate answers to changes, focusing on the future, finding new solutions, ways to reach and keep the consumers, at a viable farm size. That is nothing new: these were expectations of the successful business in the 20th century as well, but today we add another aim: the sustainability. This means new farming directions that are appropriate to the given circumstances, what have to be changed is: turning to moral economy from profit (owners) orientation, to consciously select the business’ place and role in the local economy, not only in the development and innovation process. That allows different farming strategies. Increase of efficiency must be based on resources, facilities (limited resources). The appropriate solution(s) can be based on up-to-date technologies, results of implemented innovations, on traditional farming, taking into consideration of local needs, on co-operation among farmers to meet the requirements of globalisation (i.e. higher quantity, homogeneous quality, sharing the resources etc.). Innovation and cooperation are ways for ensuring food security, open innovation lets business partners and consumers share in the innovation process: coopetition instead of competing.

In connection with land use efficiency another question is: Why innovation in the context of the bioeconomy? The Knowledge and Bio-based Economy is an economy in which food, feed, chemicals, materials, transport fuels, electricity and heat are produced economically and sustainably from renewable resources using innovations. Today, production and utilisation of biological resources and innovations in order to provide sustainable goods and services in all economic sectors is the task.

Based on the 'degrowth' theory, the task is to find new solutions with sharing the resources and knowledge by cooperation. The new values (Réévaluer – reappraise) suggest the intent of preserving nature at least in the current condition. Both precision agriculture and herb plantations or organic production are tools in this and allow the efficient use of natural resources (Restructurer – restructuring factors of production). Each farming strategy in which the farmers' cooperation is the basis of efficient machinery use (Restructurer – restructuring of social relationships), each technology that reduces the human-health risk (Réduire – reduction) shows into the direction of degrowth. In local economies taking part in resource sharing formations, cooperation or in an open innovation chain – this is such behaviour that meets some characteristics of the new paradigm of 'degrowth' and shows into the direction of a sustainable world. The connection between the 'degrowth' concept and the use of new, innovative technologies or turning back to traditional farming ensure food production with less environmental burden and less waste, and allows the increase of land use, and so somehow the strengthening of local society (local production – local consumption).

References

Andersson, H., Larsen, K., Lagerkvist, C.J., Andersson, C., Blad, F., Samuelsson, J., Skargren, P., 2005. *Farm Cooperation to Improve Sustainability*. AMBIO: A Journal of the Human Environment 34(4), 383-387. https://doi.org/10.1579/0044-7447-34.4.383

Ángyán, J., 2003. *A környezet – és tájgazdálkodás agroökológiai, földhasználati alapozása* [Environment and Landscape Management – based on Agroecological and Land Use]. Doctoral dissertation for the Hungarian Academy of Sciences.

Baranyai, Zs, Szabó, G.G., Vásáry, M., 2014. *Analysis of machine use in Hungarian agriculture – Is there any future for machinery sharing arrangements?* Annals of the Polish Association of Agricultural and Agribusiness Economists 16(3), 24-30.

Behnassi, M., Shahid, S.A., D'Silva, J. (eds), 2011. *Sustainable Agricultural Development. Recent Approaches in Resources Management and Environmentally-Balanced Production Enhancement*. Dordrecht: Springer.

Belpomme, D., 2007. *Avant qu'il ne soit trop tard* [before it is too late]. Paris: Fayard.

Brown, L.R., 1981. *Building a Sustainable Society*. New York NY: W.W. Norton and Co.

Caffey, R.H., Kazmierczak, R.F., Avault, J.W., 2001. *Incorporating Multiple Stakeholder Goals into the Development and Use of Sustainable Index: Consensus Indicators of Aquaculture Sustainability*. Staff Paper, Department of AgEcon and Agribusiness. Eunice, LA: Louisiana State University.

Chilinsky, G., Heal, G., Vercelli, A., 1998. *Sustainability: Dynamics and Uncertainty*. Drodrecht – Boston – London: Kluwer Academic Publishers. https://doi.org/10.1007/978-94-011-4892-4

Daly, H.E., 1991. *Steady-State Economics*. Washington, D.C.: Island Press.

Fukuyama, F., 1995. *Trust: The Social Virtues and the Creation of Prosperity*. New York NY: Free Press.

Georgescu-Roegen, N., 1972. *Energy and Economic Myth*. In: N. Georgescu-Roegen (ed., 1976), Energy and Economic Myths: Institutional and Analytical Economic Essays. New York NY: Pergamon Press, 3-36.

Kerekes, S., Szlávik, J., 2001. *A környezeti menedzsment közgazdasági eszközei* [The economic tools of environmental management]. KJK – Kerszöv. Környezetvédelmi Kiskönyvtár.

Latouche, S., 2007. *Petit traité de la décroissance sereine* [Farewell to growth]. Paris: Fayard.

Lorenz, K., 1973. *Die acht Todsünden der zivilisierten Menschheit* [The eight deadly sins of civilized humanity]. Serie Piper, Bd. 50. München, Piper Verlag.

Mawapanga, M.N., Debertin, D.L., 1996. *Choosing between alternative farming systems: An application of the analytic hierarchy process*. Review of Agricultural Economics 18(3), 385-401. https://doi.org/10.2307/1349623

Mensah, A.M., Castro, L.C., 2004. *Sustainable Resource Use & Sustainable Development: A Contradiction?!* Working paper. Bonn: Centre for Development Research, University of Bonn.

Mészáros, S., 2011. *Nemnövekedés: egy új gazdasági paradigma európai fejleményei* [No growth: European developments in a new economic paradigm] Gazdálkodás 3, 259-265.

Pearce, D., Attkinson, G., 1995. *Measuring of sustainable development*. In: D. Bromly (ed.), The Handbook of Environmental Economics, 166-181.

Popp, J., Pető, K., Nagy, J., 2013. *Pesticide productivity and food security*. Agronomy for Sustainable Development 33(1), 243-255. https://doi.org/10.1007/s13593-012-0105-x

Ryden, L. 2008. *Education for global responsibility V Sustainable Development*. Available at http://www.bup.fi/BUPfilm/Lars_film_site/texts/sustainable_text.pdf (Accessed 3 December 2015).

Sedlaček, T., 2012. *A jó és a rossz közgazdaságtana. A Gilgames-eposztól a Wall Streetig* [Economics of God and Evil: The Quest for Economic Meaning from Gilgamesh To Wall Street]. Budapest: HVG Kiadó.

Stull, J., Dillon, C., Shearer, S., Isaacs, S., 2004. *Using precision agriculture technology for economically optimal strategic decisions: The case of CRP filter strip enrolment*. Journal of Sustainable Agriculture 24, 79-96. https://doi.org/10.1300/J064v24n04_07

Szabó, G.G., 2010. *The importance and role of trust in agricultural marketing co-operatives*. Studies in Agricultural Economics 112, 5-22.

Takács, I., 2012. *Games of farmers – to cooperate or not?* Annals of the Polish Association of Agricultural and Agribusiness Economists 14(6), 260-266.

Takács-György, K., Takács, I., 2011. *Risk Assessment and Examination of Economic Aspects of Precision Weed Management*. Sustainability. 2011(3), 1114-1135. https://doi.org/10.3390/su3081114

Takács-György, K., Takács, I., 2016. *Some ideas about site specific crop production and theory of degrowth*. Növénytermelés. 65(2016 Supplement), 67-70.

Takácsné György, K., 1994. *A családi gazdálkodás méretére ható tényezők modellvizsgálata I* [Model analysis of factors affecting family farm size I]. Gazdálkodás XXXVIII(4), 65-69.

Tocco, B., Davidova, S., Bailey, A., 2014. *Labour adjustments in agriculture: evidence from Romania*. Studies in Agricultural Economics 116(2), 67-73. https://doi.org/10.7896/j.1406

Tudor, M.M., 2015. *Small scale agriculture as a resilient system in rural Romania*. Studies in Agricultural Economics 117(1), 27-34. https://doi.org/10.7896/j.1503

Turek, R.A., 2013. *Sustainable agriculture - between sustainable development and economic competitiveness*. In: R.A. Turek (ed.) Sustainable Technologies, Policies and Constraints in the Green Economy. Hershey, PA: IGI Global Publishing, 219-235. https://doi.org/10.4018/978-1-4666-4098-6.ch012

Tóth, G., 2014. *Kelet-nyugat átrendeződés?* [East-West rearrangement?] Journal of Central European Green Innovation 2(4), 163-170.

Valkó, G. Tóth, R. Vinogradov, Sz., Fekete-Farkas, M., 2013. *Measurement of Sustainability of Agriculture*. VADYBA 23(2), 141-148.

Wilson, P.N., 2000. *Social capital, trust, and the agribusiness economics*. Journal of Agricultural and Resource Economics 25(1), 1-13.

WCED, 1987. *Our Common Future. World Commission on Environment and Development.* Oxford: Oxford University Press.

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BioEast: Central-Eastern European initiative for knowledge-based agriculture, aquaculture and forestry in the bioeconomy

Abstract: *The territory of the Central and Eastern European (CEE) countries mostly belongs to the Continental and Pannonian Bio-geographical Regions. Specific and extreme changes in the weather resulting from the very nature of these Regions can be expected in the near future, and adaptation in agriculture and the bioeconomy is a challenge. Furthermore, in many of these countries the current levels of research, innovation, cooperation and lobbying are substantially below the European Union (EU) average, and this research and innovation divide in Europe hinders both the unlocking of excellence in the CEE region and the development of the European Research Area. BioEast is a new strategic research agenda designed to address these challenges. This paper, firstly, introduces the objectives and focus areas of BioEast; secondly recounts the CEE countries' actions so far; thirdly describes the institutional set-up of BioEast; fourthly summarises the conclusions from the BioEast workshop held in Budapest on 21-22 February 2017; and fifthly shows how BioEast can help to focus the EU's agricultural research agenda, especially Horizon 2020, the research and innovation framework programme for the period 2014-2020. Five specific topics are proposed: (a) coordination of bioeconomy-related research and innovation activities; (b) response to climate change and socio-economic challenges; (c) a buffer zone against pathogens; (d) freshwater fish production; and (e)integrated biomass production. Finally, some future actions for BioEast are suggested.*

Keywords: *biogeographical region, Visegrad countries, climate change, socio-economic challenges, Horizon 2020.*

Introduction

Over the last ten years the resources of the Common Agricultural Policy have helped the Central and Eastern European (CEE) countries of the European Union (EU) to improve their agri-food sectors, environment and rural areas, thus increasing economic and social cohesion. However, in order to achieve further progress in the sustainable growth of agriculture, aquaculture and forestry in the bioeconomy, much more emphasis is needed on research, innovation and transnational cooperation for knowledge-based development. BioEast, the Central-Eastern European Initiative for Knowledge-based Agriculture, Aquaculture and Forestry in the Bioeconomy, is a new strategic research agenda for achieving this greater emphasis. Based on the recognition that, owing to the global challenges, sustainability is only achievable at the macro-regional level, BioEast offers a shared strategic research and innovation framework for working towards sustainable bioeconomies in the CEE countries that form part of the Continental and Pannonian bio-geographical regions of Europe.

A biogeographical region can be defined as an area of animal and plant distribution having similar or shared characteristics throughout. The EU has nine terrestrial biogeographical regions (Alpine, Atlantic, Black Sea, Boreal, Continental, Mediterranean, Macaronesia, Pannonian and Steppic). Most of the territory of the CEE countries of the EU belongs to the Continental and Pannonian Bio-geographical Regions (EEA, 2002). Specific and extreme changes in the weather resulting from the very nature of these Regions can be expected in the near future, and adaptation in agriculture and the bioconomy is a challenge. Building sustainable national bioeconomies requires this challenge to be addressed, alongside the common social and governance issues of the CEE macro-region. The sustainability criteria for a circular economy add an additional feature. Furthermore, the research and innovation capacities of the CEE countries are facing significant internal disparities: in many countries, the current levels of research, innovation, cooperation and lobbying are substantially below the EU average. In terms of the CEE countries effectively joining the European Research Area (ERA) this is also a challenge to be tackled.

The CEE macro-region's societal, geopolitical, cultural and historical homogeneity and complexity may help to bring about the framework conditions favourable to bioeconomic growth. But joint efforts are required to address successfully the above-mentioned present and future challenges. A genuine macro-regional perspective, along with more vigorous EU-wide cooperation, is necessary for implementing in an effective and efficient way tailored actions that are conducive to safe, secure and sustainable development for all. Furthermore, the existing research and innovation divide in Europe hinders both the unlocking of excellence in these regions and the inclusion of specific research topics relevant to the Continental and Pannonian Bio-geographical Regions in the work programmes of Horizon 2020, the EU's research and innovation framework programme for the period 2014-2020.

In Horizon 2020, the focus of BioEast is on Societal Challenge 2 (SC2): Food security, sustainable agriculture, marine and maritime research and the bio-economy. SC2 has four components (a) Sustainable agriculture and forestry; (b) Sustainable and competitive agri-food sector for a safe and healthy diet; (c) Unlocking the potential of aquatic living resources; and (d) Sustainable and competitive bio-based industries. Work Programmes were published for 2014--2015 and 2016-2017, and a third programme is planned for the period 2018--2020. The low research, development and innovation performance of the CEE macro-region and the inadequate topic representation in Horizon 2020 not only blocks the realisation of the ERA but also the development of synergies with the European Agricultural Fund for Rural Development (EAFRD), the European Maritime and Fisheries Fund (EMFF) and the European Structural and Investment Funds (ESIF).

This paper, firstly, introduces the objectives and focus areas of BioEast; secondly recounts the CEE countries' actions so far; thirdly describes the institutional set-up of BioEast; fourthly summarises the conclusions from the BioEast workshop held in Budapest on 21-22 February 2017; and fifthly shows how BioEast can help to focus the EU's agricultural research agenda, especially Horizon 2020, the research and innovation framework programme for the period 2014-2020. The identification and implementation of specific research areas would not compromise the principle of excellence in research, on the contrary it would enhance it. Similarly, it would not mean the exclusion of other countries or macro-regions from the research: the experiences of other Regions (e.g. Mediterranean drought and Atlantic storms) would be essential for reaching relevant results. The paper concludes by suggesting some future actions for BioEast.

Objectives and focus areas of BioEast

BioEast pursues the seven objectives listed below. The achievement of these objectives would bridge the above-mentioned research and innovation gap in the CEE macro-region and could serve as the thematic framework of a Coordination Support Action (CSA) under Horizon 2020 for the macro-region:

- Initiate cooperation and the development of knowledge-based policies: establish a multi-stakeholder network and cluster at European level to facilitate joint actions, backed up by a renewed commitment to closer cooperation at both the political and operational levels through close personal contacts and communication between the countries concerned at the operational level;
- Identify common challenges and validate common research topics: map specific challenges for a Strategic Research Agenda and foster innovative multidisciplinary research and cooperation activities. These should address the relevant common CEE challenges by means of common work carried out by experts as a follow up to the Visegrad4+3 Common Declaration (discussed below);

- Initiate strategies: create a cross-sectorial approach for the development of a national circular and bioeconomy strategy;
- Provide an evidence base: establish data-driven support for implementation of policies through the creation of an interoperable, fully integrated observing and forecasting system. This would promote continuous, long-term observation based on open data structures to guarantee easy access;
- Improve skills: train a new generation of dedicated multi-stakeholder actors;
- Initiate development synergies: promote regional, national, EU and international funding opportunities to develop innovative technologies, methodologies and approaches. The purpose would be to boost the sustainable and circular economic growth of the European bioeconomy sectors and the conservation and upgrading of the regional environment, resources and cultural heritage;
- Increase visibility: draw attention to specific challenges and research potential of the macro-region, through involving society and promoting public awareness.

Figure 1. Observed and projected climate change and impacts for the main biogeographical regions in Europe

Source: EEA (2017).

BioEast has already developed and validated two common focus areas for the CEE macro-region (BioEast, 2017). These two focus areas can incorporate all the present and future research topics of the macro-region and could serve as the thematic framework of an ERA-NET Cofund call under Horizon 2020 for the macro-region:

- Response to challenges arising from the climatic and climate change specificities of the Continental and Pannonian Bio-geographical Region (Figure 1). A game changer would be to have region-specific research topics and CSAs in Horizon 2020 which reflect the current climate specificities, and address the distinctive and extreme changes in the weather can be expected in the macro-region in the near future, as is already the case in Horizon 2020 for the Mediterranean Bio-geographical Region. Key topics include crop production, animal husbandry, forestry, aquaculture and food processing, and topics such as cooling and heating, pest and disease control, risk management, and knowledge sharing;
- Response to the policy and governance challenges arising from the socio-economic characteristics of the CEE macro-region. The countries of the CEE macro-region have several social and governance challenges in common which influence directly the development of agriculture, bioeconomy and rural areas. A game changer would be to conduct research on how to involve CEE society in solving the big societal challenges, and to overcome such common economic and social challenges for agriculture, bioeconomy and rural areas as the low uptake of innovation and modern technologies, the low level of cooperation, the implications of population ageing, the difference between the employment rate in predominantly rural regions and predominantly urban regions, or the extremely low level of consumer awareness.

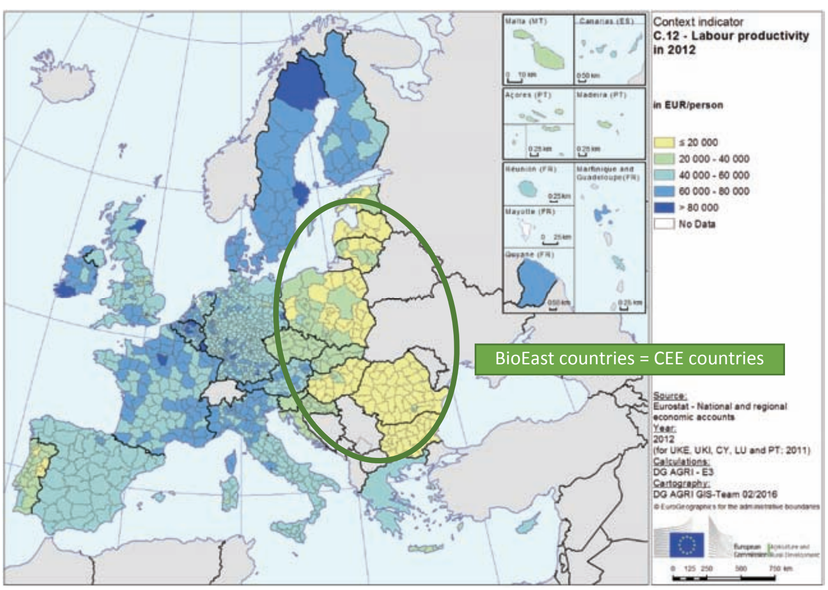

Figure 2. Labour productivity in the EU at NUTS 3 regional level in 2012

Source: EC (2016).

CEE countries' actions so far

The countries concerned are committed to working together and to contributing to the further development of the ERA by organising joint programming exercises. A long-term process was initiated in 2015. The macro-regional research and innovation needs of the CEE countries have thus been communicated at the political and expert levels several times. Support from all the EU Member States and the European Commission (EC) is now crucial to maintaining the commitment of the supporting countries and organisations. Among the numerous CEE actions are the following milestones:

- The *EU Bioeconomy Strategy – How to develop the Hungarian Research and Innovation Agenda* conference held during the National Agriculture and Food Exhibition (OMÉK in Hungarian) in Budapest. This was jointly organised by the Hungarian Ministry of Agriculture and the Research Institute of Agricultural Economics (AKI) and took place on 25 September 2015;
- AGRIFISH COUNCIL – policy discussion concerning (a) the Fourth Standing Committee of Agricultural Research (SCAR) Foresight and (b) EU strategy in the field of agricultural research and innovation, presenting the position for more effective use of the research potential of the EU-13 in the field of agriculture within Horizon 2020. Events were held on 15 December 2015 (a) and 15 February 2016 (b);
- Presentation and repetition position during SCAR works since the end of 2015;
- Active participation in the consultation process on the long-term EU strategy in the field of research and innovation in agriculture – consultation conducted by the EC from December 2015 to January 2016;
- Priority of the Polish Presidency of the Visegrad Group (2016-2017): more effective use of the research potential of the Visegrad Group countries in the field of agriculture within Horizon 2020;
- *Policy Guidelines for Agricultural Research* workshops (I, II, III) organised by jointly by the Hungarian Ministry of Agriculture, AKI and the Hungarian Chamber of Agriculture (NAK) on 10 November 2015, 14 January 2016, 27 and 31 May 2016, and 3 June 2016 in Budapest, Pápa, Kecskemét and Debrecen, Hungary (with Hungarian participants – researchers, farmers, advisors and other stakeholders);
- A meeting between Robert-Jan Smits (Director-General of DG Research and Innovation at the EC) and the Hungarian Ambassador on 15 February 2016 and a meeting between Jerzy Bogdan Plewa (Director General of DG Agriculture and Rural Development at the EC) and the Hungarian Ambassador on 16 February 2016;
- Workshop on the bioeconomy in Bratislava on 18 April 2016; participants came from the Czech Republic, Hungary, Poland, Slovakia and the EC;
- BioEast-CEE cooperation between research institutes organised by AKI on 8 June 2016 in Budapest; participants came from the Czech Republic, Hungary, Poland and Slovakia and Romania;

- Budapest Innovation Week (comprising the annual conference of the European Rural Development Network, a meeting of the SCAR Strategic Working Group on Agricultural Knowledge and Innovation Systems (AKIS), and a workshop in the frame of the DANUBIONET project), organised in Budapest by the Hungarian Ministry of Agriculture, AKI and NAK from 3 to 7 October 2016;
- Lodz Declaration of Bioregions, signed on 6 October 2016 on the occasion of the European Bioeconomy Congress;
- Bratislava Bioeconomy Conference organised by the Slovak Presidency of the EU together with EC under the auspices of SCAR, held on 17 October 2016;
- Common efforts under the Polish Presidency of the Visegrad Group – Meeting of the Ministers of Agriculture of the V4+3, adoption of the *Visegrad4+3 Common Declaration* for the stronger inclusion of the research potential of the EU-13 Member States in the implementation of projects within Horizon 2020 in the field of agriculture and the bioeconomy, with common proposals for topics as part of the Declaration;
- AGRIFISH Council held on 15 November 2016 – official presentation of the *Visegrad4+3 Common Declaration* broadly supported by the EU Member States and the EC prior to the Council meeting, a letter addressing EU Commissioners Carlos Moedas (Research, Science and Innovation) & Phil Hogan (Agriculture and Rural Development);
- Competitiveness Council (COMPET) 'Any Other Business' point on 29 November 2016;
- The BioEast initiative was presented to and welcomed by the Visegrad Group Agricultural Chambers on 1-2 December 2016 in Balatonfüred, Hungary;
- SCAR Plenary meeting including 'Bioeconomy developments' in Brussels on 6 December 2016, where the *Visegrad4+3 Common Declaration* and the BioEast initiative were presented;
- Horizon 2020 SC2 Programme Committee meeting - Presentation of the *Visegrad4+3 Common Declaration* on 18 January 2017;
- The BioEast initiative was presented and discussed at a COPA-COGECA Working Party on Research in Brussels on 15 February 2017;
- BioEast workshop in Budapest on 21-22 February 2017, discussed in detail below.

Institutional set-up of BioEast

After two years of enthusiastic actions it was evident that, to be able to operate effectively via a truly multi-stakeholder approach and at the macro-regional level, a more formal cooperation mechanism (contributing to the first objective) was needed. Despite the common aims of the CEE countries, the actions carried out so far have been fragmented and uncoordinated, and thus less efficient than they might have been. During the last two years, several actions were launched and different organisations have been working in parallel.

The Common Declaration of the Ministers of Agriculture of the four Visegrad Group countries (the Czech Republic, Hungary, Poland and Slovakia), and Bulgaria, Romania and Slovenia (the so-called *Visegrad4+3 Common Declaration*), was signed in Warsaw on 26 October 2016 and created a political base to act uniformly and represent the various interests imperiously both within and outside the borders. It was stated in the Declaration that, in order to achieve progress in a sustainable increase in the biomass potential of agriculture, aquaculture and forestry, the emphasis must shift to research, innovation and transnational cooperation for knowledge-based development. The *Visegrad4+3 Common Declaration* was presented at the EU AGRIFISH and Competitiveness Council meetings in November and December 2016. It underlined the need to find effective solutions to ensure a stronger recognition of the research needs and potential of the CEE countries in the co-creating and functioning of the ERA in the field of biomass production and processing.

The BioEast initiative aims to align the research and innovation efforts of the countries that are parties to the Declaration, while being open to other EU Member States. The Visegrad4+3 Common Declaration contains the goals and the BioEast Initiative can be the necessary tool capable of formalising the operation and facilitating the achievement of those goals. During the policy meeting held on 21 February 2017 the participants agreed on the elaboration of this tool.

The countries of the CEE macro-region are expected to communicate with the EC at both the expert and political levels. The former includes representatives of ministries, research institutes, academies of sciences, universities, and chamber organisations involving the industry. The political-level discussions will happen in the Visegrad Group working groups in the constellation of the different ministries, the communication will involve the H2020 SC2 Programme Committee and SCAR. Both levels will be governed by the Secretary, Mr. Barna Kovács (who used to work for the European Commission) who will give a face to the Initiative and furthermore will communicate with the Visegrad Group Presidency. The latter rotates yearly among the four countries. The Polish Presidency runs from July 2016 to July 2017, and will be followed by the Hungarian Presidency.

Conclusions from the BioEast workshop held in February 2017

Since the *Visegrad4+3 Common Declaration* was signed, several expert meetings and other events have been held that have confirmed that the proposed topics listed in the annex of the Declaration are of extremely high importance for the CEE macro-region. Foremost among these is the workshop held in Budapest on 21-22 February 2017 that was organised by the Hungarian Ministry of Agriculture in cooperation with AKI and NAK. It gathered together approximately 100 participants from ministries, research institutes, academies of sciences, universities, chamber organisations and PC and SCAR members with relevant expertise at an operational level. The aim of this workshop was to deepen cooperation in the field of agricultural research in the bioeconomy. During the workshop some common research topics were further developed by research experts representing the CEE countries. After developing a more stable operational structure, it is also crucially important to harmonise and prioritise the most important common research topics of the CEE countries (contributing to the second objective of BioEast).

At the workshop it was highlighted that the CEE countries are being required by the EC to demonstrate profoundly their specific challenges and own resources while sharing their proposed research topics. That is why the experiences gained during the workshop justify a revision of the annex attached to the *Visegrad4+3 Common Declaration*. The BioEast proposal does not intend to rewrite or constrict the common situational analysis that is currently at our disposal. It is only expected to focus and group the topics from the point of view of the CEE specificities. In this way the macro-region's research needs will be better represented and built in the adequate policy tools and funding programmes. Two changes are therefore proposed.

Firstly, the two focus areas of BioEast have so far proved to be relevant throughout the work of the initiative, thus we believe that these two focus areas should form the organising principle of the Visegrad4+3 Common Declaration annex.

Secondly, certain topics proved to be more clearly defined and more relevant for the CEE participants than others, and these are missing from the first draft version (dated March 2017) of the Horizon 2020 SC2 work programme for the period 2018-2020. It is proposed that these two topics (which are described in detail in the next section of this paper) should be included and ranked as top priorities in the first table of the *Visegrad4+3 Common Declaration* annex that contains the topics that are of particular importance for the CEE region. Both topics have the support of networks that are already operational in CEE (Eurotransfop and NACEE).

- Strengthen the CEE countries as a buffer zone for emerging and changing pathogens caused by globalisation and climate change in the Continental and Pannonian Bio-geographical Regions;
- Sustainable, efficient and competitive freshwater fish production in the changing climate of the Continental and Pannonian Bio-geographical Regions.

BioEast's recommendations for Horizon 2020 SC2 WP 2018-2020

BioEast welcomes the draft of the Horizon 2020 SC2 work programme 2018--2020 (EC, 2017). It offers a wide range of relevant and useful topics, ranging from climate to supply chain related issues. This work programme could truly help CEE countries to find knowledge-based solutions to the challenges they face. Reference to bio-geographical region in topic SFS-21 is especially welcome, and acknowledged as a huge step forward. BioEast also views positively the inclusion of the new digital focus in the work programme as it can be a crucial element in reducing the development and innovation divide between the different macro-regions of Europe. However digital topics are only useful for CEE countries if they are also strongly focused on human capital and on the differences in the AKIS between the different macro-regions, shortly if the uptake of technology is provided for among different social and governance circumstances. Furthermore, BioEast welcomes the geographical focus of some topics prioritising China, Africa, Mediterranean and the countries of the Atlantic region. Such focusing of topics will help to implement the different actions and flagship initiatives and would have mutual benefits for societies in both Europe and other regions.

Nonetheless, BioEast can contribute significantly to making the work programme more specific, especially from the perspective of the CEE macro-region. The most urgent priority is to make it compulsory in some specific bioeconomy-related topics for the future consortia (chosen based on excellence, of course) to fully take into account the Continental, Pannonian and Boreal biogeographical region focus. The aim is not to impose an exclusive approach but rather to introduce a compulsory aspect to the specific topic without introducing any particular criteria for the provenience of the excellence. The scope is to solve some specific regional needs based on worldwide excellence without placing burdens on research.

Coupled with this, supporting the cohesion of EU Member States via cross-sectorial policy implementation based on research and innovation should be a horizontal activity of the work programme (Box 1).

Box 1. Proposed new horizontal activity for the Horizon 2020 SC2 work programme for the period 2018-2020

Title: Supporting the cohesion of EU Member States via cross-sectorial policy implementation based on research and innovation.

Specific challenge: The EC promotes policies such as on food or bioeconomy or circular economy which could help to solve the big societal challenges, but these require cross-sectorial approaches. The most developed EU Member States are able to face the challenge involving research and innovation excellence as an overarching principle and the governments developed cross-sectorial national strategies. By contrast, in the most affected cohesion countries, EU funds are spent on sector-specific projects without considering interlinkages. 'Economic, social and territorial cohesion' is achieved less and less, and the sustainability principle considering the environmental and societal approaches is missed. There is a need for research and innovation, and knowledge-based policy development.

The solutions for the 'sustainability' challenge of the national economies are only possible to achieve at the macro-regional level. The sustainability of the renewable resources including water is very much a macro-regional challenge, indeed a global challenge. The support actions should target the macro-regions. In the EU, most of the territory of the cohesion countries is located in the Continental and Pannonian Biogeographical Regions.

Scope: The scope of this action should help to recognise the need for national-level strategic thinking. A multi-sector specific approach such as a national bioeconomy strategy could help to build up sustainable national economies embedding the primary production sectors together with processing sectors including the food-feed, materials-chemicals and energy sectors. Framing the objectives of a sustainable bioeconomy would help to govern the European Structural and Investment Funds and also to involve other investments.

Source: own composition

BioEast also proposes the inclusion in the work programme of five Region-specific topics:

- Support to the BioEast Initiative: Coordination of bioeconomy related research and innovation activities (Box 2);
- Response to challenges arising from the climate change and socio-economic characteristics of the Continental, Pannonian and Boreal macro-region (Box 3);
- Strengthen CEE countries as a buffer zone for emerging and changing pathogens caused by globalisation and climate change (Box 4);
- Sustainable, efficient and competitive freshwater fish production in the changing climate (Box 5);
- Integrated biomass production for the multi-directional use taking into account management of land with the fragmented agrarian structure and marginal areas (Box 6).

Box 2. Proposed Horizon 2020 Research and Innovation Action on the topic of coordination of bioeconomy-related research and innovation activities

Title: Support to the BioEast Initiative: Coordination of bioeconomy related research and innovation activities in the Continental and Pannonian Biogeographical Regions.

Specific challenge: Addressing relevant challenges of the Continental, Pannonian and Boreal biogeographical region's countries towards its economic, environmental and societal sustainability, calls for a stronger knowledge basis that requires the coordination of bioeconomy research and innovation activities leveraging on past and ongoing regional, national and EU initiatives.

Scope: Proposals should deliver a long-term strategic R&D plan towards a sustainable prosperous Central and Eastern European area integrating policy, industry (including aquaculture), research and education, society, taking into consideration experiences from the developed EU countries and existing initiatives. Actions should support the BioEast Initiative which aims at coordinating the research and innovation activities to support a new sustainable approach to manage and exploit the potential of the Continental, Pannonian and Boreal biogeographical region in agriculture, forestry, aquaculture, for sustainable food processing, material and chemical use and energy industries. The ultimate aim to build sustainable national level food, bioeconomy and circular economy policies.

Expected impact: The implementation of the support action will help to have impact at macro-regional, national and micro-regional levels: (1) setting-up national and international cooperation and policy development; (2) supporting national bioeconomy strategies building; (3) SRIA development; (4) data and monitoring provision; (5) skills improvement; (6) initiating synergies development; (7) cross–sectoral cooperation fostering, engaging industrial stakeholders for development of the existing and new value chains; (8) increasing visibility and social awareness.

Source: own composition

Box 3. Proposed Horizon 2020 ERA-NET Cofund on the topic of responses to climate change and socio-economic challenges

Topic: Response to challenges arising from the climate change and socio-economic characteristics of the Continental, Pannonian and Boreal macro-region.

Specific challenge: Agriculture, forestry, aquaculture and the agri-food sector are integral parts of the European economy and society. They are subject to multiple pressures from external drivers, which include rising food, feed, fuel and fibre demand, globalisation, environmental changes and public health aspects, and are constrained by planetary boundaries such as land and water limits. In the context of the sustainable biomass production the Continental, Pannonian and Boreal biogeographical region has a specific role in Europe and in the future of the sustainable European processing sector developments. With the expected increase in global population, demand for animal food products and competition for natural resources, agriculture, forestry and aquaculture will need to become more efficient, and sustainable. The sustainability criteria will be the game changer in bringing back the biomass production of the biomass in Europe for European society, as close as possible to the processing and consumption but being sustainable. The sustainable bioeconomy as part of a European circular economy would require macro-regional approach, specific macro-regional climate, ecosystem and societal pillars. The Continental, Pannonian and Boreal biogeographical region by its biomass production potential will play a key role in developing the European circular economy and common food policy.

Scope: Supporting the development of the Common European Food Policy, Central and Eastern European national level bioeconomy and circular economy strategies and policies, to enhance knowledge transfer from the best European knowledge hubs, to build up and enforce a cross European research network based on the priorities.

Expected impact: It is foreseen one call in 2020 to cover three topics from the perspective of the Continental and Boreal macro-region: (1) sustainable food production in the context of the European Food and Nutrition policy, considering the food system approach; (2) sustainable biomass production for material and chemical uses in the context of the Bioeconomy policy, considering the cascading use of the bioresources; and (3) societal acceptance in the context of circular economy policy, considering the innovative solutions and their acceptance by the society, developing models and methodologies on how to involve the Central and Eastern European society into policy making and acceptance.

Source: own composition

Box 4. Proposed Horizon 2020 Research and Innovation Action on the topic of a buffer zone against pathogens

Topic: Strengthen CEE countries as a buffer zone for emerging and changing pathogens caused by globalisation and climate change in the Continental and Pannonian Bio-geographical Region.

Specific challenge: The gap is the thorough understanding of the synergetic effects of climate change, European integration and globalisation. Trade liberalisation offers easier trade of living and processed animal and plant products (and their packaging material). The economically advantageous trade liberalisation increases our vulnerability from the animal health and phytosanitary point of view (e.g. African swine fever, bovine besnoitiosis). Moreover, the impact of climate change increases the possibility of modified disease behaviour making spreading easier and causing a European level problem (e.g. grape and apricot phytoplasma).

Scope: The game changer would be to understand the synergetic effects of these two trends (increased trade and climate change) on animal and plant health with the help of forming a "buffer zone scientific network" to support monitoring and stopping these transboundary pathogens in the CEE countries and where possible save the rest of Europe from the economic losses. Preference will be given to consortia focusing on Continental, Pannonian and Boreal biogeographical regions of Europe as defined by the European Environment Agency

Expected impact: Owing to the advances in molecular diagnostics in microbiology, specific and sensitive technics are becoming available for the detection and rapid identification of significant pathogens. Improved methods of sample collection from wild animals and invertebrate vectors, with the combination of remote sensing techniques, epidemiological modelling and risk assessment; as well as reasonable and state of the art combination of target pathogens, could lead to the the development of an internationally standardised, comprehensive, cost-effective and real-time monitoring system for the early detection of significant, emerging animal pathogens. The well-planned and harmonised application of the monitoring system could reduce significantly the risk of the insidious spread of these pathogens in the EU. Preventing the introduction or immediately blocking the spread of such diseases is a key element of cost-effective animal and food production.

Source: own composition

Box 5. Proposed Horizon 2020 Research and Innovation Action on the topic of freshwater fish production

Title: Sustainable, efficient and competitive freshwater fish production in the changing climate of the Continental and Pannonian Bio-geographical Regions.

Specific challenge: The challenge is related to the fact that, while freshwater aquaculture is known to provide 21 per cent of the total EU aquaculture production, it is still a largely unexplored (and, on an EU-wide policy level, somewhat neglected) area, which is also affected by the changing climate. The freshwater fish farming sector and, in particular, pond farming, whose European core area lies mainly within the Continental and Pannonian Bio-geographical Regions, is facing the challenge of maintaining sustainable and efficient production using limited resources, one that will become even more pressing in the future because of increasing water scarcity and the growing incidence of climatic and hydrological extremes. The largely unacknowledged and uncompensated provision of multiple ecosystem services, which also includes feeding of certain protected wild animals (e.g. the great cormorant, *Phalacrocorax carbo* L., or otter, *Lutra lutra* L.) represents an increasing challenge for fish farmers struggling to maintain their competitive position. Research on how to unlock the potential of freshwater aquaculture to promote the rural economy and to provide ecosystems services would be a game changer. Thus, it is important to gain knowledge on how to improve the economic viability of freshwater aquaculture practices with increasing environmental sustainability.

Scope: The objectives of the project should include, firstly, building detailed, standardised databases by collecting missing and additional supplementary data and, secondly, analysing production performance by evaluating potential fish production and efficiency under various pond conditions, taking into account the expected effects of different climate scenarios and sustainability. Preference will be given to consortia focusing on the Continental and Pannonian biogeographical regions of Europe as defined by the European Environment Agency.

Expected impact: The results of the comprehensive analysis will support farmers and farmers' associations in making decisions on implementing improved management practices to facilitate adaptation to climate change and market conditions in a sustainable manner and to improve resource use efficiency. This will contribute to sustainable intensification, i.e. a form of production where yields are increased without affecting the environment (an example being the use of combined intensive-extensive fish production systems and integrated multitrophic aquaculture or recirculating aquaculture systems). The results are also expected to contribute to a more rational development and expansion of multi-functional fish production systems (i.e. those diversifying their income through angling, tourism and ecosystem services). Creation of genome banks will permit the maintenance of the genetic diversity of crucial fish populations by storing individuals (and their sperm) with desired genotypes. Such material can be used for the 'revitalisation' of endangered populations, ensuring optimum proportions of particular genotypes.

Source: own composition

Box 6. Proposed Horizon 2020 Research and Innovation Action on the topic of integrated biomass production

Title: Research in this area is very important as the global demand for biomass used for food and non-food purposes is constantly growing. On the other hand, the area of land available for production is decreasing, especially in the developed and developing countries. Therefore, it is necessary to break structural barriers that reduce the effectiveness of biomass production. An important issue on a European scale is to restore marginal land to production and to improve the effectiveness of its management and help to develop the value chain approach of production and usage of biomass within the regions. The proposal should help to create innovative approaches and help to create new products and services in the regions. A multi-actor approach should be implemented in order to achieve these goals.

Specific challenge: Undertaking the research in this area is very important as the global demand for biomass used for food and non-food purposes is constantly growing. On the other hand, the area of land available for production is decreasing, especially in the developed and developing countries. Therefore, it is necessary to break structural barriers that reduce the effectiveness of biomass production. An important issue on a European scale is to restore marginal land to production and to improve the effectiveness of its management.

Scope: Proposals should specify the conditions for producing and using biomass in a closed cycle as well as the conditions for developing the non-food uses of agricultural products. It should allow the development of a selection of relevant species and agricultural technology for biomass production in certain regions of Europe, depending on the local soil and climate conditions. It should also indicate the directions of the biomass production, depending on the local market conditions and the agrarian structure.

Expected impact: The impacts of the work will include: (a) diversification of the agricultural production; (b) increase in the effectiveness of production; (c) improvement in and stabilisation of farmers' income, and (d) a reduction in negative pressures on the environment.

Source: own composition

Discussion

In summary, the aim of BioEast is to address agricultural, bioeconomy and rural policy and governance challenges in the less-developed EU regions that form part of the Continental and Pannonian bio-geographical regions of Europe. It recognises two key challenges, the likely negative impacts of climate change in a very sensitive part of Europe, and the common economic and social challenges for agriculture, bioeconomy and rural areas of the region. Addressing these challenges would benefit the EU as a whole but this activity is in turn compromised, partly because of the lack of region-focused topics in Horizon 2020, and also by the low research, development and innovation performance of the CEE macro-region.

BioEast has arisen from the recognition that the most directly affected EU Member States must take the lead in formulating and promoting a strategic research agenda for solving these problems. Coupled with this, there is a need for national-level strategic thinking, and specific cross-sectorial policy development, which requires research and innovation, and knowledge-based policy development. Most of the CEE EU Member States and regions are still building their national policies on primary sectors such as agriculture, forestry, fisheries and aquaculture, without thinking in broader terms such as sustainable food systems, or circular economies including the waste streams, or the job opportunities in the materials and chemical sectors for the advanced use of the available biomass. Most of the job opportunities in rural and remote areas are linked with the primary sectors, and one objective must be to stop the decline. The bioeconomy offers a sustainable use of biomass by creating new value chains and added value to the products. The CEE countries have the potential to produce biomass in a cost-effective way; however, the missing government-level strategic thinking hinders the development of sustainable circular bioeconomies.

The progress achieved by BioEast until now, including the staging of various events, the mobilisation of a wide range of actors across the CEE region and, maybe most importantly, advancing clear proposals on topics to be included in the forthcoming H2020 work programme, has been impressive. However, there is much more to be done. Therefore, apart from the formalising the network and harmonising the list of priority research topics, the following common and immediate BioEast actions are proposed:

- Active involvement in the development of the Horizon 2020 SC2 2018--2020 work programme;
- More workshops to be organised, the first in Poland to cover the remaining CEE-relevant research topics;
- Building a website for the BioEast initiative;
- Starting the dissemination of a regular newsletter;
- Starting to discuss and lobby for the setting-up of a common Coordination and Support Action and a common ERA-NET instrument with the thematic content defined in this paper.

References

BioEast, 2017. *BioEast Initiative* [www document]. Available at http://eip.fm.gov.hu/index.php?page=pages&page_name=bioeast-Initiative (accessed 30 April 2017).

EC, 2016. *CAP context indicators 2014-2020. 12. labour productivity 2016 update*. Brussel: European Commission.

EC, 2017. *Horizon 2020 draft work programme, 2018-2020: 9. Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy*. Brussel: European Commission.

EEA, 2002. *Europe's biodiversity – biogeographical regions and seas. EEA Report No 1/2002*. København: European Environment Agency.

EEA, 2017. *Key observed and projected climate change and impacts for the main regions in Europe* [www document]. Available at http://www.eea.europa.eu/data-and-maps/figures/key-past-and-projected-impacts-and-effects-on-sectors-for-the-main-biogeographic-regions-of-europe-5 (accessed 30 April 2017).

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Four ideal types for Leaderability: Cases from Local Action Groups

Abstract: *Among the European Union-funded programmes supporting development, the LEADER approach aims to promote the peculiarities of rural areas through an innovative participatory approach based on the following key words: participation, decentralisation, partnership and devolution of managerial functions to communities. The approach has been running for 20 years and plays a key role in the development of European rural areas; however, it is still a quite new system for East European countries. In this framework, is the LEADER approach the perfect tool to tackle European rural development issues? This paper explores and compares the implementation of the LEADER approach in Bulgaria, comparing it with Apulia region in Italy, through a web survey administrated to Local Action Groups (LAGs): respondents were 10 Bulgarian and 15 Italian LAGs. The surveyed LAGs deal with diverse challenges concerning the adoption of the LEADER approach, partnerships, available resources and, above all, decision power in the local area. The analysis investigates the so-called 'Leaderability' faced by the LAGs, focusing on the main role they cover in the local area: the aim is to examine whether the selected LAGs match with the LEADER features. The results show that most of the Bulgarian and Italians cases consider the LAG as a rural development agency by using strategies, resources and partnerships fitting with the model of Leaderability. The implications shed some light on the need to find a clearer identity according to the diverse LEADER ideal types they can shape, such as information diffusion centre or expertise and competence centre with different responsibilities.*

Keywords: *LEADER approach, rural development, participation, innovation*

Introduction

Council Regulation (EC) No 1698/2005[1] deals with European Union (EU) rural development policy and its goals: improving the competitiveness of the agricultural and forestry sector; improving the environment and the countryside; improving the quality of life in rural areas and encouraging diversification of the rural economy. Rural development is often translated into concepts such as food chain organisation, social inclusion, sharing innovative and best practices, fostering integrated and multi-sector actions. The latest reforms of the Common Agricultural Policy (CAP) have recognised the importance of innovation, cooperation and networking, but agricultural innovation systems need to be updated in order to reinforce the development of rural areas through local stakeholders.

Rural development research is increasingly focused on the importance of the network-based approach involving local stakeholders in supporting innovative ideas and strategies for development (Dargan and Shucksmith, 2008; Shortall, 2008; Teillmann, 2012). Innovation has been the core concept behind the latest agricultural policy programmes. The shift from a 'linear' to a 'learning process' view of innovation, implied a crucial change in rural development and also in agricultural extension services. Barke and Newton (1997, p. 320) stress a change in rural development that "implies a process of local mobilisation and requires an organisational structure which brings together varied community interests to pursue agreed objectives, a locally agreed strategic planning process, and an agreed allocation of resources with the specific purpose of developing local capacity in terms of skills and competences".

Then, among the EU-funded programmes supporting sustainable rural development, the LEADER approach (EC, 2006) has attempted to analyse and to promote the specificities and peculiarities of European rural areas with an innovative participatory approach based on 'community-based initiatives', 'participation', 'decentralisation', 'partnership and collaboration' (Ray, 2000; Shortall, 2008; Arabatzis et al., 2010). The importance of the LEADER method in the context of a local development strategy has been recognised across Europe and has been running for more than 20 years, achieving valuable results for the development of rural areas. Furthermore, it is necessary that some of the funds are used for projects based on the LEADER Community Initiatives. Every Member State was obliged to formulate a Rural Development Programme (RDP) for the 2007-2013 period, outlining goals that should be addressed, measures to be implemented and the amount of funding that will be spent on them (Kopeva et al., 2012).

Finally, the LEADER community initiative is based on the following principles of neo-endogenous and endogenous development: the bottom-up approach, participation in decision-making, public-private partnerships, inter-territorial

[1] Council Regulation (EC) No 1698/2005 of 20 September 2005 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD).

cooperation, networks and innovation, integrated rural development, by improving the use of local assets and resources and the promotion of economic diversification (Navarro et al., 2015). The LEADER approach operates through the Local Action Group (LAG), born from the dialogue among civil, private and public individuals and/or organisations that bring together local development strategies (Kovach, 2000; Perez, 2000). These partnerships, widespread across Europe, receive financial support to develop and implement a Local Development Strategy (LDS) based on the LEADER approach. The added value of the LAGs is a better identification with local needs and an increased capacity for innovation. LAGs surely contribute to the success or failure of the programmes' implementation by achieving synergies to improve the sustainable and economic competitiveness of rural areas by means of strengthening cooperation between local actors, who often have little experience in networking (Fiore et al., 2014; Spada et al., 2016). The LEADER approach has been transposed by Member States in different ways and according to different political strategies for establishing 'action areas' (Lošťák and Hudečková, 2010; Strahl and Dax, 2011; Chevalier et al., 2012).

The initiative started with LEADER I (1991-1993) and II (1994-1999) and during the 2000-2006 programming period evolved into LEADER+. In the early stage, the initiatives were conceived as a laboratory to encourage the emergence and testing of new approaches to integrated and sustainable development and to influence, complement and/or reinforce rural development policy in the local community (Lukesch, 2007). Since its launch in 1991 by the European Commission as a Community Initiative, the LEADER approach has provided rural communities in the EU with a method for involving local partners in shaping the future development of their area. The LEADER approach has attracted a high level of interest within the EU and far beyond, not only in rural areas but also in urban and coastal areas. The early generations of LEADER received funding from the EU structural funds as a separate rural community initiative. The programme reached a 'maturity' phase in 2004-2006 and, since 2007, has been implemented under the Rural Development Programmes and co-funded under the European Agricultural Fund for Rural Development (EAFRD). The success of the initiative in rural areas led other EU Funds to open up the possibility of applying this approach to other types of areas. In the 2007-2013 period, it was successfully transferred to the European Fisheries Fund and nearly 2.500 LAGs were established during this programme. From 2014 it also became available in the European Regional Development Fund (ERDF) and the European Social Fund (ESF). For this wider application the term 'Community-Led Local Development' (CLLD) is used for the current (2014-2020) programming period and represents an extension of the LEADER approach. Through the CLLD model, LAGs will be able to use a combination of different funds and different measures in order to implement their LDSs. This extension of LEADER activity has the potential to enable rural areas to develop the social capital and the common identity that underpin innovation, and pursue innovative solutions to local challenges through a far broader range of measures.

Accordingly, with the European initiative, LAGs are seen as 'network of practice' where local actors perform mutual learning and an integrated approach to address complex rural issues. Their key concepts rely on assembling people with various backgrounds, fostering a good communication and cooperative climate. The LAGs help to initiate innovative activities on the basis of a rural development strategy. They are a useful tool for the establishment of new relationships and partnerships between stakeholders, boosting the current rural areas (ENRD, 2013). The legal status could differ according to their partnership's composition, mainly composed of public (local institution, municipalities, others such as parks and public consortia) and private actors (farmers' associations, farmers, banks and so on). Primarily they answer to the innovation process' construction demand. Indeed, their value and contribution to the development of rural areas under different perspectives is widely recognised: establishing new models of governance (Pemberton and Goodwin, 2010; Fałkowski, 2013; Wellbrock et al., 2013), fostering diffusion of innovation and network (Esparcia, 2014) or measuring social capital (Shortall, 2008; Teilmann, 2012). Accordingly, the European Network for Rural Development (ENRD, 2013) highlights the need to overcome the disadvantages created by the lack of networks and cooperation in rural areas. The LAGs could potentially stimulate local market opportunities and add additional income to the local areas.

Methodology

The LEADER approach has the goal to encourage cooperation between representatives of three classes of local actors of the rural area: civil society, public administration and private sector (Fałkowski, 2013). The LEADER Community Initiative has come into being also with a pedagogic function, seeking to introduce relational innovations in difficult areas characterised by a low development approach (Casieri et al., 2010; Chmieliński, 2011). Finally, a LAG can increase social capital and trigger virtuous development mechanisms based on the promotion of endogenous territorial resources and the participation of local communities in drawing up sustainable and shared development strategies (Casieri et al., 2010).

The so-called 'Leaderability' is a concept linked to a variety of factors under the LEADER approach. This analysis tries to work out whether a LAG contributes to local rural development through evaluation questions relating to the adoption of the LEADER approach. In order to examine this complexity, we used qualitative analysis to explore the implementation of the LEADER approach in Bulgaria and the Apulia region in Italy.

A web questionnaire entitled 'The LAG's contribution for rural development: the Leaderability' was prepared and distributed to the 35 LAGs of Bulgaria and the 25 LAGs in the Apulia region as individuated on the EU LAGs website. A pre-validation survey was administrated to a sample of ten respondents (experts in rural development, EU politicians, those responsible for RDP planning, academic scholars etc.) in order to identify and to clarify issues related to the implementation of the research instrument and listing questions to be investigated. The questionnaire was composed of 20 questions and divided into the following eight sections:

- *Evaluation questions relating to the adoption of the LEADER approach*: during the elaboration of LDSs, the analysis of the Leaderability aims at understanding how the regulatory framework of the RDP gives power to LAGs in terms of strategies, organisational features, according to a 'genuine' LEADER approach. The identification of well-defined geographic territories is directly related to the percentage of success, in terms of operation and effectiveness of a LAG;
- *The territory*: the area covered by each LAG strategy must be uniform in terms of shared cultural identity, production specialisation and combination of physical characteristics in terms of natural endowment and infrastructures;
- *The partnership:* the area covered by each LAG strategy must be uniform in terms of shared cultural identity, production specialisation and combination of physical characteristics in terms of natural endowment and infrastructures;
- *The partnership in decision-making*: Pursuant to Article 62 of Regulation (EC) 1698/2005, the LAGs are groups representing partners from the various locally-based socioeconomic sectors in the territory concerned;
- *The regulatory framework*: The regulatory framework is constituted by several acts: the RDP, the approval on selection criteria for measures and 'not LEADER' tender notice, the announcements for the selection of LAGs, agreements on funding, agreements with funds delivery bodies, eventual guidelines etc.;
- *The available resources*: Relevant decisions concerning the LDS regard substantially the optimal allocation of public funds investments and then their conceivable leeway;
- *The LEADER fitness*: This term indicates different types of interventions associated with strategic components that are characteristics of the LEADER approach, as follows:
  - interaction between actors and projects of different sectors of the local economy;
  - implementation of innovative approaches;
  - implementation of cooperation projects;
  - networking of local partnerships.
- *Ideal type of Leaderability*: Starting from the National Rural Network report 'the Evaluation of the LEADER approach within the Rural Development Programmes 2007/2013: a methodology contribution' the following four models of Leaderability were identified and proposed: (1) The LAG as involvement and information diffusion centre (limited decision making power); 2) The LAG is moving towards the rural development agency identity (full decision power capability and autonomy); (3) Centre of ex-

pertise on management and administrative practices (limited autonomy with regard to pathways of developments identifications); (4) Centre of competence on thematic strategies (high strategic capability but no specific realisation responsibility).

The questions were structured open, closed and 5-point Likert scale questions. Every question aimed at responding to our research objective. Before each question, a little introduction was given in order to clarify the mean of the question. A trick control question was added for the reliability of the test responses (Oppenheimer et al., 2006). The tested assumption is the following: LAG respondents meet the criteria of having some responsibility in implementing the Leaderability at any extent. Only 10 Bulgarian (about 30 per cent) and 15 Italian LAGs (60 per cent) responded correctly. As the sample has not been stratified but depended on the full response, our data do not aim to be fully representative of EU LAGs.

Results

Territory, partnership and regulatory framework

In the first part of the questionnaire we focus on suitable territories. The respondents agree that the area covered by all LAGs strategy is uniform in terms of shared cultural identity, production specialisation and combination of physical characteristics in terms of natural endowment and infrastructures. In particular, the Bulgaria LAGs highlight that their area is covered 90 per cent by plains and the main production specialisation is agriculture (53 per cent production of maize, wheat, and sunflowers and 30 per cent production of oil plants): the gap is about the infrastructure that it is not so good, but in progress. The strength is cultural heritage with its churches and traditions, industrial tourism and energy innovations.

The unique geology, the hilly and the mountainous terrain of the Western Balkans is a prerequisite for the great diversity of flora and fauna of the area and by meeting the criteria of the Natura 2000 network. Within the LAG areas six protected areas were registered. Finally, the entire territory shares common natural-economic characteristics and social problems mainly because the economic crisis that developed new problems and perspectives. Indeed, the traditional territory of the agrarian sector over the years has undergone a severe crisis and a number of structural transformations, from which recovery is slow and difficult. Economic indicators are characterised by very low values to be maintained throughout the whole period since 2001. There is evidence that the sector is beginning to recover, albeit only step by step. The modernisation of the sector is gradually but very slowly profiting from the gradual absorption of EU funds for rural development and schemes for direct payments to farmers.

Uncertainty arises from one Italian LAG, regarding the potential and uniformity of the local territories: “In our area there is a certain homogeneity in terms of production specialisation, mostly in agriculture. In other sectors, including the third one, there is a strong discrepancy between the various municipalities of the LAG”.

The partnership composition in the Bulgarian cases is in line with the whole sample. Panagyurishte, Strelcha and Lesichovo LAGs stated that the components of the partnership are villages, NGOs, public and private partners and SMEs that are very important for the territory and the LDS is built in implementation of the public and private interest. Therefore, the remainder of the LAGs strongly approved that the partnership is composed of public and private actors, in order to collect a balanced and representative series of the different socioeconomic players of the territory. From the Italian LAGs a strong accent on the importance of national entities appear because it plays a decisive role in the social structure of many groups: “Although ‘formal’ partnership of the LAG contains several actors representing various local economic sectors, in practice the public component has greater voting and decision power. This condition does not allow the full expression of the private party”.

Some differences between Italian and Bulgarian LAGs were revealed by the survey. In Bulgaria, the partnership consists of much more rural women’s associations and cultural associations than in Italy. It would be in line with the stated need of achieving the involvement of the different genders in agriculture, and so it is based on the same reason why the EU has been providing more financing support to female agricultural entrepreneurship than male for several years. On the other hand, Italian LAGs display a more prominent presence of farmer organisations than do the Bulgarian ones.

At the decision-making level, concerning the design and the implementation of LDSs, all respondents assert that the bottom-up approach has been concretely implemented. According to the sample, Bulgarian LAGs work together with economic actors, local entities and cultural associations more than with farmers, rural women association and environmental groups.

The capability of the partnership, within the administrative activity as well as in the financial and the strategies decision making, is suitable for all the LAGs activities and takes into account quality and quantity of human resources and management procedures. Tinutul Barsei LAG adds: “Sometimes, a ‘resources organisation’ with strong expertise could be a critical success factor,” but often in the LAGs “there are poorly qualified people in the regions and it is very difficult to organise the community”. Anyway, many local operators have received EU funding, which increases the possibility to consider different innovative projects in partnership.

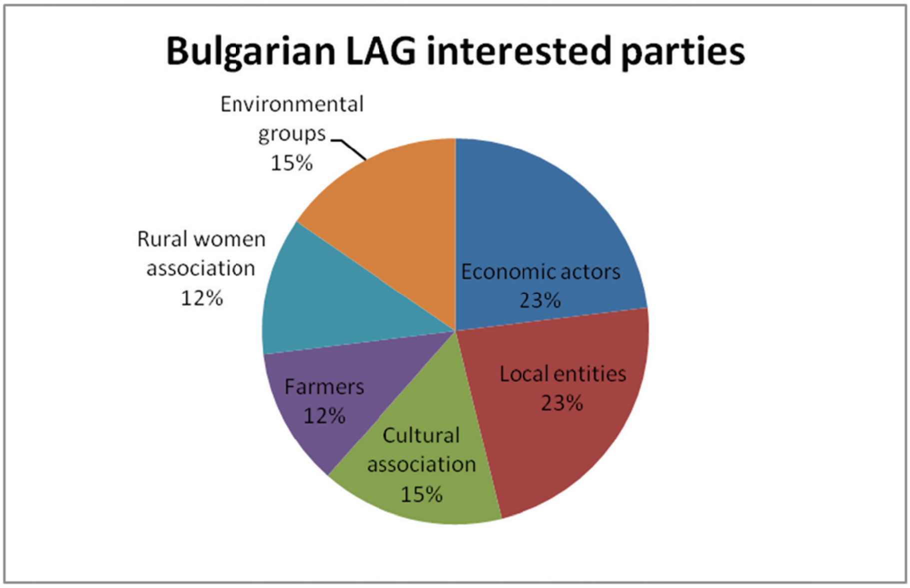

Figure 1. Bulgarian LAG partnership composition

Source: own data.

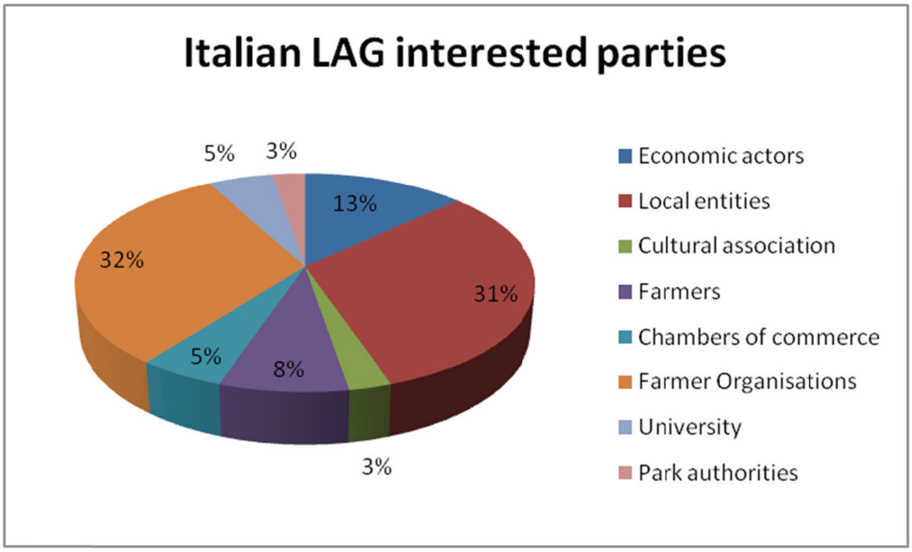

Figure 2. Italian LAG partnership composition

Source: own data.

Bulgarian respondents agree that the LAG is able to elaborate specific LDSs according to their resources and time availability, being also able to establish selection criteria on best investments which are coherent with planned strategies. More doubts are expressed from the Italian LAGs referring to the human resources' contract and on the selection criteria: "We are trying to increase the staff, but there is uncertainty surrounding the next programming phase" and "The autonomy of the LAGs in the definition of calls for proposals and project selection criteria should be recognised".

The LEADER fitness and four ideal types

The second part of the questionnaire focuses on different types of interventions associated with strategic components that are characteristics of the LEADER approach, as follows:

- The interaction between actors and projects of different sectors of the local economy;
- Implementation of innovative approaches;
- Implementation of cooperation projects;
- Networking of local partnerships.

The results show that the LAGs promote and carry out a synergic interaction between operators and stakeholders, policies and territorial resources, for the majority of the respondents, involving them through meeting and creating trust. "Meetings with the private and public sectors are held constantly. The economic sector is growing and the LEADER approach is a great opportunity for them".

Innovation is also a key word in the planning activities and on the implementation of new projects. Most of the interviewed LAGs show relevant interest in new methods of divulgation and formation: "We want to improve the quality of life of our population and try to understand their needs. In order to do that we do door-to-door meetings to promote our LAG's actions". "We aim at organising and promoting workshops and seminars among companies active in the same sector (speed business dates)". "We intend to analyse the 'Albergo Diffuso' model and to implement it in our territory".

The cooperation topic, conversely, presents different answers. Fifty per cent of the Italian respondents answer 'yes' to the question related to the occurrence of networks with local partnerships. Most of them refer to collaboration among different LAGs, universities and national partnerships. In the Bulgarian cases, it seems that networking and cooperation are strongly present in the territory, specially between LAGs (nine Bulgarian cases out of ten, said that they have at least one project going on with other LAGs).

The final section of the questionnaire depicts four ideal types of Leaderability from the National Rural Network report referred to above. We found that six Bulgarian and eleven Italians cases consider the LAG as a rural development agency, mentioning that their current strategies, plans, resources and partnerships could fit with this model of Leaderability. It is the case that mostly reflects the functioning of the LAGs. Conversely, three Bulgarian and two Italian LAGs see their activities closer to the diffusion centre model. The centre of expertise on management model, on the other hand, has been chosen as the relevant model only by two Italian cases, meanwhile there is just one Bulgarian LAG who states that it is acting as a centre of competence on thematic strategies (bio-energy and alternative energy).

Discussion

The paper aimed at investigating the 'soul' of the LAGs comparing to the Leaderability: certainly, the LEADER approach has been implemented by local actors following the main European principles. The latter are clearly identified as pillars underpinning local growth (Lukesch, 2007) and are based on the ideas of cooperation, forecasting spread of innovations and setting up networks. Over time, the LEADER approach has been implemented through three different plans: LEADER I, LEADER II and LEADER+. The success of those initiatives led to a more complex and ambitious plan, the so-called Community-Led Local Development. These events have produced many efforts by local actors to address EU policies toward the above-mentioned purposes, emphasising cooperation and uniform results from all EU Member States (EC, 2014). Clearly, LAGs' activities aim at achieving the final goal of sustainable growth (EC, 2014). In this study, our questionnaires highlighted there is a certain homogeneity in the primary sector in terms of production. Different evidence comes from the secondary and third sectors: it means that LAGs' efforts have been focused on rural and agricultural issues, not taking sufficiently into account the industrial and services sectors. This is a crucial point due to it revealing a weak integration and collaboration among those different players, and so it is in contrast with the key features of the LEADER approach.

Instead, according to the composition of involved partners, the comparison between Italian and Bulgarian LAGs depicts an alignment of local actors' morphology to EU integration policies. In fact, the latter aim at fulfilling larger social and economic homogeneity that would cover larger area than that within national border one (Doitchinova, 2012). In this regard, the emerged data are much more relevant because of countries showing more relevant diversity from EU standards (by international agreements); that is precisely the eastern EU Member States. A prominent presence of local entities, mostly identified as public entities, emerges both in Italian and Bulgarian LAGs. Notwithstanding the mentioned homogeneity on partnership composition, it results in a stronger influence that public entities have in practice at the decision-making phase than from the other participants (Navarro, 2015).

A little difference has arisen between two selected samples, but the CLLD plan should lead players towards a major convergence because of changes from 'linear' to 'learning processes' on which it is based. Meanwhile, farmer organisations, which are well-known as many farmers in agreement to share and cope challenges, organised in a single entity called ‘farmers’ organisations’ (FAO, 2015), are considerable in terms of presence in Italian LAGs. This means that the national agro-sector has been building up a significant cooperative structure in order to face international market challenges. Thus, farmers’ organisations play an active role in addressing LDSs through their role in LAGs. Bulgaria’s farms are ‘younger’ than those in Italy and similar structures are yet unknown.

Discrepancy in partnership composition depends also on the arising economic and financial crisis that has stressed local market features, raising problems unknown earlier. Consequently, local needs have changed and players have had to establish new prerequisites on which to implement their LDSs. The international crisis has weakened local economic potential and people were not ready to tackle it. Another weak point is related to the capability to involve new human resources. In Italy, the main cause is the lack of freedom to select and employ resources. Then the necessity emerges to be much more autonomous in order to make faster decisions and not to postpone important activities. Conversely, in Bulgaria, LAGs can manage human resources independently and access new human resources rapidly.

After evaluating the composition of LAGs and consequent implications, the survey collected data on the fitness of actions carried out by local players with the concept of Leaderability. The meaning of this word is strictly related to capabilities of the LEADER plans (EC, 2014) to achieve the goals that inspire them. In this regard, Leaderability shows how these initiatives solved critical points that affected territories for many years. Following this framework, it has been observed that connections and synergies among private and public actors have been engaged enough, even though the prominent influences of public operators play a significant role (Doitchinova, 2012) in implementing strategies, reducing the bottom-up approach. The success of relationships engaged by players depends on new methods to implement divulgation of the activities carried out and to train operators. On the other hand, innovations represent important drivers to lead changes in such methodologies. In this way, attention has been placed on the ‘Albergo Diffuso’ model. It consists in living territories as unforgettable and unique experience that would come from typical characterising values on which geographical areas are identified. Hence, the territory concept brings together tangible and intangible aspects, returning added value to local citizens. However, in front of the positive results, there are some weaknesses related to the cooperation among Italian partners (there is a reduced number of partners, that are universities and national partnerships). An international cooperation should establish robust and lasting networks (EC, 2014). In other words, interactions among players allow, in turn, cooperation that facilitates the ideation and implementation of innovations, which, finally, can be spread by networks.

The last part of the survey was focused on the identification of ideal type matching LAGs experiences with ideal type identified from the National Rural Network report previously mentioned. What transpires is in line with previous considerations concerning the composition of LAG partnerships where the presence of local public entities and farmers was prominent. In fact, among the others, the rural development agency is the answer mostly indicated by respondents. This ideal type entails that LAGs should appear as agencies where actors address policies and introduce their developing proposals. It is the type through which the implementation of planned activities is much more feasible due to main associated features recognise powerful ability and autonomy in decision making. Conversely, several individuals perceive LAGs as diffusion centres with limited decision-making power. Local development is strictly related to the capacity of LAGs to take decisions and, in this case, the bottom-up approach builds constrains to making them quickly. Yet, involving more and more actors means to deeply understand and collect local needs. In addition, interviewees disagree with the idea of identifying LAGs as research institutions as, for example, universities, and so, few respondents agree with centre of expertise on management or centre of competence on thematic strategies. One of the main points pursued by Europe addresses concerns networking between local growth and local expertise having suitable knowledge to trigger it in order to increase critical mass (Carree, 2012). Over the years, researchers have developed increasing capabilities related to agricultural and rural issues, but they regularly remained within the academic milieu (Muscio and Pozzali, 2012), resulting in the absence of sharing and implementation of acquired knowledge with the world of enterprise. Therefore, policies undertaken on territories should be much more oriented in involving high competences coming from research entities (Blagoeva-Yarkova, 2012). Paying attention to all emerging data, it is necessary to bring together the absence of cooperation concerning, above all, human resources in research with the ideal type identified in the rural development agency. In this way, the rural development agency should involve researchers in order to strengthen potential action in local territories and to conform local action to EU development guidelines.

However, what should be clearly affirmed is that there is a limit deriving from the size of the sample. This, in turn, means that the results presented here have to be interpreted with some caution. This work, notwithstanding its limitations, can be a good starting point for giving new insights on the type of Leaderability rooted in EU LAGs.

References

Arabatzis, G., Aggelopoulos, S., Tsiantikoudis, S., 2010. *Rural development and LEADER + in Greece: Evaluation of local action groups*. Journal of Food, Agriculture and Environment 8(1), 302-307.

Barke, M., Newton, M., 1997. *The EU LEADER initiative and endogenous rural development: the application of the programme in two rural areas of Andalusia, southern Spain*. Journal of Rural Studies 13(3), 319-341. https://doi.org/10.1016/S0743-0167(97)00027-2

Blagoeva-Yarkova, Y., 2012. *The role of local cultural institutions for local sustainable development. The case-study of Bulgaria*. Trakia Journal of Sciences 10(4), 42-52.

Carree, M., Della Malva, A., Santarelli, E., 2012. *The contribution of universities to growth: empirical evidence for Italy*. Springer Science+Business Media 39, 393-414.

Casieri, A., Nazzaro, C., Roselli, L., 2010. *Trust building and social capital as development policy tools in rural areas. An empirical analysis: the case of the LAG CDNISAT*. New Medit 1, 24-30.

Chevalier, P., Maurel, M.-C., Polá, P., 2012. *L'experimentation de l'approche leader en Hongrie et en Republique Tcheque: Deux logiques politiques differentes* [Experiments with the LEADER approach in Hungary and the Czech Republic: Two different political rationales]. Revue d'Etudes Comparatives Est-Ouest 43(3), 91-143. https://doi.org/10.4074/S033805991200304X

Chmieliński, P., 2011. *On community involvement in rural development - a case of Leader programme in Poland*. Economics and Sociology 4(2), 120-128. https://doi.org/10.14254/2071-789X.2011/4-2/11

Dargan, L., Shucksmith, M., 2008. *LEADER and innovation*. Sociologia Ruralis, 48(3), 274-291. https://doi.org/10.1111/j.1467-9523.2008.00463.x

Doitchinova, J., Miteva, A., Stoyanova, Z., 2012. *The process of creating Local Action Groups in Bulgaria – Problems and Prospects*. Scientific Annals of the Alexandru Ioan Cuza" University of Iasi. Economic Sciences 59(2), 183-208.

ENRD, 2013. *Annex II – Background Paper of the Knowledge Transfer & Innovation Focus Group*. Background paper, Final Draft. Available at http://enrd.ec.europa.eu.

Esparcia, J., 2014. *Innovation and networks in rural areas. An analysis from European innovative projects*. Journal of Rural Studies 34, 1-14. https://doi.org/10.1016/j.jrurstud.2013.12.004

EC (2006): *The Leader approach: A basic guide*. Brussels: European Commission, available at: http://ec.europa.eu/agriculture/index_en.htm.

EC, 2014. *European Structural and Investment Funds Guidance for Member States and Programme Authorities Guidance for Beneficiaries – Guidance on Community-Led Local Development for Local Actors*. Brussels: European Commission

Fałkowski, J., 2013. *Political accountability and governance in rural areas: Some evidence from the Pilot Programme LEADER+ in Poland*. Journal of Rural Studies 32, 70-79. https://doi.org/10.1016/j.jrurstud.2013.04.008

FAO, 2015. 2014 *Annual Report on FAO's projects and activities in support of producer organizations and cooperatives*. Roma: FAO.

Fiore. M., Contò. F., Spada. A., Caruso. D., La Sala. P., 2014. *Multifunctionality and firm modernization plans: a case study of Apulia Region*, In G. Marotta, C. Nazzaro (eds), Proceedings of LI SIDEA Conference 'CAP 2014-2020: Scenarios for European Agri-Food and Rural Systems', 18-19/2014 Benevento.

Kopeva, D., Madjarova, S., Peneva, M., 2012. *Assessing EU policy impacts on the multifunctional characters of rural areas*. Trakia Journal of Sciences 10(4), 28-35.

Kovach, I., 2000. *Leader, a New Social Order, and the Central and East-European Countries*. Sociologia Ruralis 40(2), 181-189. https://doi.org/10.1111/1467-9523.00140

Lošťák, M., Hudečková, H., 2010. *Preliminary impacts of the LEADER+ approach in the Czech Republic*. Agricultural Economics 56(6), 249-265.

Lukesch, R., 2007. The LAG handbook. Brussels: Leader Observatory.

Muscio A., Pozzali A., 2012. *The effects of cognitive distance in university-industry collaborations: some evidence from Italian universities*. Springer Science+Business Media 38, 486-508.

Navarro, F.A., Woods, M., Cejudo, E., 2015. *The LEADER Initiative has been a Victim of Its Own Success. The Decline of the Bottom-Up Approach in Rural Development Programmes*. The Cases of Wales and Andalusia. Sociologia Ruralis 56(2), 270-288. https://doi.org/10.1111/soru.12079

Oppenheimer, D.A., Meyvis, T., Davidenko, N., 2006. *Instructional manipulation checks: Detecting satisficing to increase statistical power*. Journal of Experimental Social Psychology 45, 867-872. https://doi.org/10.1016/j.jesp.2009.03.009

Pemberton, S., Goodwin, M., 2010. *Rethinking the changing structures of rural local government–State power, rural politics and local political strategies?* Journal of Rural Studies 26(3), 272-283. https://doi.org/10.1016/j.jrurstud.2009.12.005

Pérez, J.E., 2000. *The LEADER programme and the rise of rural development in Spain*. Sociologia Ruralis 40(2), 200-207. https://doi.org/10.1111/1467-9523.00142

Ray, C., 1998. *Territory, structures and interpretation—Two case studies of the European Union's LEADER I programme*. Journal of Rural Studies 14(1), 79-87. https://doi.org/10.1016/S0743-0167(97)00039-9

Shortall, S., 2008. *Are rural development programmes socially inclusive? Social inclusion, civic engagement, participation, and social capital: Exploring the differences*. Journal of Rural Studies 24(4), 450-457. https://doi.org/10.1016/j.jrurstud.2008.01.001

Spada A., Fiore M., Caruso, D., Contò, F., 2016. *Explaining Local Action Groups heterogeneity in a South Italy Region within Measure 311 Axis III notice of LDP*. Agriculture and Agricultural Science Procedia 8, 680-690. https://doi.org/10.1016/j.aaspro.2016.02.079

Strahl, W., Dax, T., 2011, *The role of LEADER in the rural development programme – experience with the programme's application in Austria*. Journal of the Austrian Society of Agricultural Economics 20(1), 23-32.

Teilmann, K., 2012. *Measuring social capital accumulation in rural development*. Journal of Rural Studies 28(4), 458-465. https://doi.org/10.1016/j.jrurstud.2012.10.002

Wellbrock, W., Roep, D., Mahon, M. and others, 2013. *Arranging public support to unfold collaborative modes of governance in rural areas*. Journal of Rural Studies 32, 420-429. https://doi.org/10.1016/j.jrurstud.2013.10.002

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Enabling environments for rural innovations: lessons learned from Rural Development Programmes in Italy, 2007-2013

Abstract: *The European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-Agri) aims to foster the competitiveness and sustainability of the agriculture and forestry sectors. In the 2014-2020 rural development programmes (RDPs), Operational Groups are multi-actor projects aimed at building bridges between different actors, in order to speed up the development of farmer-driven innovative projects. The Managing Authorities of the RDPs have a crucial role in setting the scene for enabling and promoting such innovation processes. The aim of this research is to explore the different policy frameworks adopted by the Italian regions to support cooperation for innovation projects in RDPs in the period 2007--2013. These were analysed against the conceptual background outlined by the European Commission and the international literature on the interactive approach to innovation processes (EC, 2013). The study is supported by the use of a mixed-methods approach, based on desk and on field research, qualitative and quantitative methods. The results of this research illustrate (a) the relevance of well-defined policy and programme setting to enable innovative environments; (b) differentiation of innovative processes according to local agricultural systems; (c) project-driven innovation approaches might not support the capacity development on innovation; (d) the importance of networking instruments – such as national networks – particularly in regionalised MSs; and (e) the importance of appropriate monitoring and evaluation tools and methods to follow innovations and their effects.*

Keywords: *evaluation, AKIS, cooperation for innovation, interactive innovation model*

Introduction

The aim of this research is to explore the different policy frameworks adopted by the Italian regions in supporting cooperation for innovation co-financed by the European Union (EU) through measure 124 of Rural Development Programmes (RDPs) in the period 2007-2013. This is in view of providing an overview of enabling or disruptive factors for setting innovative environments in rural systems as well as capturing possible benchmarks for the next programming period. The conceptual background of this research is the outlined by the European Commission (EC, 2011; 2013) and the interactive approach to innovation processes (Hall et al., 2006; Knickel et al., 2009; Roling, 2009; Klerkx et al., 2010; 2012; EU SCAR, 2012; 2015; Brunori et al., 2013; TAP, 2016).

Contemporary agricultural and rural development is complex and characterised by socio-economic and environmental interactive dynamics, such as the demand of global markets, urbanisation, agricultural commercialisation, provision of public goods, consumption patterns and food safety standards, climate change, concentration and vertical integration of food production. Addressing this complexity requires more open and responsive innovations in agriculture and rural development which are based on user-centric and multi-actor approaches which focus on effective targeting of needs/opportunities of farmers and achievement of co-ownership through their involvement in effective knowledge sharing and demand-driven development of innovations. Also necessary is the contribution of a broad set of actors, which also belong to other sectors and extend beyond formal science, to make best use of complementary types of knowledge (scientific and practical).

In terms of policy designs and arrangements, the concept of co-creation of innovation calls for a shift from research policies to innovation policies, which emphasise the role of governments to set the stage for context-specific and farmer-driven innovations, by supporting networks and systems through financial and non-financial measures, which are focused on meeting systemic problems and opportunities (Bergek et al., 2010; Moreddu, 2013; EC, 2013; EU SCAR, 2012; 2015). With the concept of the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-Agri), interactive innovation has become a focal point of the 2014-2020 RDPs and will be undertaken mainly by Operational Groups (OG), which are multi-actor partnerships tailored upon and aiming at tackling certain practical problems or opportunities which may lead to an innovation (ENRD, 2013a; 2013b).

Methodology

This study started in 2012. The methodology applied was inspired by Birner *et al*. (2009) and, as already discussed in our previous research papers, also by focusing on the role of the advisory services in innovation projects (Cristiano and Proietti, 2015), the actors involved in innovation brokerage functions (Cristiano and Proietti, 2014a), the overview of experiences and pathways of innovations applied in 2007-2013 RDPs (Cristiano and Proietti, 2013) and the reflections on a possible evaluation strategy of EIP-Agri (Cristiano and Proietti, 2014b).

The whole research strategy is illustrated in Table 1 and it is supported by the use of a mixed-methods approach**,** based on desk and on field investigations, qualitative and quantitative methods. According to the conceptual background, the research is structured around a set of four driving themes (policy and delivery system, innovation drivers and accelerators, role of different actors, innovation at farm level and its effects) and respective research questions and criteria.

The desk research was the basis for the analysis of the regional approaches and policies (RDPs and measure designs, policy-oriented or farmer-needs oriented) and delivery systems (i.e. prizes, selection criteria, advances, financial rates, potential beneficiaries and roles, use of other measures) applied to support cooperation projects for innovation. It was conducted at both programme and project level. The collection of relevant qualitative and quantitative information on projects features, partners, supply chains and financial provisions led to the setting up of a database of all the innovation projects funded (872) under measure 124 of the 2007-2013 RDPs in Italy.

The analyses in the field was based on semi-structured interviews, a questionnaire, focus groups and workshops, which supported the poll of different innovation rural actors, allowing to capture mostly descriptive and relational information on relevant issues: organisational models of cooperation, with a focus on farmer empowering and knowledge exchange arrangements, partnership consensus on roles and functions played by each actors, with a focus on innovation brokerage (Howells, 2006; Klerkx et al., 2009; Koutsouris, 2012) and networking. Especially, the semi-structured interviews and focus groups allowed us to deepen our perceptions and direct experience of the beneficiaries though raising claims, tips and recommendations to the policy makers.

Five case studies were carried out in order to cover the whole research themes for the specific projects and under different regional frames. The research is still ongoing and, with the ex-post perspective, it will deepen on economic and technical effects of innovations at farm level as well as on the capacity development achieved by the rural actors of innovation projects.

Table 1. Themes. analysis criteria and observation techniques and analysis used in the research

Research themes	Analysis criteria	Observation techniques and analysis
Policy designs and delivery systems	• Innovation policy and systemic approach to innovation; • Consistency and supportiveness of delivery system; • Targeted to establishing interlinks and/or stable cooperation between research, advice and farming worlds; • Financial and non-financial frames and organisational structures; • Context specific; • Targeted to spreading innovation across farmers/forestry managers.	• Desk analysis; • Semi-structured interviews (25).
Innovation drivers and accelerators	• Innovation brokerage; • Farmer empowering; • Networking and cooperation; • Knowledge exchange and dissemination.	• Survey (388); • Focus groups; • Semi-structured interviews; • Workshops.
Roles for innovation design and implementation (project level)	• Advisory providers; • Research/innovation bodies; • Producers organisation; • Farmer/forest manager.	
Innovation at farm level and effects	• Relevance of innovation for practical farming; • State of play of innovation and benefits at farm level; • Capacity development on innovation (different actors).	• Semi-structured interviews; • Farm Accountancy Data Network.

Source: own compilation.

Results

The numbers on the implementation of measure 124 show that it was considered an important policy tool for rural development and it had a good response in all the territories. In fact, almost all the Managing Authorities (MA) had to increase their financial allocations to the measure (+18 per cent) during the programming period and, at the end, the total expenditure was EUR 178,683,776 at the national level (19 RDPs).

As a whole, 872 projects were completed and 3.968 partners cooperated for innovation. Among them, 61 per cent were farmers, 27 per cent were represented by universities and research institutes and 12 per cent were represented by other types of organisations, such as advisory services, professional organisations and agroindustry. The innovations involved all the relevant sectors of Italian agriculture, though their distribution clearly reflected the specific regional and local endowments and specialisations. The most interested sectors were: livestock (22 per cent), fruit and vegetables (21 per cent), wine (14 per cent) and cereal crops (12 per cent). In a relevant number of cases, partners represented other sectors: pharmaceutical, bioenergy, fodder industry.

Certainly, the cooperation for innovation experienced allowed the development and introduction of innovations at farm (90 per cent), agro-food (6 per cent) and forestry (4 per cent) level. Particularly, the types of innovations introduced regarded the new and meliorated food products (fruit and vegetables, milk and cheese chains), techniques and processes for the waste and water reduction and management and renewable energies, new varieties and protection of plants (floriculture and forestry plantation), animal health and safety (livestock and agro-food industry), food preservation and packaging (food industry). Besides, the intervention encouraged the development of cohesive economic relationships among different agricultural and rural actors. Its implementation was strongly supported both by the representatives of producers and by the research sector, who saw a chance to finance their activities, at a particular moment of funding shortage.

Despite the novelty of the measure and the lack of experience of all the actors involved, in many cases these projects were a success. In fact, the study shows that most of the innovations were effectively implemented at farm level and the farmers feel satisfied. Moreover, these experiences seem to be influential in empowering farmers and enhancing their culture of innovation through boosting changes in the entrepreneurial behaviours and strengthening their innovative/adaptive capabilities (Cristiano and Proietti, 2013).

Owing to the long-term return on investments of such innovation projects, further research will be done in order to assess long-term effects, such as an increase in the socio-economic and environmental performances of farmers, of the global competitiveness of the value chains or the consolidation of trends in entrepreneurial innovative behaviours.

Policy and delivery system

Policies play a key role in creating an enabling environment for innovation in agriculture and rural areas, by reducing information asymmetries and encouraging collaborative behaviours aimed at reducing the cognitive gap and sustaining innovative processes. In the case of measure 124, the policy approach attracted the interest of research in rural development policy, by improving farmers' access to research results and triggering new relational dynamics between the research and the entrepreneurial world aimed at satisfying innovation needs of farmers. Despite this, the design of the Italian 2007-2013 rural development policy and the programme settings failed to create a collaborative environment. Firstly, the managing authorities showed a lack of strategic vision on rural development and, above all, on innovation policy. Moreover, they lacked a 'systemic approach' to the agricultural knowledge and innovation system and had difficulty in recognising all its actors and the roles they play. This, together with Italian historical dynamics, did not lead to the sharing of a common vision on rural development and innovation. Quite the opposite, it shaped divergent interests, thus creating a strong competition to get public funding. In particular, the delivery system raised a clear division between research and advisory, as the last was excluded from support under measure 124. On this basis, the RDPs were unlikely to promote the activation of synergies and complementary actions between all the actors, as well as the implementation of integrated and coordinated innovation processes.

Also, the lack of an ad-hoc needs assessment on innovation brought to the implementation of an extensive bottom-up approach in projects supported under measure 124. In very few cases, later on during the programming period, the managing authorities gave some indications on themes related to climate change, but this mostly as a consequence of the health check of the EU's Common Agricultural Policy (CAP), which had specific requirements on the matter. On the one hand, this was good because almost all the innovations were applied for addressing specific needs of the farms. On the other, it led to a wide fragmentation into many similar, small projects. This, together with a lack of dissemination and coordination, certainly reduced the policy impacts, as innovations involved only single farms or small groups of them, rather than being defined and shared at supply chain or regional level.

From this point of view, it must be emphasised that the administrations expressed a clear attempt to promote an integration among different types of interventions and actors involved in innovation projects. This occurred, particularly, through the integrated use of measure 124 with other RDP measures, within the integrated supply chain projects. These latter, in line with some literature (Alston and Gray, 2013; Moreddu, 2016), have been instrumental to broaden the whole spectrum of relevant partners, strengthen the scale of the innovation and establish stable cooperation across the supply chains.

The role of local systems on innovation paths

An important finding of this research is the fundamental role demonstrated by local systems in enabling innovation processes. This is mainly because of the existing networks and trustfulness among rural actors as well as of the local specialisations and the common interests and understanding on specific needs/problems/opportunities for development. Interactions between producers, research institutes and local governments play an important role in the development of innovation processes and may result in different outcomes, both on innovative dynamics and their efficiency.

Field investigations show that innovations can be produced mainly within network activities in which different actors have strong and interdependent connections (business relations, knowledge flows, sharing of experiences and material factors, financial transactions etc.). The greater is the number of relationships available to the farmers, the greater are the opportunities for learning and, thus, for implementing innovation. Innovations often develop thanks to the geographical proximity of certain actors and factors. The study showed that some local actors (local administration, cooperatives / consortia / producers' associations, advisors or professional organisations), due to their representativeness, the local consensus and the trust that they achieved among the farmers were able to aggregate specific needs of local supply chains, facilitating the dialogue with the research and informing the potential beneficiaries on the opportunities to invest in innovation. In several cases, the managing authorities tried to foster such enabling conditions by including the local innovation/research centre and/or a cooperative/consortia into the partnership as eligibility criteria for applying to the measure.

The innovations implemented under measure 124 seem to have been relevant for practical farming. Although universities and research centres played a significant role in promoting and developing innovations, in many cases with a leader role in the partnerships, the innovations are intertwined with farmers' specific knowledge and their needs (economic, organisational, market etc.), thus generating a positive impact at farm level.

Strengths and weaknesses of project-driven innovation

Cooperation for innovation co-financed under measure 124, as with the EIP-Agri OGs, was addressed at finding an innovative and practical solution to solve a farmers' problem or exploit an opportunity. The projects were focused on innovative investment projects tailored for farmers participating in the partnership, largely based on a multi-actor approach. Being these features, they definitely were relevant for practical farming. Indeed, the case studies illustrated that innovations were effectively tailored to farmers' needs, and their expectations were satisfied. However, the study shows that such benefits hardly went beyond the partnerships' boundaries, without specific actors who support the widespread use through the supply chains or territories. Moreover, such project-driven innovations not necessarily support the growth of innovative entrepreneurships neither, in general, the capacity of the system to innovate. In fact, a number of intangible outputs, such as mutual trust among the stakeholders involved in the projects, brokerage skills or social capital, can be lost by the end of the project and may not necessarily be reused to set up other partnerships and projects afterwards.

Use of networking instruments

In the case of regionalised innovation systems as in Italy, the use of networking instruments applied at both national and local levels has been of great utility, especially for two main reasons: the novelty of EU innovation policy and the effective cooperation and exchange of information with the AKIS. Particularly, for the first point, at national level, the National Rural Development Network supported the common understanding of the EU innovation policy, the designs of regional policies and programmes and the exchange of experiences among the administrations.

Networking activities, including dissemination, helped to bridge the communication gaps and were consequently the real engine of innovation (Brunori et al., 2013). They allow innovation to be scaled up, so reducing fragmentation and maximising the utility of public investment. Moreover, networking activities are instrumental to dialogue and knowledge sharing between actors, development of learning processes, dissemination of innovation and application in practical farming, both internally and externally to the partnership. Indeed, their use within the implementation of measure 124 was very limited. The supported partnerships were the result of spontaneous combinations of local actors and factors. Generally, there was a lack of actors/structures able to act as an interface between research and entrepreneurs, or to support the processes of problem solving or developing new ideas.

Dissemination activities promoted by MAs were carried out mostly through final project seminars, without achieving an effective knowledge sharing, in terms of replications and spin-offs of the projects. When other networking instruments were used (e.g. study visits or workshops), the interactions between farmers helped to increase trust and awareness on the usefulness of the innovation, beyond the simple exchange of information. Moreover, such on-going interactions are instrumental to the setting up of long-term relationships, which are likely to convey information and knowledge even beyond the end of the project, thus inducing new ideas and emulative behaviours among the farmers.

Monitoring and evaluation

The most important result of this study is that the importance of appropriate monitoring and evaluation approaches and arrangements for improving the rural development intervention is emphasised in the case of interactive innovations applied in multi-actor projects, such the ones implemented under measure 124 and the forthcoming OGs.

In the 2007-2013 RDPs, monitoring arrangements were very minimal and focused on the financial inputs and physical outputs. Also, evaluation was focused only on economic and environmental effects of innovation at farm level, while there is no evidence of any investigation on the achievements on innovative capacity development at the levels of rural actors and of the local systems. In this regard, according to some recent literature, appropriate monitoring and evaluation (M&E) strategies should be systemic, concurrent, multilevel and commonly recognised. Systemic M&E strategies would reflect better the newly holistic approaches and multi-actorial models to innovation. Specifically, the different innovation policies and systems, local specificities and transversalities to policies and sectors need to be analysed. Their influence on pathways of innovation should be adequately tracked as well.

Moreover, the study found that there is a need for on-going and multi-level M&E strategies which embrace programmes and projects as well, across their entire period of implementation (Cristiano and Proietti, 2014). In fact, as it is, the applicable M&E framework for the CAP is not properly tailored upon the needs of policy makers and practitioners for on-going feedback and reflexive processes on the implementation of respective programmes and projects. Also, concurrent M&E strategies should contribute to encouraging co-learning processes through facilitating collective knowledge building, experience sharing and adaptive learning by the partnerships and across the rural innovation systems (Klerkx et al. 2010; TAP, 2016). In this regard, M&E strategies should focus on 'how', enabling and disabling factors, innovations are processed and achieved, and on 'which conditions' the innovation policies and partnerships are well functioning; by which mechanisms and actors the innovation is implemented at farm level and across the supply chains. Also, the 'effects' analysis should aim to assess the medium-long term outcomes/effects of the innovation actions on rural systems, farms and value chains (Ricciardulli, 2012).

Finally, commonly-recognised M&E strategies and indicators, at least in the EU, would allow comparison and benchmarking, which could help ongoing adjustments at the policy level, on programme settings and delivery systems, and of the projects, on multi-actor approaches and innovation processes (Technopolis, 2012).

Discussion

Well-defined as well as targeted policies and programme setting are crucial in fostering an enabling environment for innovation. Policy should ensure smooth communication between all the actors involved in innovation processes, as well as the activation of synergies and complementary actions rewarding cooperative behaviours. To this aim, all the local actors should take part in the expression of innovation strategies. This could give major consistency to the project, set up linkages among actors, ensure dissemination along the supply chain. Moreover, there is a need for a strategic vision that allows a switch from fragmented project-led innovation to a developmental agricultural system. Particularly, there is a need for a systemic approach to AKIS in order to highlight the functional relationships between the various actors and components, so as to foster the systemic capacity to innovate.

A second point to consider is that different local systems produce different innovation paths. Geographical proximity plays a significant role when there are no interface structures specifically created to build bridges between research and the local production system. The presence of these last is helpful to identify the most appropriate knowledge in order to meet the real needs of farmers, whether they are located nearby or not. In that case, the innovation approach is driven by the farmers' demands, and the effects, by definition, have an impact on the local system. In addition, these structures allow interaction between research and local producers independently from the presence, on the territory, of a research institution.

Networking instruments are needed in order to integrate knowledge, support structures and / or other supporting organisations effectively (Hall et al., 2006; Klerkx et al., 2009, 2010; Brunori et al., 2013; Hermans et al., 2015). Particularly, they allow a switch from fragmented project-led and / or policy-led innovations to a developmental agricultural system. According to this, the local AKIS can be organised as learning platforms and take on the responsibility for fostering innovation across the supply chains. Networks also have an important role in influencing innovation processes and shaping policies for innovation, being also able to create value chains that transcend geographical boundaries.

Finally, a focus on monitoring and evaluation of innovation processes would be needed. For the managing authorities it can be a propitious moment to coordinate, exchange experiences, activate synergies and receive return information. The utilisation-focused and reflexive approaches can support prompt adjustment of intervention and the development of programme management and of rural actors' skills (Klerkx et al., 2012). The early involvement of these last in ongoing evaluation processes can foster the scale up of innovation and the enhancement of innovation system capacities.

References

Alston, J., Gray, R., 2013. *Wheat Research Funding in Australia: The Rise of Public-Private-Producer Partnerships*. Eurochoices 12(1), 30-35. https://doi.org/10.1111/1746-692X.12017

Bergek, A., Jacobsson, S., Hekkert, M., Smith, K., 2010. *Functionality of innovation systems as a rationale for and guide to innovation policy*. In R. Smits, S. Kuhlmann and P. Shapira (eds.) Innovation policy, theory and practice. An International handbook, Elgar Publishers, 117-146.

Birner, R., Davis, K., Pender, J., Nkonya, E., Anandajayasekeram, P., Ekboir, J., Mbabu, A., Spielman, D., Horna, D., Benin, S., Cohen, M., 2009. *From best practice to best fit. A framework for analyzing pluralistic agricultural advisory services worldwide.* Journal of Agricultural Education and Extension 15(4), 341-355. https://doi.org/10.1080/13892240903309595

Brunori, G., Barjolle, D., Dockes, A.C., Helmle, S., Ingram, J., Klerkx, L., Moschitz, H., Nemes, G., Tisenkopfs, T., 2013. *CAP reform and innovation: the role of learning and innovation networks*. EuroChoices, 12(2), 27-33. https://doi.org/10.1111/1746-692X.12025

Cristiano S., Proietti P., 2013. *Farm Innovation through Rural Development Programmes: experiences and pathways of innovation in Italy*. Journal of Agricultural Education and Extension 19, 79-92. https://doi.org/10.1080/1389224X.2013.768069

Cristiano S., Proietti P., 2014a. *Acting as Agricultural Innovation brokerage in Italy: experiences from the Rural Development Programmes 2007-2013*. In Farming systems facing global challenges: Capacities and strategies. Vol. 1 Proceedings of the 11th European IFSA Symposium, Berlin, Germany 2014, (803:812) ISBN 978-3-9813957-5-4.

Cristiano S., Proietti P., 2014b. *Farm Innovation through Rural Development Programmes 2014-2020: an evaluation model of the EIP*. In: Farming systems facing global challenges: Capacities and strategies. Vol. 1 Proceedings of the 11th European IFSA Symposium, Berlin, Germany 2014, (141-152) ISBN 978-3-9813957-5-4.

Cristiano S., Proietti P., 2015. *Farm Advisory Services in knowledge transfer and innovation: which role in Rural Development Programmes (RDPs) 2014-2020*. paper presented at the 22nd European Seminar on Extension and Education.

EU SCAR, 2012. *Agricultural knowledge and innovation systems in transition – A reflection paper*. Brussels.

EU SCAR, 2015., *Agricultural Knowledge and Innovation Systems Towards the Future – a Foresight Paper*. Brussels.

EC, 2011. *Implementation of Measure 124 Working Document-48-634-11*. Brussels: European Commission.

EC, 2013. *Draft Guidelines on programming for innovation and the implementation of the EIP for agricultural productivity and sustainability*. Brussels: European Commission.

ENRD, 2013a. *Focus Group on Knowledge Transfer & Innovation. EIP Operational Groups: Lessons and recommendations from the 2007-2013 Rural Development Programmes*. Final draft. Brussels.

ENRD (2013b). *Focus Group Knowledge Transfer & Innovation. Towards Successful Innovation Brokerage: Insights from the 2007-2013 Rural Development Programmes.* Final draft. Brussels.

Hall A., Janssen W., Pehu E., Rajalahti R., 2006. *Enhancing agricultural innovation: How to go beyond the strengthening of research systems*. Washington, DC: World Bank.

Hermans, F., Klerkx, L., Roep, D., 2015. *Structural conditions for collaboration and learning in innovation networks: using an innovation system performance lens to analyse agricultural knowledge systems*. The Journal of Agricultural Education and Extension 21, 35-54. https://doi.org/10.1080/1389224X.2014.991113

Howells, J., 2006. *Intermediation and the role of intermediaries in innovation*. Research Policy 35 (5), 715-728. https://doi.org/10.1016/j.respol.2006.03.005

Klerkx, L., van Mierlo, B., Leeuwis, C., 2012. *Evolution of systems approaches to agricultural innovation: concepts, analysis and interventions*. In Darnhofer, I., Gibbon D., B. Dedieu (eds.), Farming Systems Research into the 21st Century: The New Dynamic, Springer Science, Dordrecht. https://doi.org/10.1007/978-94-007-4503-2_20

Klerkx, L., Aarts, N., Leeuwis, C., 2010. *Adaptive management in agricultural innovation systems: The interactions between innovation networks and their environment*. Agricultural Systems 103, 390-400. https://doi.org/10.1016/j.agsy.2010.03.012

Klerkx, L., Hall, A., Leeuwis, C., 2009. *Strengthening agricultural innovation capacity: are innovation brokers the answer?* International Journal of Agricultural Resources, Governance and Ecology 8: 409-438.

Knickel, K., Brunori, G., Rand, S., Proost, J., 2009. *Towards a better conceptual framework for innovation processes in agricultural and rural development: from linear models to systemic approaches*. Journal of Agricultural Education and Extension 15(2), 131-146. https://doi.org/10.1080/13892240902909064

Koutsouris, A., 2012. *Facilitating agricultural innovation systems: a critical realist approach*. Studies in Agricultural Economics 114(2), 64-70. https://doi.org/10.7896/j.1210

Moreddu, C., 2013. A*gricultural innovation systems: a framework for analyzing the role of the government*. Working Party on Agricultural Policies and Markets. Paris: OECD.

Moreddu, C., 2016. *Public-private partnerships for agricultural innovation: lessons from recent experiences*. OECD Food, Agriculture and Fisheries Papers, No. 92, OECD Publishing, Paris. https://doi.org/10.1787/5jm55j9p9rmx-en

Ricciardulli, N., *2012. in Mid-term evaluation of the Region Veneto RDP 2007-2013 – Rev. 1 – 30th December 2012* Agriconsulting SpA.

Röling, N., 2009. *Pathways for impact: scientists' different perspectives on agricultural innovation*. International Journal of Agricultural Sustainability 7, 83-94. https://doi.org/10.3763/ijas.2009.0043

TAP, 2016. *Common Framework on Capacity Development for Agricultural Innovation Systems: Synthesis Document*. Tropical Agriculture Platform. CAB International, Wallingford, UK.

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Cooperative approaches to targeted implementation of Agri-Environmental Schemes and the establishment of a case study in Hesse, Germany

Abstract: *The increasing intensification of agricultural production and the associated simplification of landscape structure is a major threat to biodiversity. The current Agri-Environmental Scheme (AES) funding structure is lacking the incentive for farmers to participate actively in environmental management and achieve greater environmental objectives. The effectiveness of the AES is a heavily debated topic, since it is not always spatially targeted and in some cases does not consider synergies and trade-offs among the objectives. A case study design was developed to assess whether group approaches have higher degrees of achievement in the allocation of suitable priority areas for species conservation in a landscape. From existing national and international agri-environmental group oriented approaches, an agri-environmental and biodiversity concept for a region in Hesse (Germany) was derived. With a case study in Hesse (Germany), the suitability of such a concept should be controlled and it is to be considered what modifications are necessary in order to use group-oriented approaches successfully. The idea behind the case study is not only to coordinate AES bilaterally between the public sector and individual farmers, but also to look at the best way to reward the farmers for their participation. It is more about sharing knowledge on biodiversity issues with farmers, in the hope of encouraging them to cooperate, and to promote a mutual commitment in the area of regional habitat and species protection.*

Keywords: *cooperation, habitat and species conservation at the farm level*

Introduction

Agriculture occupies 45 per cent of the area in Germany (Destatis, 2014). The land management practices are widely characterised by specialisation and the decoupling of production branches (Matthews and Selman, 2006). Uniform agricultural production practices can have problematic and long-running environmental impacts such as soil erosion and soil compaction by heavy equipment, loss of soil organic matter by having unbalanced crop rotations, water pollution from discharges of nitrogen, phosphorus and pesticides, and the loss of biodiversity (Geiger et al., 2010; Thiele-Bruhn et al., 2012; Baker et al., 2013; Hampicke, 2013; Fahrig et al., 2015).

Significant changes in the pattern of land use and the associated simplification of landscape structure are a major threat to habitats and species in the agricultural landscape (Duelli, 1997; Duelli and Obrist, 2003; Di Falco and Perrings, 2005; BMU, 2010, 2014; Geiger et al., 2010; Hadley and Betts, 2012; Mitchell et al., 2013; Rizzo et al., 2013). Bird species have also suffered a decline in numbers in agricultural landscapes in recent decades. Those of open country regions in Germany have had particularly high proportions of unfavourable conservation status according to the farmland bird index of Europe, Germany and Hesse (BMU 2010, 2014; HMUKLV, 2014). It has been shown that, when done correctly, agriculture itself can provide major contributions to the environment and help achieve biodiversity targets. Therefore, further treatment of current agricultural practices is required. (Groves et al., 2002; Benton et al., 2003; Bianchi et al., 2006; Billeter et al., 2008; Batary et al., 2011; Fahrig et al., 2011; Bamière et al., 2013; Fahrig et al., 2015).

In order to prevent displacement effects in land use, agri-environmental schemes (AES) must be applied in an ecologically and economically efficient manner (Moxey et al., 1999; Matzdorf and Lorenz, 2010). Farmers and conservation organisations do not have many intervention options for protection measures of the threatened species individually, but when working in a group those options might be chosen best and more efficiently (Eggers et al., 2008; McVittie et al., 2009). In this paper, a group-oriented transdisciplinary approach to implement an agrarian biodiversity concept in the state of Hesse, Germany is presented.

Agri-Environmental Schemes of the European Union

To control the negative impact of agriculture on ecosystems and to achieve the objectives of the European Biodiversity Strategy, parts of the budget of the European Common Agricultural Policy (CAP) are provided in the first pillar, designated by 'Greening' (EC, 2013a), and in the second pillar by the EAFRD (EC, 2013b). The CAP uses payments as compensation for AES and to incentivise farmers to engage in more sustainable and extensive land use, such as expansion of crop rotations, different cutting regimes in grasslands for the conservation of breeding bird populations, or the installation of flower strips along field margins to help create a habitat for small animals. A key element of the agri-environmental programmes is the voluntary nature of farmer participation. The goals of the programmes are usually a mix between environmental protection, biodiversity conservation and landscape maintenance (Kleijn and Sutherland, 2003).

In Germany, agri-environmental actions are normally undertaken individually by the farmers. In this case it can also be described as a top-down instrument since the government creates different measures which the farmer can then apply on the land if he/she joins an AES contract. AES is only one alternative for farmers in their land management concept, but the current funding structure of the CAP lacks the incentive for farmers to participate actively in achieving the desired environmental objectives (Burton et al., 2008; Burton and Schwarz 2013), and this results in overall low implementation of AES in favourable arable farming areas (Lettmann, 1995; Höft, 2003; Haaren et al., 2008).

Currently single agri-environmental measures (AEM) are offered at the administrative level of the states in Germany. Many of these measures have insufficient regional specification (Nölting, 2006) and this fact reduces the ecological effectiveness and economic efficiency. This leads to the situation that in Germany more than 20 per cent of the arable land is bound to AEM (BMEL, 2013), but still some different ecological indicators are worsening (Henle et al., 2008; BMU, 2010; Halada et al., 2011). This means a substantial part of the financial investment for species and habitat conservation is done without measurable positive results (BMEL, 2014). Effectiveness prediction of the European Agricultural Fund for Rural Development (EAFRD) funds for the period 2014-2020 estimate the expected success rate of the species and habitat protection as low (Pe'er et al., 2014; Schmidt et al., 2014).

New EAFRD approaches – improve cooperation of agriculture and conservation – strengthen farmers as partners of conservation!

Critics of AES call for improved coordination between actors because of its landscape specific requirements (Pe'er et al., 2014). Although AEM normally contracts with individual farmers, the purpose is to change the landscape on a larger scale so that it can be discussed at a wider range (Dolman et al., 2001; Batary et al., 2011; Fahrig et al., 2011). For stabilising a functioning habitat structure, a spatial and temporal heterogeneity is needed. This means a mosaic of ecosystems consisting of different, but individually tailored, types of habitats for the associated biodiversity in an area. This raises questions about the optimal mix of intensively-farmed agricultural area relative to the natural ecosystems in a landscape. As mentioned before, the operating level for nature conservation measures almost always exceeds the farm operation level because the species concerned have a larger radius (Franks and McGloin, 2007).

Through a coordinated working group of farmers, landscape managers, conservation organisations and the agricultural administration, a higher accuracy and ecologically efficient implementation of suitable priority areas for species conservation can be achieved (Prager 2010, 2012, 2015; Emery and Franks 2012; Franks and Emery 2013). However, in terms of AES in the context of a landscape approach two, critical factors have to be considered. One is the willingness of the landowner to cooperate, and the other is an organisational structure to coordinate and oversee jointly the implementation of the AEM. Both will lead to higher transaction costs (Mettepenningen et al., 2011; Mettepenningen et al., 2013).

Challenges and possibilities of cooperative AES approaches

To counteract the low ecological efficiency of AES and the low participation by farmers, different studies on AES recommend cooperative approaches that operate on the landscape scheme (Falconer, 2002; Herzog, 2005; Matthews and Selman, 2006; Fahrig et al., 2011; Termeer et al., 2013; Pe'er et al., 2014; Prager, 2015). The municipal level could be achieved through a combination of land users, landscape planners and ecologists, who act as an agricultural land care group (Falconer 2002; Franks and McGloin 2007; Franks 2010; Carmona-Torres et al., 2011). Thus, the spatial requirements of the protection concepts can be met and active nature conservation services could be provided (Glasbergen, 2000).

Information distribution involving all stakeholders regarding the relationship between agriculture and environmental conservation, and the upcoming costs based on environmental damage, can be a tool to avoid further damages. Farmers, for example, can integrate site preservation aims into their decision-making. The municipality or community can then, through better information sharing, achieve ways to do voluntary adjustment and nature conservation (Omer et al., 2010a; Omer et al., 2010b).

The shift from the current measures moves from an individual level more towards a landscape-oriented focus on the collective level, which can also develop inter-enterprise and innovative solutions in the land care management sector. Better coordination would be possible to increase the selection of land and to implement cross-linking elements in the landscape (Franks and McGloin 2007). At the same time there is a relaxation in the competition for land in the region. The advantages are that a group of farmers doing conservation together specifically catering to local conditions can perform actions which are based on local knowledge and experience. This group can then provide professional support to other interested farmers, creating a better understanding of the environmental needs and professional management (OECD 2013).

However, this new approach to AES is not easy to implement, because it needs an increase in coordination efforts of implementation on the administrative level in the respective provinces. This is because the definition and the controllability of the individual AES approach is very important for the administrative authorities in order to verify and document the proper implementation for the EU (Schmidt et al., 2014). Therefore, a further goal of an organisational innovation like the above mentioned group approach should be a reduction in costs, and an increase in the feasibility of the programme, like more flexibility and adaptability by the public sector (Naschold et al., 1997). It is also possible that payments for AES compensation could happen at the group level, therefore minimising the administrative burden of the agricultural administration and other transaction costs to the farmers.

Methodology

To derive an agri-environmental and biodiversity concept for a region in Hesse (Germany) a survey was carried out that considered the current group-oriented agri-environmental approaches and analysed their efficiency and effectiveness. From the existing national and international agri-environmental group oriented approaches, two concepts from the Netherlands and Switzerland were chosen and intensively studied and analysed. The Dutch approach was chosen because of its focus on group work and the Swiss approach because of its ecological network component.

The Netherlands

Since 1 January 2016 no more individual agri-environmental contracts have been offered in the Netherlands. All AEMs are implemented through the cooperation of farmers on a wider landscape scheme. This model was determined following a five-year test phase (Deelen, 2013; MEA, 2013; Rosendaal, 2014). The basis for this legislative decision was laid out in the 1990s. Farmers formed environmental cooperatives (ECs or Agrarische Natuurverenigingen) and pursued the common goal to maintain agricultural land for the protection of biological diversity and to promote these ecological services. These ECs originated from a growing concern among farmers about the direction where the Dutch agri-environmental programme was heading (Glasbergen, 2000; Franks and McGloin, 2007; Lehmann et al., 2009).

The Dutch approach concerning the designation of funds for agri-environmental measures is based on the Article 28, paragraph 2 of EU Regulation 1305/2013. A 2011 report commissioned by the Dutch government shows that the state of nature and the landscape can be improved when an instrument is applied to better integrate agricultural production; this is consistent with the findings of ECA (2011). A report by the Dutch Council for Environment and Infrastructure from 2013 titled ‘Toward a Robust Nature Policy’ goes a step further, the authors argue that the current single farm payments for AEMs in the Netherlands are not sufficiently effective. These evaluations and numerous publications (Franks and McGloin 2007) made the Dutch government decide to revise the objectives and the operation of the system for agriculture, nature and landscape. The Dutch Government now formally makes contracts with the ECs, which takes them to the final recipients of compensation for the nature conservation services. The members (farmers) act as independent contractors with ownership of the agricultural land. The types of member responsibilities, the services to be provided and specific activities, are precisely defined in the associations (Termeer et al., 2013).

Since 1992, approximately 150-170 primary agricultural associations have been formed, which are financed by member contributions and different project funding (Schouten et al,. 2013). For the new AES system from 2016 the government required a professionalisation of the farmers' groups with a special quality manual of process management, a self-organised management, and a certification by the provinces. With this measure, the government hopes to ensure the orderly implementation within the EU and national regulations. However, not all of the 150 regional groups could meet the requirements of the examination of the state government. Therefore, a reform of some ECs was needed before the implementation of the new AES system. A shift in the coordination of the national association was made as an umbrella organisation for more administrative purposes. The Dutch administration agreed in 2015 to the objective and measures with only 39 ECs. These collectives are now organising the implementation of measures on their own, through private legal agreements with the farmers. The ECs serve as a regional agent between government and farmers. They present the cause of the farmers to the government, serve as a single point of contact, lower administration costs and coordinate and implement AES. The EC also coordinates the interactions between governments and social organisations. For some members the association's administration takes over the application of funds for biodiversity and landscape conservation in the Dutch government. This is an important point for the farmers, because a significant part of their annual income comes from the payments for services provided by the Dutch government. In addition, the organisations manage partially-owned investigation committees to monitor whether farmers comply with their management of the national and regional measures that were agreed upon. This has caused farmers to take more responsibility for achieving environmental objectives in their own region (Termeer et al., 2013).

Switzerland

The eco quality regulation called 'Öko-Qualitäts-Verordnung' (ÖQV) was established in 2001 and aims to promote a regionally typical variety of plants and animals. It is based on two parts, 'networking' and 'quality' which have a strong focus on environmental outputs. The 'quality' part is a single payment scheme were farmers are compensated between SFR 450 per ha (for extensively used pastures in the mountain areas III - IV) and SFR 3000 per ha (for quality hedges and copses). Moreover, there are new quality criteria defined for extensively-used pasture for grazing and forest for vineyards with natural biodiversity. This allows that farmers are now paid for single element contributions of the biological quality. It can be observed that the use of the means for ÖQV, which are provided up to 80 per cent by the federal government and up to 20 per cent by the municipalities, are continuously rising (Mann, 2010). Since the 'networking' part requires more assistance from the municipalities as the 'quality' part from the ÖQV, some municipalities have entered in this part of the programme only in recent years. The ÖQV gives incentives to carry out networking projects for ecological compensation areas (ECAs) and has a strong focus on environmental outputs. In networking projects, the ECAs are placed and managed so that favourable conditions for the development and distribution of animals and plants arise. In networking projects only areas designated as ECAs can be introduced, which are registered under the direct payment Regulation. Each project needs an underlying concept with the initial current state of the area, the desired future state and specifically defined faunal and floristic target and indicator species, as well as an action plan (BAFU, 2008). Another funding requirement is the long-term commitment and a vulnerability assessment of the ÖQV.

Results

Model for a case study

From the Swiss and Dutch approaches, a model of a group oriented AES was developed. With a case study the suitability of that model should be controlled and it should be considered what modifications are necessary in order to use group oriented approaches successfully. The state of Hesse was selected because the ministry promotes the development (HALM A1) and implementation and monitoring of group approaches (HALM A2) in the 2015 established 'Hessian programme for agri-environmental and landscape management measures' (HALM).

The case study design tries to build a basis for an analysis of advantages and disadvantages of such approaches in Germany. The project is the basis for designing a concept for implementation of in-situ conservation, which is referred to as 'Community Biodiversity Management' (De Boef et al., 2012). The practices of in-situ conservation of agricultural biodiversity will be implemented by professionals who work within a process to be continued or intensified in the relationships and the dynamics (Brookfield, 2001). The conservation strategy of 'in-situ conservation' is a process or an emerging property of the conservation organisation, the farmers and related NGOs. The number of established practices is the means by which the properties will be continued, strengthened, restored or can be revitalised. The actors together form the Community Based Management approach (CBM). CBM is a participatory approach with the aim to empower the institutions to recognise and take advantage of related knowledge and their assets of biological and genetic resources. In order to implement in-situ conservation effectively by a group approach and the accompanying practices, it is necessary that rural communities have control and make their own decisions, such as the control of agricultural biodiversity.

The case study started 2016 in two municipalities with a high share of favourable arable farming area in the county Darmstadt-Dieburg in Hesse. A group of eight farmers declared their willingness to cooperate. During the case study running time further farms were invited to group discussions, and information is shared on field days.

A problem analysis based on the initial state and the analysis of the landscape situation should frame the ecological targets. They describe the intended effect on the landscape in terms of the promotion of faunal and floristic diversity and the desired effect in terms of target and indicator species, such as the preservation and enhancement of biological permeability of the landscape for migratory species, increasing the range of habitats to promote the target species, and in increase of breeding sites and food supply of target species. Based on the developed objectives, the aspired, spatial arrangement is illustrated and described. Newly-created surfaces and objects are deferred as optimal areas (eligible areas) like buffer zones along the edges of forests, landscape features, waters or lines / corridors for networking of individual objects or to the development of migration corridors for animals. In a further step to the measures proposed, where it is possible to be more precise and spatially explicit, a draft of the plan will be discussed in the meeting with the initiative group. The planning and organisation of the implementation of the measures is to be developed in close contact through discussions between the participants.

In the region, a tailored project area with ecologically valuable habitats was developed by ecologists who are defining objectives and measures for a specific group of indicator species. The goal of the planning phase is to display the optimal areas on a map. The implementation goals give particular answers to questions such as: Which measures are to be promoted in which habitat in the project area? What location and with what priority? Which target of crosslinking surfaces is desirable for the individual habitat types? When are the objectives to be realised? How can the AES funding procedure (flower pastures, arable flower strips, field margins, arable weeds surfaces possibly with arable light strips, erosion and water protection strips) be best used as a means to achieve these goals?

The communication strategy in the case study is to be constructed so that it is made clear which areas are important as habitat structures and why certain measures in specific locations are crucial. The planning and organisation of the measure implementation is to be developed in close contact through discussions between the participants. During individual counselling with the participating farms, special information regarding their farmed land will be distributed, as well as discussion of the general information about their situation. Also it is to be analysed on which surfaces the farms signal to cooperate and how these areas can be enhanced by AES. So it is intended that through networking between farms and the advisors, there is an increase in the implementation of measures. The idea behind the case study is not only to coordinate bilaterally AES between the public sector and individual farmers but also to reward them. It is more about sharing knowledge on biodiversity issues with farmers, encouraging farmers to cooperate and thus to obligate to mutual commitment in regional habitat and species protection. Within the conducted working group meetings, the awareness of the landscape-oriented approach should be strengthened.

Discussion

The presented case study approach tries to build a first basis for an analysis of advantages and disadvantages of such cooperative AES approaches in Germany. In this example, it comes on the one hand to agriculture with intensive use and on the other hand to mobile and connected species. The approach tries to create awareness of the problems regarding the loss of biodiversity at all participating actors on all levels and provides the basis of area-related planning information regarding the possible uses of AES. It is designed on the basis of the research outcomes of agri-environmental cooperative approaches of recent years and will be tested on different farmer groups. It should be examined whether the actors can be convinced to participate in a group-oriented approach or where the chance of success is greatest of such a concept, and where there is great resistance and problems in the implementation of a group approach. Further questions to be answered are: how decisions about allocating funds are made, where it is to be invested, who controls, when investments are carried out voluntarily or as peer pressure and how a new payment structure could be developed.

References

BAFU, 2008. *Umweltziele Landwirtschaft: Hergeleitet aus bestehenden rechtlichen Grundlagen* [Environment Agriculture: Derived from existing legal foundations]. Bern: BAFU.

Baker, N.J., Bancroft, B.A., Garcia, T.S., 2013. *A meta-analysis of the effects of pesticides and fertilizers on survival and growth of amphibians*. Science of the Total Environment 449, 150-156. https://doi.org/10.1016/j.scitotenv.2013.01.056

Bamière, L., David, M., Vermont, B., 2013. *Agri-environmental policies for biodiversity when the spatial pattern of the reserve matters*. Ecological Economics 85, 97-104. https://doi.org/10.1016/j.ecolecon.2012.11.004

Batary, P., Báldi, A., Kleijn, D., Tscharntke, T., 2011. *Landscape-moderated biodiversity effects of agri-environmental management: a meta-analysis*. Proceedings of the Royal Society B: Biological Sciences 278(1713), 1894-1902. https://doi.org/10.1098/rspb.2010.1923

Benton, T.G., Vickery, J.A., Wilson, J.D., 2003. *Farmland biodiversity: is habitat heterogeneity the key?* Trends in Ecology & Evolution 18(4), 182-188. https://doi.org/10.1016/S0169-5347(03)00011-9

Bianchi, F., Booij, C., Tscharntke, T., 2006. *Sustainable pest regulation in agricultural landscapes: a review on landscape composition, biodiversity and natural pest control*. Proceedings of the Royal Society B: Biological Sciences 273(1595), 1715-1727. https://doi.org/10.1098/rspb.2006.3530

Billeter, R., Liira, J., Bailey, D., Bugter, R., Arens, P., Augenstein, I., Aviron, S., Baudry, J., Bukacek, R., Burel, F., Cerny, M., Blust, G. de, Cock, R. de, Diekötter, T., Dietz, H., Dirksen, J., Dormann, C., Durka, W., Frenzel, M., Hamersky, R., Hendrickx, F., Herzog, F., Klotz, S., Koolstra, B., Lausch, A., Le Coeur, D., Maelfait, J.P., Opdam, P., Roubalova, M., Schermann, A., Schermann, N., Schmidt, T., Schweiger, O., Smulders, M., Speelmans, M., Simova, P., Verboom, J., van Wingerden, W., Zobel, M., Edwards, P.J., 2008. *Indicators for biodiversity in agricultural landscapes: A pan-European study*. Journal of Applied Ecology 45(1), 141-150. https://doi.org/10.1111/j.1365-2664.2007.01393.x

BMEL, 2013. *Statistisches Jahrbuch über Ernährung, Landwirtschaft und Forsten 2013* [Statistical Yearbook on Nutrition, Agriculture and Forestry 2013]. Bonn: Bundesministerium für Ernährung und Landwirtschaft.

BMEL, 2014. *Agrar-Umweltmaßnahmen: Überblick über Agrarumwelt- und Klimamaßnahmen (AUKM)* [Agricultural Environmental Measures: Overview of Agro Environmental and Climate Measures (AUKM)]. Bonn: Bundesministerium für Ernährung und Landwirtschaft.

BMU, 2010. *Indikatorenbericht 2010: zur Nationalen Strategie zur biologischen Vielfalt* [Indicator Report 2010: on the National Strategy on Biological Diversity].

BMU, 2014. *Die Lage der Natur in Deutschland: Ergebnisse von EU-Vogelschutz- und FFH-Bericht* [The situation of nature in Germany: results of EU bird protection and FFH report].

Brookfield, H., 2001. *Exploring Agrodiversity. New York NY: Columbia University Press*. https://doi.org/10.7312/broo10232

Burton, R., Kuczera, C., Schwarz, G., 2008. *Exploring Farmers' Cultural Resistance to Voluntary Agri-environmental Schemes*. Sociologia Ruralis 48(1), 16-37. https://doi.org/10.1111/j.1467-9523.2008.00452.x

Burton, R.J.F., Schwarz, G. 2013. *Result-oriented agri-environmental schemes in Europe and their potential for promoting behavioural change*. Land Use Policy 30(1), 628–641. https://doi.org/10.1016/j.landusepol.2012.05.002

Carmona-Torres, C., Parra-López, C., Groot, J.C.J., Rossing, W.A.H., 2011. *Collective action for multi-scale environmental management: Achieving landscape policy objectives through cooperation of local resource managers*. Landscape and Urban Planning 103(1), 24-33. https://doi.org/10.1016/j.landurbplan.2011.05.009

De Boef, W.S., Thijssen, M.H., Shrestha, P., Subedi, A., Feyissa, R., Gezu, G., Canci, A., Fonseca Ferreira, M.A.J. Da, Dias, T., Swain, S., 2012. *Moving beyond the dilemma: Practices that Contribute to the On-Farm Management of Agrobiodiversity*. Journal of Sustainable Agriculture 36(7), 788-809 https://doi.org/10.1080/10440046.2012.695329

Deelen, J.G., 2013. *Collective approach to agri-environment actions: the Dutch case*. Den Haag: Ministry of Economic Affairs.

Destatis (2014): *Bodenfläche nach Art der tatsächlichen Nutzung - Fachserie 3 Reihe 5.1 - 2014* [Land area by type of use] https://www.destatis.de/DE/Publikationen/Thematisch/LandForstwirtschaft/Flaechennutzung/BodenflaechennutzungPDF_2030510.pdf?__blob=publicationFile (accessed 3 May 2016).

Di Falco, S., Perrings, C. 2005. *Crop biodiversity, risk management and the implications of agricultural assistance*. Ecological Economics 55(4), 459-466. https://doi.org/10.1016/j.ecolecon.2004.12.005

Dolman, P.M., Lovett, A., O'Riordan, T., Cobb, D., 2001. *Designing whole landscapes*. Landscape Research 26(4), 305-335 https://doi.org/10.1080/01426390120090120

Duelli, P., 1997. *Biodiversity evaluation in agricultural landscapes: an approach at two different scales*. Agriculture, Ecosystems & Environment 62(2), 81-91. https://doi.org/10.1016/S0167-8809(96)01143-7

Duelli, P, Obrist, M.K., 2003. *Regional biodiversity in an agricultural landscape: the contribution of seminatural habitat islands*. Basic and Applied Ecology 4(2), 129-138. https://doi.org/10.1078/1439-1791-00140

EC, 2013a. *Regulation (EU) No 1307/2013: Establishing rules for direct payments to farmers under support schemes within the framework of the common agricultural policy*. Brussel: European Commission.

EC, 2013b. *Regulation (EU) No 1305/2013 of the European Parliament and of the Council of 17 December 2013: On support for rural development by the European Agricultural Fund for Rural Development (EAFRD)*. Brussel: European Commission.

ECA, 2011. *Is agri-environment support well designed and managed?* Special Report No 7//2011. Luxembourg: European Court of Auditors.

Eggers, J., Mettepenning, E., Beckmann, V., 2008. *Assessing the Efficiency of Local Action Groups and Auctions for Designing and Implementing Agri-Environmental Measures in the EU: Results from an Expert Survey*, in T. Gelbe, A. Heißenhuber, L. Kirner, S. Pöchtrager, K. Salhofer (eds), Agrar- und Ernährungswirtschaft im Umbruch. Schriften der Gesellschaft für Wirtschafts- und Sozialwissenschaften des Landbaus e.V. Münster-Hiltrup: Landwirtschaftsverlag, 367-377

Emery, S.B., Franks, J.R., 2012. *The potential for collaborative agri-environment schemes in England: Can a well-designed collaborative approach address farmers' concerns with current schemes?* Journal of Rural Studies 28(3), 218–231. https://doi.org/10.1016/j.jrurstud.2012.02.004

Fahrig, L., Baudry, J., Brotons, L., Burel, F.G., Crist, T.O., Fuller, R.J., Sirami, C., Siriwardena, G.M., Martin, J., 2011. *Functional landscape heterogeneity and animal biodiversity in agricultural landscapes*. Ecology Letters 14(2), 101-112. https://doi.org/10.1111/j.1461-0248.2010.01559.x

Fahrig, L., Girard, J., Duro, D., Pasher, J., Smith, A., Javorek, S., King, D., Lindsay, K.F., Mitchell, S., Tischendorf, L., 2015. *Farmlands with smaller crop fields have higher within-field biodiversity*. Agriculture, Ecosystems & Environment 200, 219-234. https://doi.org/10.1016/j.agee.2014.11.018

Falconer, K., 2002. *Developing a co operative approach to Agri-environmental policies: a transaction cost perspective on farmer participation in voluntary schemes*, in Hagedorn, K. (ed.), Environmental co-operation and institutional change. Theories and Policies for European Agriculture. Cheltenham: Edward Elgar, 239-259.

Franks, J., 2010. *Boundary organizations for sustainable land management: The example of Dutch Environmental Co-operatives*. Ecological Economics 70(2), 283-295. https://doi.org/10.1016/j.ecolecon.2010.08.011

Franks, J.R., Emery, S.B., 2013. *Incentivising collaborative conservation: Lessons from existing environmental Stewardship Scheme options*. Land Use Policy 30(1), 847-862. https://doi.org/10.1016/j.landusepol.2012.06.005

Franks, J.R., McGloin, A., 2007. *Environmental co-operatives as instruments for delivering across-farm environmental and rural policy objectives: Lessons for the UK*. Journal of Rural Studies 23(4), 472-489. https://doi.org/10.1016/j.jrurstud.2007.03.002

Geiger, F., Bengtsson, J., Berendse, F., Weisser, W.W., Emmerson, M., Morales, M.B., Ceryngier, P., Liira, J., Tscharntke, T., Winqvist, C., Eggers, S., Bommarco, R., Pärt, T., Bretagnolle, V., Plantegenest, M., Clement, L.W., Dennis, C., Palmer, C., O-ate, J.J., Guerrero, I., Hawro, V., Aavik, T., Thies, C., Flohre, A., Hänke, S., Fischer, C., Goedhart, P.W., Inchausti, P., 2010. *Persistent negative effects of pesticides on biodiversity and biological control potential on European farmland*. Basic and Applied Ecology 11(2):97-105. https://doi.org/10.1016/j.baae.2009.12.001

Glasbergen, P., 2000. *The Environmental Cooperative: Self-Governance in Sustainable Rural Development*. The Journal of Environment & Development 9(3), 240-259. https://doi.org/10.1177/107049650000900303

Groves, C.R., Jensen, D.B., Valutis, L.L., Redford, K.H., Shaffer, M.L., Scott, J.M., Baumgartner, J.V., Higgins, J.V., Beck, M.W., Anderson, M.G., 2002. *Planning for Biodiversity Conservation: Putting Conservation Science into Practice A seven-step framework for developing regional plans to conserve biological diversity, based upon principles of conservation biology and ecology, is being used extensively by the nature conservancy to identify priority areas for conservation*. Bioscience 52(6) 499-512. https://doi.org/10.1641/0006-3568(2002)052[0499:PFBCPC]2.0.CO;2

Haaren, C. von, Hülsbergen, K.-J., Hachmann, R., 2008. *Naturschutz im landwirtschaftlichen Betriebsmanagement: EDV-Systeme zur Unterstützung der Erfassung, Bewertung und Konzeption von Naturschutzleistungen landwirtschaftlicher Betriebe* [Nature conservation in agricultural management: IT systems to support the collection, evaluation and design of nature conservation services of agricultural enterprises]. Stuttgart: ibidem-Verlag.

Hadley, A.S., Betts, M.G., 2012. *The effects of landscape fragmentation on pollination dynamics: absence of evidence not evidence of absence*. Biological Reviews 87(3), 526-544. https://doi.org/10.1111/j.1469-185X.2011.00205.x

Halada, L., Evans, D., Romão, C., Petersen, J.-E., 2011. W*hich habitats of European importance depend on agricultural practices?* Biodiversity and Conservation 20(11), 2365-2378. https://doi.org/10.1007/s10531-011-9989-z

Hampicke, U., 2013. *Kulturlandschaft und Naturschutz: Probleme-Konzepte-Ökonomie* [Cultural Landscape and Conservation: Problem-Concepts-Economy].

Henle, K., Alard, D., Clitherow, J., Cobb, P., Firbank, L., Kull, T., McCracken, D., Moritz, R.F., Niemelä, J., Rebane, M., Wascher, D., Watt, A., Young, J., 2008. *Identifying and managing the conflicts between agriculture and biodiversity conservation in Europe –A review*. Agriculture, Ecosystems & Environment 124(1-2), 60-71. https://doi.org/10.1016/j.agee.2007.09.005

Herzog, F., 2005. *Agri-environment schemes as landscape experiment*s. Agriculture, Ecosystems & Environment 108(3), 175-177. https://doi.org/10.1016/j.agee.2005.02.001

HMUKLV, 2014. *Hessischer Biodiversitätsbericht 2014: Bericht der Landesregierung über die im Zeitraum Mitte 2012 bis Mitte 2014 ergriffenen und bis Ende 2014 geplanten Maßnahmen zur Erhaltung der biologischen Vlelfalt in Hessen* [Hessischer Biodiversitätsbericht 2014: Report of the state government on the measures planned for the period from mid-2012 to mid-2014 and planned for the end of 2014 to preserve biological diversity in Hesse]. Wiesbaden: HMUKLV.

Höft, A., 2003. *Akzeptanz von Förderprogrammen zur naturschutzgerechten Grünlandnutzung im Landkreis Rügen* [Acceptance of subsidy programs for the protection of grassland in the district of Rügen]. Diploma thesis. Greifswald: Universität Greifswald.

Kleijn, D., Sutherland, W.J., 2003. *How effective are European agri-environment schemes in conserving and promoting biodiversity?* Journal of Applied Ecology 40(6), 947-969. https://doi.org/10.1111/j.1365-2664.2003.00868.x

Lehmann, P., Schleyerb, C., Wätzold, F., Wüstemannd, H., 2009. Promoting multifunctionality of agriculture: an economic analysis of new approaches in Germany. Journal of Environmental Policy & Planning 11(4), 315–332. https://doi.org/10.1080/15239080903033879

Lettmann, A., 1995. *Akzeptanz von Extensivierungsstrategien: Eine empirische Untersuchung bei Landwirten in Nordrhein-Westfalen* [Acceptance of extensification strategies: An empirical study of farmers in North Rhine-Westphalia]. Bonner Studien zur Wirtschaftssoziologie. Witterschlick/Bonn: Verlag M. Wehle.

Mann, S., 2010. *Eine Schwachstellenanalyse der Öko-Qualitätsverordnung* [A weak point analysis of the eco-quality regulation]. Agrarforschung Schweiz 1(1), 24-29.

Matthews, R., Selman, P., 2006. *Landscape as a Focus for Integrating Human and Environmental Processes*. Journal of Agricultural Economics 57(2):199-212. https://doi.org/10.1111/j.1477-9552.2006.00047.x

Matzdorf, B., Lorenz, J., 2010. *How cost-effective are result-oriented agri-environmental measures? – An empirical analysis in Germany*. Land Use Policy 27(2), 535–544. https://doi.org/10.1016/j.landusepol.2009.07.011

McVittie, A., Moran, D., Thomson, S., Economy, L., 2009. *A review of literature on the value of public goods from agriculture and the production impacts of the single farm payment scheme*. Report prepared for the Scottish Government's Rural & Environment Research & Analysis Directorate (RERAD/004/09), Land Economy and Environment Research Group, Scottish Agricultural College

MEA, 2013. *Farmers' groups and the Common Agricultural Policy*. Newsletter published by the Dutch Ministry of Economic Affairs.

Mettepenningen, E., Beckmann, V., Eggers, J., 2011. *Public transaction costs of agri-environmental schemes and their determinants – Analysing stakeholders' involvement and perceptions*. Ecological Economics 70(4), 641-650. https://doi.org/10.1016/j.ecolecon.2010.10.007

Mettepenningen, E., Vandermeulen, V., Delaet, K., van Huylenbroeck, G., Wailes, E.J., 2013. *Investigating the influence of the institutional organisation of agri-environmental schemes on scheme adoption*. Land Use Policy 3, 20-30. https://doi.org/10.1016/j.landusepol.2012.12.004

Mitchell, M.G.E., Bennett, E.M., Gonzalez, A. 2013. *Linking landscape connectivity and ecosystem service provision: current knowledge and research gaps*. Ecosystems 16(5), 894-908. https://doi.org/10.1007/s10021-013-9647-2

Moxey, A., White, B., Ozanne, A., 1999. *Efficient Contract Design for Agri-Environment Policy*. Journal of Agricultural Economics 50(2), 187-202. https://doi.org/10.1111/j.1477-9552.1999.tb00807.x

Naschold, F., Oppen, M., Wegener, A., 1997. *Innovative Kommunen. Internationale Trends und deutsche Erfahrungen* [Innovative communities. International trends and German experiences]. Stuttgart: Köhlhammer Verlag, 49-74.

Nölting, B., 2006. *Die Politik der Europäischen Union für den ländlichen Raum. Die ELER-Verordnung, nachhaltige ländliche Entwicklung und die ökologische Land-und Ernährungswirtschaft* [The policy of the European Union for rural areas. The EAFRD regulation, sustainable rural development and the ecological land and food industry]. Discussion paper Nr. 23/06. Berlin: Technische Universität Berlin.

OECD, 2013. *Providing Agri-environmental Public Goods through Collective Action*. Paris: OECD Publishing.

Omer, A., Pascual, U., Russell, N., 2010a. *A theoretical model of agrobiodiversity as a supporting service for sustainable agricultural intensification.* Ecological Economics 69(10), 1926-1933. https://doi.org/10.1016/j.ecolecon.2010.04.025

Omer, A.A., Pascual, U., Russell, N.P., 2010b. *The contribution of biodiversity to modern intensive farming systems*, in S. Lockie and D. Carpenter (eds), Agriculture, Biodiversity and Markets: Livelihoods and Agroecology in Comparative Perspective. London and Washington DC: Earthscan, 117-135.

Pe'er, G., Dicks, L.V., Visconti, P., Arlettaz, R., Báldi, A., Benton, T.G., Collins, S., Dieterich, M., Gregory, R.D., Hartig, F., 2014. *EU agricultural reform fails on biodiversity*. Science 344(6188). 1090-1092. https://doi.org/10.1126/science.1253425

Prager, K., 2010. *Local and Regional Partnerships in Natural Resource Management: The Challenge of Bridging Institutional Levels.* Environmental Management 46(5), 711-724. https://doi.org/10.1007/s00267-010-9560-9

Prager, K., 2012. *Collective efforts to manage cultural landscapes for resilience*, in T. Plieninger and C. Bieling (eds), Resilience and the Cultural Landscape: Understanding and Managing Change in Human-Shaped Environments. Cambridge: Cambridge University Press, 205-223. https://doi.org/10.1017/cbo9781139107778.016

Prager, K. 2015. *Agri-environmental collaboratives for landscape management in Europe*. Current Opinion in Environmental Sustainability 12, 59-66. https://doi.org/10.1016/j.cosust.2014.10.009

Rizzo, D., Marraccini, E., Lardon, S., Rapey, H., Debolini, M., Benoît, M., Thenail, C., 2013. *Farming systems designing landscapes: land management units at the interface between agronomy and geography*. Geografisk Tidsskrift-Danish Journal of Geography 113(2), 71-86. https://doi.org/10.1080/00167223.2013.849391

Rozendaal, W., 2014. *The Dutch collective approach in agri environmental schemes: Project leader Pilot CAP*. Project secretary SCAN.

Schmidt, T.G., Röder, N., Dauber, J., Klimek, S., Laggner, A., Witte, Td., Offermann, F., Osterburg, B., 2014. *Biodiversitätsrelevante Regelungen zur nationalen Umsetzung des Greenings der Gemeinsamen Agrarpolitik der EU nach 2013* [Biodiversity-relevant regulations for the national implementation of the EU's post-2013 EU Common Agricultural Policy]. Working Paper 20. Braunschweig: Thünen.

Schouten, M., Polman, N., Westerhof, E., 2013. *Exploring green agricultural policy scenarios with a spatially explicit agent-based model*. Werkdocument 323. Wageningen: Wageningen UR.

Termeer, C.J., Stuiver, M., Gerritsen, A., Huntjens, P., 2013. *Integrating Self-Governance in Heavily Regulated Policy Fields: Insights from a Dutch Farmers' Cooperative*. Journal of Environmental Policy & Planning 15(2), 285-302. https://doi.org/10.1080/1523908X.2013.778670

Thiele-Bruhn, S., Bloem, J., Vries, F.T. de, Kalbitz, K., Wagg, C., 2012. *Linking soil biodiversity and agricultural soil management*. Current Opinion in Environmental Sustainability 4(5):523-528. https://doi.org/10.1016/j.cosust.2012.06.004

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National Strategy for Agriculture in Romania – Horizon 2035

Abstract: *In this paper we formulate and develop foundation targets for the Romanian agri-food sector in the short, medium and long terms. The national strategy must have in view the main impact trends such as: innovation, knowledge transfer, institutional cooperation and re-organisation, infrastructure development, cohesion between the local, regional, national and European policies and projects. The development in the world of tomorrow, Horizon 2020-2035, is expected to include: significant technological advances in biology, genetics and agriculture; development of communication, IT, cognitive sciences; China's economic rise; European demographic decline; European Union (EU) economic stagnation and gradual loss of competitiveness in the face of new emergent countries; climate changes. In this context, the conditionality of the population's food security draws attention to major issues that Romania will face in the medium and long terms, such as: population decline and aging, progressive depletion of the productive potential of soil in the absence of supporting measures, and research fragility for agriculture sector. To answer the questions related to food safety and security in Romania towards 2030-2035, SWOT analysis was used for the following products: cereals, vegetables, fruit, meat and processed products. The analysis revealed certain vulnerabilities: Romania's domestic agricultural supply is insufficient in a range of products; annual instability for domestic agricultural supply; Romania's competitiveness in many agricultural products is problematic, and the integration into the European single market has amplified these problems; low level of processing the agricultural raw materials and of value added; low income and income gaps between the residence areas resulting in food insecurity; existing problems in rural areas, mainly with weak infrastruc-*

ture; poor food consumption in terms of quality. Then, we defined three main strategic directions for food security and safety in Romania, in the next two decades, trying to identify those areas on which Romania should focus its efforts to reach performance convergent with the developed countries of the EU. The proposed scenarios show the ways in which we see to achieve the identified targets.

Keywords: *agriculture, strategy, Horizon 2035, Romania.*

Introduction

Food security can be evaluated at different levels, yet most references are made at the macro-economic level (world, regional or national) and the micro-economic level, i.e. at household and individual level. Depending on the level of reference, the focus is laid on one or several out of the four food security dimensions, namely: food availability, supply stability, economic access and utilisation of food, represented by the individuals' desire to eat healthy food. In the case of using the food security concept at world or national level, the focus is laid on the capacity of countries to provide a sufficient agricultural supply so as to meet the population's food and nutrition needs (Pinstrup, 2009). The availability of food does not necessarily ensure access to food, as the problems linked to income distribution at society level can affect food security at the household level.

In this context, a first objective of this paper, which is based on certain results of Project 5 'Food Security and Safety' elaborated by the Institute of Agricultural Economics under the Romanian Academy Programme 'Romania's Development Strategy for the Next 20 years', was to evaluate the Romania population's food and nutrition security situation and to identify its main determinants and vulnerabilities. In the next sections, on the basis of plausible scenarios on the evolution of the general economic situation, as well as on the evolution of the Romanian agri-food sector, the necessary benchmarks are defined, on the basis of which the vision on food security and safety towards 2035 was developed.

The agri-food sector represents an important element for food security, as it is responsible for domestic food availability and supply stability. In a situation when it can meet these requirements only partially, due to insufficient agricultural resources or insufficient development, countries can import foodstuffs, yet this possibility can be limited by their available financial resources for imports. The reliance on massive food imports represents vulnerability, mainly in the current context of increased volatility of world agricultural prices. However, at the same time, food security is only partially conditioned by the existence of sufficient agricultural supply. Most often, the problems and vulnerabilities appear at micro-economic level, where the access to food is practically limited by the low purchasing power, by the lack of incomes, by poverty in general. That is why an essential determinant of a country's food security is represented by its general sustainable development level, on which the household incomes, the population welfare and the physical and economic access to food ultimately depend. That is why in the approach to the vision on food security and safety at the 2035 horizon, we took into consideration the need for the country's general socio-economic development in parallel with the need for the development of the agri-food sector and rural areas, on the other.

Methodology

Our approach focuses on issues related to the agricultural sector's contribution to ensure food security for the population, as well as on aspects related to the access to food, to the food demand determinants and to certain elements regarding the population's nutritional status. The methods used in our analysis were from the class of qualitative methods (synthesis of literature, SWOT analysis, defining the scenarios and the vision), quantitative methods (extrapolation of trends) and semi-quantitative methods (Delphi technique).

On the basis of specialty literature on food security and safety, a diagnosis analysis of the agriculture and food situation in Romania was made, which covers the following thematic: agricultural land (including soil resources, soil quality conservation, water resources and climate change effects), economic performance of agricultural holdings, evolution of crop and animal production in the period 1990-2013/2014 and food security (focus on population's access to food).

For the SWOT analysis, a mix of indicators was used, which also included the indicators used by national and international organisations for the evaluation of the population's food and nutrition status in different regions of the world. The data sources refer to indicators and studies elaborated by FAO, OECD, IFPRI, Eurostat, EUI, Defra, MS and Romanian National Institute of Statistics (INS).

The formalisation of the vision on the future food security in Romania at the 2035 horizon was based on the quantification of the convergence potential of food security indicators from Romania with the developed countries from the EU, taking France and sometimes Poland as references.

By using the trend extrapolation method, we estimated the evolution of the food consumption expenditure share in total consumption expenditures, together with the evolution of cereals and meat consumption per capita. These variables were calculated under two economic growth scenarios. The first presupposes a moderate economic growth rate of 2 per cent, which is equal to the average economic growth rate in the investigated period. The second is more optimistic, because a 4 per cent economic growth rate is taken into consideration. These two economic growth rates are applied to the GDP value per capita expressed in PPS (purchasing power standard), thus obtaining an evolution of this in the forecast interval.

For calculating the evolution of the share of consumption expenditures in total expenditures we used 'Household Budget Survey', a database with information at household level, in 2012. A regression was estimated of the form:

$$w_i = a_1 + a_{2*} y_i + u_i$$

where: w_i is the share of food expenditures in total expenditures for each household;

a_1 and a_2 are coefficients estimated by the least square method;
y_i is the household income;
u_i is the regression error.

By using the regression equation, more exactly the a_1 and a_2 coefficients, we calculated the share of food expenditures for the given incomes from the two scenarios.

For calculating food consumption, we used information from the food balance sheets, supplied by Faostat. This database offers information on the food availabilities per capita for the main food products in different countries.

Results

SWOT analysis

In this paper, the analysis of strengths and weaknesses is structured by the four dimensions of food security, namely: A. Agricultural production availability, B. Access to food, C. Supply stability and D. Food safety and quality (Table 1).

Table 1. SWOT analysis

Strengths	Weaknesses
A. Agricultural and food production availability	
1. Romania is an important agricultural producer, with significant agricultural resources (crop production: arable land; animal production: pastures and hayfields). 2. For certain groups of food products, domestic production could cover the population's consumption needs (and positive trends for poultry, mutton and goat meat). 3. The food and beverages industry is the second largest in Central and Eastern Europe, after Poland, and significant investments were made in this sector in the last decade. 4. The food retail sector has significantly developed, with growth rates among the highest in the region. 5. In calorie terms, the food availability per person exceeds the average food consumption requirement per capita recommended by the Ministry of Health.	1. Weak performing agri-food sector; there are significant productivity gaps between Romania and the developed countries, which will only be gradually removed. 2. The extremely fragmented agrarian structure and the large number of farms make it difficult for the agricultural products to cross the chains, mainly in the vegetables, fruit and dairy products sectors. The absence of producer associations makes this situation even more difficult. 3. Domestic agricultural production cannot cover the population's consumption needs, on a systematic basis, in certain important groups of foodstuffs (meat, milk, fruit, vegetables and fish). 4. The share of low-value calories coming from cereals, potatoes and edible roots is much higher compared to other EU countries, yet decreasing.

	5. The daily availability of animal protein, expressed in grammes/capita/day is lower than in other European countries. 6. The food production value per capita is lower, which also means that the food supply per capita is lower.
B. Access to food	
1. The population's real incomes significantly increased in the economic growth period (2001-2008). 2. The relative prices of food, at purchasing power parity (PPS), are lower compared to the European average, yet they have increased much faster in recent years (e.g. being higher than in Poland in 2012). 3. Food consumption increased in the economic growth period, mainly in the products with a higher nutritional value. 4. In the period 2001-2009 food consumption in the products with lower nutritional value, i.e. in potatoes, edible roots and even in certain cereals, decreased.	1. GDP per capita expressed at PPS is very low, below the EU average (in the penultimate place, above Bulgaria). 2. There are big territorial disparities in terms of GDP per capita at PPS, and these increased in the post- EU accession period. 3. The share of food consumption expenditures in total consumption expenditures is extremely high; it exceeds 65 per cent for the poor population (first deciles). 5. The poverty rate is very high, mainly in the rural areas. 6. The road network density per 100 km² is lower than in the compared countries and has declined in recent years.
C. Supply stability	
1. The consumer prices of food are relatively stable, their volatility being comparable to that from France and Poland. 2. The variability of available food supply per capita, expressed in kcal (measured by the standard deviation from the trend of per capita calorie availability in the last five years), is low. 3. In the last decade, warehouses were built for grain storage on the farm, with investments that were funded through European programmes.	1. Crop production is extremely volatile, mainly in the case of cereals. 2. The human consumption dependency on imports is high in most years in soybeans, sugar, meat, fish and fruit, and even in cereals (wheat) in certain years. 3. The share of effectively irrigated agricultural land has continuously decreased in the last 20 years. 4. The value of food imports in total exported commodities is higher compared to the other EU member states, and this can bring to discussion the problem of financial availabilities for agricultural imports. 5. Food production variability per capita, expressed in international dollars at PPS, is higher compared to other countries. 6 The level of public expenditures for research and development is very low. 7. Farmers' access to credits is low, which limits the possibility of funding certain production infrastructure elements (for instance, local solutions for irrigation) or production technologies that could attenuate the effect of weather excesses.

D. Food safety and quality	
1. The phytosanitary and zoo-veterinary standards in conformity with the EU legislation were implemented both in the agricultural production sector and in the agro-processing sector. 2. The Romanian population's dietary diversity increased with the increase of incomes.	1. The percentage of population with access to improved drinking water sources is below the European standards. 2. The percentage of population without access to sanitary facilities is below the European average. 3. The percentage of child mortality as a result of food problems varied in the period 1990-2002, from 4.3 per cent to 3.3 per cent of all children under 5 years old. 4. There are a significant share of stunted children under 5 years due to poor nutrition. 5. The share of underweight children under 5 years old is relatively high for a EU country.
Opportunities	**Threats**
1. It is expected that the poverty level and implicitly the food insecurity risk will decrease with the increase of incomes. 2. The domestic food demand is growing for the superior products from the nutritional point of view, such as fruit, meat, fish and dairy products, with the increase of incomes. 3. Food demand is very elastic, which means that it has a significant growth potential, in the conditions of growing incomes. 4. Income growth will also change the population's consumption preferences, with an increased demand for quality, healthy, ecological products. 5. The foreign demand for food is on the rise, e.g. for meat in the Asia-Pacific area, which will ensure export markets for Romanian products in the future. 6. In the medium term, there is a stability and predictability in relation to the agricultural policy in Romania, as the Common Agricultural Policy (CAP) measures for the period 2014-2020 have already been adopted. 7. The continuation of EU funding through regional development funds and from other structural funds will improve Romania's transport infrastructure, making it more attractive for foreign investments. 8. Romania's geographical position may allow a commercial hub status between the emergent countries from the Near East and the EU, with the economic benefits arising from that status.	1. There is the risk of widening gaps with regard to the population's incomes across regions and by residence areas and of a deepening of social polarisation in the next period. 2. There are uncertainties in relation to the future evolution of the CAP by 2035 and to agriculture funding from the EU budget. 3. There are important agricultural production risks related to climate factors and depletion of certain natural resources, like the reserves of soil substances and the water reserves. 4. The risk related to regional political crises can become important, and this might stop foreign investment and financial flows, putting into danger the future economic growth of the country. 5. The demographic risk related to the diminution of the country's population and of the young and active population in particular may put pressure on the country's future development and, more concretely, on the economic sectors where capital productivity is lower (such as agriculture), as the labour force will migrate to the sectors where it will be better remunerated. 6. The disease risk can affect the livestock herds and the economic performance of the livestock sector, as well as the exports. At the same time, the crop diseases can affect yields and economic results in crop production.

Source: own compilation

Vision

The vision on the population's food security in Romania was developed starting from the scope of this concept, which was gradually extended, from the initial condition of the existence of sufficient food for the entire population of the country, towards more complex approaches related to the population's economic access to food, to supply stability, food quality and nutrition security. As such, *the vision on ensuring food security for the population in the next 20 years implies not only a better functioning of the agricultural and agro-processing sector, but also sustainable development and economic growth on the long run, in parallel with environment preservation and conservation, as a guarantee to the preservation of the soil, water and air resources*, in the absence of which not only food security and safety are threatened, but also people's life itself.

The design of this vision started from the hypothesis that, in order to have a credible process of convergence with the developed countries of the EU we need sustained economic growth, coupled with a consistent investment effort, which should raise Romania's agriculture productivity and competitiveness to higher levels.

The objectives promoted by us under this vision target the availability and stability of agricultural and food supply, on one hand, as well as objectives related to the increase of the living standard and of the population's economic access to food, on the other hand:

- increase of Romanian agriculture's role as a supplier of food security, by increasing the coverage of food consumption needs from domestic production, by domestic agricultural supply stabilisation (mainly through irrigation infrastructure support measures as well as other measures to combat climate change and its impacts) and by increasing agricultural exports and acquiring the food security supplier status at regional and European level;
- improving the population's food access and of food quality through the increase of the population's purchasing power, by narrowing the gaps in relation to the economic access to food of the different population categories and dietary quality improvement through the increase of food protein intake and of dietary diversity;
- rural development and raising the educational level of the population employed in agriculture, premises for the food and nutrition safety improvement, by solving the problem of technical and transport infrastructure in the rural communities until 2035 and by raising young farmers' educational and training levels.

Increasing the coverage of food consumption needs by domestic production

Agricultural production self-sufficiency, defined as the proportion of domestic consumption covered by domestic production, is considered as the main guarantor of a country's food security. This approach is relevant for Romania from the perspective of the natural resources this country has, as well as by the comparisons in time (with the situations from the relatively recent past) and space (with EU member states with similar agricultural potential). As a result of price increases on the global markets of agricultural commodities, from 2007-2008, the concerns for food security were found among the consultation themes of 2010 on the CAP reform, while the importance attached to self-sufficiency by the officials responsible for agricultural policies has increased in recent times, at both European and national level. Self-sufficiency in certain important agricultural products in the EU featured stability in the last decade (Matthews, 2014), most staples being self-sufficient in 2013: wheat (126.1 per cent), cheeses (107.9 per cent, upward trend), butter (104.5 per cent, downward trend), skimmed milk powder (158.2 per cent, upward trend) and whole milk powder (213.5 per cent), pork (111.0 per cent) and poultry meat (104.2 per cent). The products for which the consumption at EU level is not covered by production are the following: maize (88.6 per cent), rice (64.3 per cent), sugar (88.6 per cent, downward trend), beef (99.6 per cent, upward trend) and sheep and goat meat (86.1 per cent, upward trend).

In Romania's case, the coverage of food consumption needs from domestic production is a priority objective for meat, as a result of the alarming low self-sufficiency rate in pork (72.6 per cent in 2013). For the other types of meat, self-sufficiency was not reached either in 2013. That is why the vision proposed had in view reaching a self-sufficiency rate in meat (per total) of 100 per cent by 2035. The improvement of self-sufficiency in fruit and vegetables was added to this potential target, as these products are considered important from the perspective of food consumption pattern evolution in Romania, in the sense of increasing the share of fruit and vegetables in the population's diet. In this respect, the targets proposed for total production can ensure self-sufficiency in meat and meat preparations at the 2035 horizon, mainly on the basis of the sustained growth of poultry meat production and re-launching the pork production. Through the contribution of these two sectors, total meat production is expected to increase by 26 per cent in the medium term and by 41 per cent in the long term, thus ensuring average yearly meat consumption per capita of 64.4 kg in the medium term (2025) and 69.3 kg in the long term (2035).

In vegetables, the self-sufficiency level is expected to reach almost 100 per cent in the medium and long terms, as a result of the increase of the areas under greenhouses and plastic tunnels and of the increase of yields per hectare, on the basis of selected seeds with high productive potential, as well as of the correct application of technologies, including the procurement of equipment, logistics, new storage systems. In addition, production and price volatility due to adverse climate evolutions might decrease. Corroborated with the increase in the number of producer groups and organisations, the number of warehouses could also increase and the storage capacity could reach 166.8 thousand tonnes in 2018. This will make it possible to better plan the production, avoiding the surplus production situations in certain species of vegetables or the lack or insufficient cultivation of other vegetables, which is a relatively frequent situation at present.

For fruit, re-plantations are envisaged, which will improve self-sufficiency in the medium and long terms; yet the imports of fruit will continue to be important in the population's consumption, mainly out of season (citrus, other exotic fruit). It is expected that the re-plantations will receive financial support under the National Rural Development Plan (PNDR), but the high co-financing rate asked from farmers may become a restrictive factor in the access to funds.

Romania – net exporter of agri-food products

From the vision on agriculture as food security supplier, we shall next analyse the context in which Romania could regain the status of agri-food exporter and food security supplier at regional and European level. In formulating the work hypotheses, we must also take into account the main EU perspectives on the world market at the 2024 horizon, namely: the EU will remain a net exporter of meat (pork and poultry), dairy products (cheese, milk powder) and wheat; but will continue to have trade deficits in maize and oilseeds (soybean) and soybean meal.

For Romania, the statistical indicators for the period 2007-2014 were calculated (average yearly growth rate and annual fixed base and chain indices). These were correlated with the trends supplied by the information from the balance sheets, as well as with the trends estimated by the members of the team who investigated the most important products.

An important target is re-conquering the domestic market, so that for the main products with problems (meat, vegetables, fruit), domestic production can supply the largest part of the production sold in Romania (mainly in urban retail – supermarkets and hypermarkets).

At the 2035 horizon, we expect that the value of exports will double compared to 2013, considering the production forecasts and the self-sufficiency targets for the main products (live animals, meat, vegetables, fruit and cereals).

The import growth rates will be much lower (estimated at about 1.3 per cent per year, compared to almost 2.4 per cent per year in exports), so that by 2035 the imports will be about 32 per cent higher than in 2013. The increase of imports of very high quality processed products is envisaged (with high value), as well as of breeding animals of high genetic value. As a result, we estimate a positive trade balance, as well as coverage of imports by exports of over

125 per cent, after 2020. The necessary conditions for the increase of exports are the rehabilitation of domestic agri-food commodity chains, increase of the population's food consumption needs coverage by the domestic production, supply concentration, improving and maintaining product quality.

Table 2. Targets related to the value of trade with the analysed products (EUR million)

Specification	Reference value (2013)	Short term (2018)	Medium term (2025)	Long term (2035)
Exports				
Live animals	314	358	400	421
Meat	226	232	264	358
Vegetables	80	99	132	200
Fruit	79	94	119	168
Cereals	1983	2162	2634	3012
Imports				
Live animals	164	208	176	130
Meat	487	448	352	287
Vegetables	186	149	109	69
Fruit	294	274	247	214
Cereals	327	327	327	327

Source: authors' estimates.

Increasing the population's access to food

The population's food access represents a main condition for the population's food security. This depends in the first place on the household incomes and the food prices. In the countries with lower development level, food access can also depend largely on the subsistence production of the small peasant household farms and in this case their food security is conditioned by the agricultural land and animals into ownership. Subsistence economy and self-consumption still play an important role in ensuring food security for the population in Romania[1], mainly for the rural households, yet this modality to ensure the necessary food resources may lose its importance in the future, with the development of the country and mainly with the modernisation of rural areas.

As Romania is one of the EU countries with medium-low level of incomes per capita, it is facing certain vulnerabilities referring to the food security of certain population groups, under the background of poverty and social exclusion. The indicator that most synthetically reflects this situation is the share of food consumption expenditures in total consumption expenditures, which reached 44.9 per cent in 2013, one of the highest shares in the EU. However, this share was down from 55.9 per cent in 2001, hence by 11 per cent in 15 years.

[1] According to the Household Budget Survey, 2011, conducted by the National Institute of Statistics (INS) from Romania, more than half of the food consumption on the rural households comes from own-produced food. The level of self-consumption in total food consumption is 56 per cent in milk, 53 per cent in cheese, 85 per cent in eggs, 50 per cent in fresh meat, 60 per cent in vegetables, 45 per cent in fruit.

In the medium term, with the constant growth of incomes, the food demand becomes inelastic, in the sense that it continues its growth but it slows down its growth rate; in the long term, a saturation of demand growth will be reached for most products, and the demand will even decrease for certain products, under the background of diet modification and increase of concerns for healthy food. These evolutions, i.e. demand saturation and consumption decrease in certain products (such as meat), are currently taking place in certain developed European countries, due to the concerns for healthy food, change of demographic structures by the increase of the share of elderly population, changes in the lifestyle that presuppose a less intense physical activity. For example, in France, food consumption expenditures were down from 20 per cent in 1960 to 14 per cent in 2001, hence by 6 per cent in 40 years. However, in the same period, the population's food behaviour changed, due to the increased focus on health problems. People gradually gave up consuming traditional products rich in sugar and fat, and the red meat consumption has decreased since 1980. The consumption of poultry meat and ready-prepared food has increased instead (Monceau et al., 2002).

We presuppose that similar evolutions of food consumption will also take place in Romania, with the increase of population's incomes and purchasing power. As regards the growth of population's incomes, we started from the hypothesis of a positive growth trend of GDP per capita, expressed at purchasing power parity, which should get the population's purchasing power in Romania closer to the average EU-28 level in 2025 and to the current level of France in the long term, in 2035.

Taking into consideration the fact that the long-term trends that we have consulted (EC, 2015) indicate an economic growth of 2.3-2.4 per cent for Romania in the period 2014-2025 and a slowing down of growth rate from 1.6 per cent-1.7 per cent in the period 2025-2030, we considered it reasonable to presuppose that GDP per capita expressed at purchasing power parity will increase by 4 per cent on average annually in the period 2015-2025 and by 2 per cent annually in the period 2026-2035. Starting from these hypotheses and using certain regression equations based on Engel's curbs, we estimated the values of the share of food consumption expenditures, in the medium and long terms (Table 3).

The share of self-consumption expenditures is decreasing very slowly Romania's, although we presupposed a significant upward trend of GDP per capita at PPS (up to EUR 27,500 per capita at purchasing power parity, by 2035). This because for estimating the parameters of regression equations we used historical data (2000-2013), when the dynamics of this coefficient were affected by the very high income disparities, both across regions and by residence areas. Although incomes increased on average, the indicator referring to the share of food consumption expenditures features great inertia due to the rising disparities in relation to the level of incomes and the high share of poor and very poor population. We can presuppose that this indicator will reverse its trend in the future if we can reduce the income gaps and social polarisation.

Table 3. Target indicators of the increase of population's access to food

Specification	UM	Reference value (2013)	Short term (2018)	Medium term (2025)	Long term (2035)
Share of food consumption expenditures in total consumption expenditures	%	44.9	43.5 - 42.6	39.2 - 37.1	35.8 - 32.9
Meat consumption per capita total carcass equivalent, of which:	kg/annum	57.4	60.5	64.4	69.3
-pork	kg/annum	29.02	29.58	31.20	32.64
-poultry	kg/annum	17.53	19.36	20.78	22.74
-beef	kg/annum	5.1	5.5	5.9	6.5
Vegetables consumption	kg/annum	152	167	184	187
Fruit consumption	kg/annum	73.7	79.3	86.0	89.3

Source: authors' estimates.

Rural development and the educational level of the population employed in agriculture

Table 4. Targets for technical and transport infrastructure in the rural communities

Specification	Reference value	Short term (2018)	Medium term (2025)	Long term (2035)
Share of modernised rural roads	9.67 (2014)	20	40	80
Share of communes with water pipe networks	71.65 (2013)	75	80	90
Share of communes with sewerage networks	23.49 (2013)	30	50	75

Source: authors' estimates.

The poor state of technical infrastructure is one of the most important factors which restricts the development of the rural areas in Romania. Strategic objectives, by 2035 are similar with Romania's territorial development strategy in 2035: i) providing a functional integration of rural areas in the national territory by supporting interconnection of transport networks; ii) increasing the quality of life in rural areas by developing the technical infrastructure in order to ensure quality, attractive and inclusive rural areas. The targets were divided into three categories: short-term (2018), medium-term (2025) and long term (2035) (Table 4).

Targets can be achieved through more financial support from different policy instruments, mainly PNDR and Operational Programmes (small and large infrastructure respectively).

In Romanian rural areas, the younger generation is becoming less and less concerned with access to secondary and higher education and specialised training of managers in agriculture is weak. The strategic objective proposed can be operationalised through two specific objectives: i) improving the education and training of young people in rural areas to improve access and their participation in the labour market designed to ensure a satisfactory level of incomes and thereby access a nutritionally balanced diet; ii) professionalisation of agriculture in order to increase the economic performance of farms and agricultural product quality for end users. The targets are summarised in Table 5.

Table 5. Targets for increasing agricultural education and training specialised in rural Romania

Specification	Reference value	Short term (2018)	Medium term (2025)	Long term (2035)
Share of young people in sparsely populated areas (15-17 years) who are not enrolled in education or training system, or employees	8.5 (2014)	8	5	2
Rate of early school leaving in sparsely populated areas (18-24)	29.2 (2013)	26	18	11
Share of farms with managers with agricultural training	3.6 (2013)	7	35	60

Source: authors' estimates.

We note that targets for increasing the educational level of the younger generation and rural training agricultural specialists have been determined taking into account the current realities of rural Romania compared with realities of rural and agriculture from France.

Resources

In order to reach the targets on the self-supply in the important products from Romania's food security perspective, i.e. meat, vegetables and fruit (Table 6), we estimated the necessary public funds for investment support in the respective agricultural production sectors.

Table 6. Self-supply targets in the important agricultural products for food security (%)

Product	Baseline situation (2013)	Short term (2018)	Medium term (2025)	Long term (2035)
Pork	72	72	93	100
Poultry meat	94.3	97	100	109
Beef	91.2	93	96	100
Vegetables	91	93	95	100
Fruit	78.6	79	83	86

Sources: INS (2013) and authors' estimates.

The necessary financial resources from public funds for the support to investments in the priority areas for food security and safety in the period can be provided in the period 2016-2020 from the PNDR funds and through special budgetary allocations (for the main irrigation infrastructure or for the rural infrastructure), according to the estimates presented in Table 7.

Table 7. Estimating the support from public funds necessary for funding the investments in the priority areas for food security and safety (EUR million)

Priority sector	Available 2016-2020	Necessary 2016-2020	Necessary 2021-2025	Necessary 2026-2035	Observations
Pork	823 (SM 4.1)	150	150	300	Beneficiaries will ensure co-financing from own or attracted sources
Poultry meat	373 (SM 4.2)	171	172	345	
Beef	400 (SM 6.1)	85	130	235	
Vegetables	17 (SM 9.1)	188	196	208	
Fruit	25 (SM 16.4)	321	443	443	

Note: SM = sub-measure of PNDR 2014-2020
Source: authors' estimations.

The comparison between the available and necessary resources for the period 2016-2020 reveals the fact that from the food security perspective the main problem is not represented by the financial resources (in fact, the available funds were not spent under PNDR 2007-2013 either), but rather by the set of measures to boost investments (and production implicitly) in the priority sectors, i.e. livestock, vegetables and fruit. The credit guarantee funds will have an important contribution to the implementation of measures to support private investments, as proved for PNDR 2007-2013 by the activity of Rural Credit Guarantee Fund (RCGF).

Scenarios

This report estimates started from the hypothesis of continuation of the generous EU finance received by the agricultural sector and rural areas of Romania. We mention that this funding started even from the pre-accession period, under the SAPARD programme, and continued with the financial allocations received under the two CAP Pillars, from EAGF and EAFRD, under the financial programming 2007-2013 and 2014-2020. The agricultural sector was thus one of the main beneficiaries of Romania's EU membership, the European money ensuring the stability and predictability of farmers' finance. At the same time, we consider that a prospective approach, on a long-time horizon, implies certain uncertainties, in the first place related to the political and economic evolutions outside Romania, both at European and world level. In this context, we cannot ignore the fact that *there are the risks that, under the pressure of eurosceptic currents, the common European project has little chance of fulfilment, putting into difficulty the agriculture and rural area modernisation process in Romania*.

The specificity of the food security and safety issue is given by the importance of EU finance, both for the support to agricultural investments (through the seven-year rural development programmes) and for the support of current farmers' incomes (through direct payments). Among the elements that would generate uncertainty one can also mention, as an extreme event with low probability, the dissolution of the EU (and disappearance of the CAP), as well as an event with higher probability, the gradual diminution of funds allocated to

CAP in he next budget planning periods under the pressure of states advocating the perspective 'public money for public goods' to the detriment of the perspective that relies on supply management and market regulation. Thus, three scenarios can be taken into consideration, which represent directions to investigate in this study: realistic, pessimistic and optimistic.

The realistic scenario has in view *CAP functioning in its present directions in the next 20 year*s, with slowly decreasing financial allocations, with stronger convergence between Romania and the EU Old Member States, both in relation to the financial support level and to the level of average yields and labour productivity. The estimates of the necessary investment funds (public component for the priority sectors in food security and safety terms) from the present report were mainly based on elements of this scenario. The amounts of the entire budget of the Ministry of Agriculture and Rural Development (MADR) as well as those put at the disposal of Romania through the CAP (separately by its two Pillars) are given in Table 8.

Table 8. Estimating the public support to agriculture and rural development by main finance sources in the realistic scenario (EUR million per year)

	2015	2020	2025	2035
State budget (MADR)	1157	1270	1300	1500
CAP Pillar 1 (EAGF)	1072	1903	2000	2200
CAP Pillar 2 (EAFRD)	1519	1142	1000	900

Source: authors' estimates.

The pessimistic scenario takes into consideration the *hypothesis of continuation of EU functioning in the next 20 years, but it has in view a diminution of CAP funding through the re-allocation of finance to other areas* (environment conservation, poverty alleviation, retraining, environment conservation, professional reorientation, technological research, energy etc.). In this situation, the estimated finance for reaching this strategy targets should largely come from the national budget, which could lead to non-reaching certain objectives. Compared to the realistic scenario, the total sums (from national and EU funds) for the agricultural sector might decrease by EUR 300 million each year for the first post-2020 programming period (year 2025 from Table 9) and by EUR 700 million each year in the second programming period (2028--2034), situation extrapolated for the year 2035 as well.

Table 9. Estimating the public support for agriculture and rural development by the main funding sources In the pessimistic scenario (EUR million, annually)

	2015	2020	2025	2035
State budget (MADR)	1157	1270	1500	1700
CAP Pillar 1 (EAGF)	1072	1903	1700	1500
CAP Pillar 2 (EAFRD)	1519	1142	800	700

Source: authors' estimates.

The optimistic scenario presupposes that the importance of agriculture from the multiple perspectives of food security, economy, employment, environment, territoriality and resilience will be recognised at European level, which will result in the future CAP being structured around three main objectives[2]: *contribution to economic growth and job creation, response to the climate change challenges and ensuring the equilibrium in rural areas, strengthening the agricultural sector resilience and risk management*. In this case, Romania might be an important beneficiary of CAP funds, and the technical and economic performance of Romania's agriculture could be significantly improved over the long term. Such a favourable situation, transposed into figures (Table 10), would mean in terms of public finance an additional annual support to agriculture and rural development by EUR 300 million in the first programming period (corresponding to the year 2025) and by EUR 500 million in the second programming period (to which the year 2035 has been assimilated).

Table 10. Estimating the public support for agriculture and rural development by the main funding sources in the optimistic scenario (EUR million, annually)

	2015	2020	2025	2035
State budget (MADR)	1157	1270	1300	1500
CAP Pillar 1 (EAGF)	1072	1903	2100	2400
CAP Pillar 2 (EAFRD)	1519	1142	1200	1000

Source: authors' estimates.

Table 11. Agriculture and rural development expenditures, from national and EU funds, in the realistic scenario (% of GDP)

	2015	2020	2025	2035
State budget (MADR)	0.72	0.61	0.50	0.41
CAP Pillar 1 (EAGF)	0.67	0.92	0.77	0.61
CAP Pillar 2 (EAFRD)	0.95	0.55	0.38	0.25

Source: authors' estimates.

The agriculture and rural development sector has a special situation among the national economy sectors, due to the CAP that aligns Romania to the practices of Old Member States (even though not at the same level of subsidies so far). However, what is not granted under the direct payments form is offset to some extent by the support to rural development. That is why it is expected that the necessary investments for the post-2020 period will continue to be ensured from EU funds. At the same time, the national component will be increasingly important for investments in infrastructure. Having in view the debates that are still at an early stage referring to the future CAP and taking as reference the position of France, whose officials consider that a strong European agricultural policy is indispensable to the EU, we estimated the level of public expenditures for agriculture and rural development at values comparable to the current ones, both as regards MADR budget contri-

[2] ***, (2016): A reformed CAP for competitive, sustainable and resilient agriculture. French contribution to the 29/31 May 2016, Informal Council on the post 2020 CAP.

bution and that of the two CAP Pillars (values corresponding to the realistic scenario); these amounts are expressed in Table 11 as share of GDP, for the horizons 2020-2025-2035.

While the funds granted to Romania under CAP Pillar 1 after 2020, in absolute value, were estimated to increase, those dedicated to rural development (CAP Pillar 2) were estimated to decline, as absolute value (as a result of solving certain problems of agriculture and rural area). The amounts allocated from the state budget were estimated to increase slowly, in absolute value, which will lead to the diminution of agricultural expenditure share in GDP from 0.72 per cent in 2015 to 0.41 per cent in 2035. By comparison, 0.4 per cent represents the share of agriculture, forestry, fisheries and hunting expenditures in GDP in France, in the period 2009-2011 (in the last years this share was down to 0.2 per cent). In Romania, after the diminution in share of these expenditures from 1.2 per cent of GDP in the period 2009-2011 to 0.9 per cent in 2012-2014, the gradual diminution to 0.4 per cent by 2035 means that the budget of agriculture will increase more slowly than GDP increase.

Conclusions

The estimates presented in this study show that the support to investments through EU funds will create the conditions for the increase of farmers' incomes and change of the quality of life in rural areas. The concrete approaches have to be identified that enable the access of all farms (small, medium and large) to funding for investments because, beyond all the farm performance indicators, the following objectives remain essential for the food security purpose: poverty alleviation at national level, social polarisation diminution and rural population's welfare increase. The main conclusions of the study are as follows:

- A positive trade balance is estimated, as well as a degree of coverage of imports by exports of more than 125 per cent, after 2020.
- The share of food consumption expenditures will decrease very slowly, from about 45 per cent at present to about 33-35 per cent in 2035, in the conditions in which the population's incomes have a positive trend, and GDP per capita at purchasing power parity will increase to a level that gets the population's purchasing power in Romania close to the EU-28 average by 2025 and to the present level of France in the long term, by 2035.
- Financial resources are needed to reach the proposed targets, and these can be ensured from public funds for support to investments in the priority areas for food security and safety in the period 2016-2020, namely from PNDR funds and through special budgetary allocations. These will add to the structural funds.
- The share of agricultural, forestry, hunting and fisheries expenditures in GDP is estimated to reach the level of France (of the period 2009-2011) in 2035, which reveals a 25-year gap between the two countries.

- Any of the three investigated scenarios is possible, noting that some other factors of influence may occur in the long term, which could not o considered in our analysis.

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References

EC, 2015. *The 2015 Ageing Repor*t. European Commission, DG for Economic and Financial Affairs.

INS, 2011. *Household Budget Survey*, Bucharest, Romania.

Matthews, A., 2014. *Trends in EU agricultural self-sufficiency*. 28 September. (www.capreform.eu).

Monceau, C., Blanche-Barbat, E., Echampe, J., 2002. *La consommation alimentaire depuis quarante ans, Des plus en plus de produits elabores*. INSEE Premiere.

Pinstrup, A., 2009. *Food security: definition and measurement*, in Food Security 1:5-7, Springer.

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It is all about the risk – how can an enabling environment for agricultural innovation be created within the Common Agricultural Policy?

Abstract: *When creating an enabling environment for agricultural innovation adoption, it is not only the financial risk that has to be taken into account but also other aspects of risk and their behavioural determinants. The paper applies a systematic review approach to present the recent findings on behavioural factors that determine farmers' participation in different policy schemes that should be taken into account when shaping innovation support instruments within the European Union's Common Agricultural Policy (CAP). The aim of the paper is to present what should be the next steps in developing an enabling environment for innovation adoption within the CAP and in which direction future research on adoption of innovations by farmers should go.*

Keywords: *Common Agricultural Policy, innovation, risk, behavioural economics.*

Introduction

Agriculture in the European Union (EU) faces numerous challenges. The most important of them relate to two issues – competitiveness and the environment. With the strive to enter the path of sustainable development, sustainable intensification, climate-smart agriculture, bio-based economy or circular economy, it is of key importance that European agriculture absorbs innovations balancing economic and environmental goals related to agricultural activity. Also looking from a strictly economic perspective, the high costs of labour and other factors of productions in EU agriculture makes innovation the only potential solution for increasing the competitiveness. Therefore, the Common Agricultural Policy (CAP) should encourage innovations in agriculture. The most recent reform of the CAP introduced measures to support innovation, but it is too early to assess their impact. However, we can suppose that there is still much room for improvement as the financial incentives seem not to be sufficiently accompanied by mechanisms to tackle other than financial barriers to implementing innovations at a farm level.

In relation to innovations there are two separate, although closely related, issues that need to be tackled. The first of them is the creation of truly innovative, new technologies and practices. The second one is the implementation of both brand-new innovative technologies and of already-established technologies that have not been implemented so far by a given farmer. Although both creation and implementation of innovations are important, a visible impact on the competitiveness and environmental footprint of agriculture has the implementation of innovations as only spreading innovations can make a noticeable difference. Therefore, it should be a priority for the CAP, while innovation creation should be a shared responsibility of the EU research policy and the CAP.

Innovations offer benefits both at social and private level (Moreddu, 2016). Therefore, there is a rationale to support them using public funds via a well-planned and targeted policy to ensure efficiency and effectiveness. The key barrier that should be addressed by public policy is risk, which is commonly known to slow the pace of adapting new technologies (Marra et al., 2003). Yet, risk is not only related to financial aspects. As stated by Grolleau et al. (2015), taking into account the non-economic factors when shaping agricultural policy can lead to higher efficiency and effectiveness. In order to benefit from behavioural economics in agricultural policy design, carefully prepared experiments must be conducted to study determinants of farmers' decisions. There is already a wide range of studies on conducting experiments in agriculture (Greiner et al., 2014), so there is a basis for more in-depth assessment of factors triggering specific behaviours.

Several very common non-economic factors that should be accounted for when designing policy instruments can be named. They all seem to be especially important when trying to encourage farmers to implement innovations.

The best-known behavioural factor biasing farmers' decisions is loss aversion (Grolleau et al., 2015). The other key elements that have to be taken into account are: risk aversion, ambiguity aversion, status quo bias/default bias and choice overload (Colen et al., 2015). Moreover, policy makers must also bear in mind that there is a certain time inconsistency between their decisions and actions undertaken by other stakeholders.

In this paper, agricultural innovations are understood broadly as introducing both farming practices and any other organisational and managerial practices that are new to a given farm. Thus, as innovations are seen both transformation from a conventional to an organic farm and making use of leasing as a way to acquire a new agricultural equipment.

The aim of the paper is to present what should be the next steps in developing an enabling environment for innovation adoption within the CAP and in which direction future research on adoption of innovations by farmers should go. The paper presents a literature review of the behavioural barriers to innovation adoption in the farming sector.

Methodology

The paper applies a systematic review approach. The databased used for the study was ISI™ Web of Knowledge™ and the search was conducted across the whole period covered by this database. The study was conducted in the following steps based on the research problem 'Creating enabling environment for agricultural innovation'. Firstly, the concept of agricultural innovations was defined for the purposes of this research. Based on this definition, the literature review concentrated on the issue of the characteristics of an enabling environment for agricultural innovations, especially in the context of public policy instruments. Following the results of this literature review, the key research question was: What are the shortcomings of the current CAP in supporting the scaling up and out of agricultural innovations?

A further research step was the literature review concentrating on the barriers to adoption of innovations in agriculture. The review results served as an assessment questionnaire for identifying the flaws of the current design of the CAP. Given the paper limitations, the paper focuses on presenting the results related to the last step of the systemic literature review conducted – identified barriers to effective CAP support of scaling-up and out agricultural innovations.

The systematic literature review was not a goal in itself and it was not intended to identify the most popular topics and issues related to the enabling environment, but rather to identify the most novel ideas that can give the CAP a cutting edge in scaling agricultural innovations. Therefore, the details of the procedure conducted at each step are not presented in this paper[1]. The systematic literature review stems from medical research where it is applied to identify dispersed research results concerning one issue. In the case of medical research or any other research question requiring precision the procedure conducted within the systemic literature review must be carefully followed and recorded to make it verifiable by other research groups[2]. Yet, in this paper the actual setting of the research review or the number of participants are irrelevant as the review is conducted to identify a set of potentially relevant issues that need to be accounted for in order to create an innovation enabling environment.

It is important to look for new policy tools and the specific details of designing them that could increase the creation of innovations and their uptake among EU farmers as the limitations of environmental resources and cost of labour are not the factors through which the global competitiveness of EU farming could be boosted. An overview of the research relating to non-economic barriers to innovation presented in this paper provides a broad-spectrum summary of the potential directions for altering the CAP policy tools aimed at increasing diffusion of innovations in the EU agricultural sector.

Results

The innovation process is interlinked not only with market but also with political and institutional support (Figure 1). In the case of agriculture, it is the support policy that can tip the scales for creation and adoption of innovations.

Different roles of public policy in the innovation process can distinguish Wieliczko (2016), namely a direct role of public policy in the development and adoption of innovations (this includes different kinds of incentives such as tax allowances or preferential credits), and an indirect role of public policy in the development and application of environmental innovations that focuses on education and popularisation of innovations.

The enabling environment for agricultural growth and competitiveness has already been defined. An illustrative index created by Diaz-Bonilla et al. (2014) shows which key elements create a basis for agricultural growth and competitiveness. It presents the so-called systems-oriented approach, thus it is not limited to technology and includes, inter alia, social and institutional aspects (Schut et al., 2014). The Agricultural Growth Enabling Index (AGEI) consists of following elements:

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[1] The keywords used related to farmers' behaviour and innovation process, including, among others: farmers' risk aversion, agricultural innovation, farmers' ambiguity aversion, farmers' loss aversion, information overload in innovation process. It must be stated that the number of records for most of the search phrases was not satisfactory. Therefore, the study also included a number of papers cited by the authors of publications found on the ISI Web of Knowledge. The study was limited to publications in English.

[2] See, among others, Higgins and Green (2008) for details concerning the application of systematic literature review focused on numerical findings.

I. Governance (20 per cent weight; equal shares on each subcomponent): macro, institutions and political stability affecting food security;

II. Capital (20 per cent weight; equal shares on each subcomponent): health/education, presence of food safety nets and infrastructure;

III. Markets (20 per cent weight; equal shares on each subcomponent): goods market operations, labour market operations and financial market operations;

IV Agriculture/rural areas (20 per cent weight on each pillar; equal shares on each subcomponent within a pillar with the exception of double weight on public agricultural R&D expenditures):

4.1. Pillar A: access to financing for farmers, public agricultural R&D expenditure as a per cent of agricultural GDP and land market rights and access.

4.2. Pillar B: agricultural infrastructure, index of intensification and index of availability of land and water.

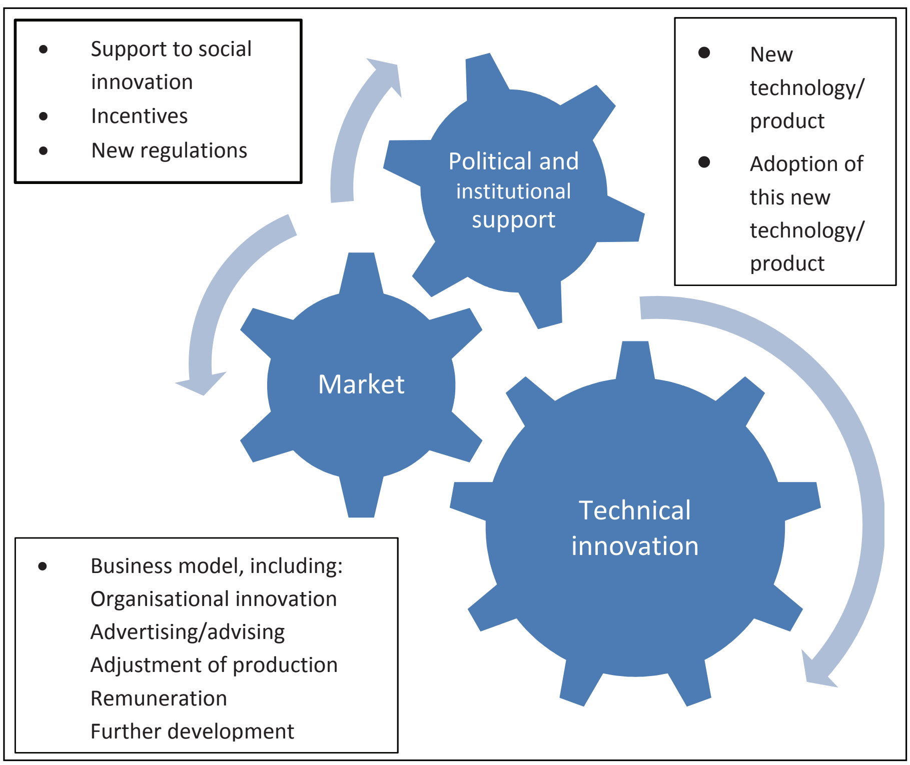

Figure 1. Links between innovation process and institutional, market and technical sphere

Source: Impresa (2016).

This index shows that R&D is part of the environment enabling agricultural growth. Yet, the index was based on the experiences of developing countries and thus it seems that it can show the factors enabling the growth path to be reached rather than keeping to it. In the case of developed countries, the role of innovations is probably even more profound.

Ward and Sight (2014) stated that "when studying technology adoption, failing to account for risk preferences potentially introduces bias in the estimated effects of other determinants of adoption". This is an important hint for improving the CAP, as the actual role of public policy in implementation of innovations is the so-called scaling of the adoption of innovations. We can distinguish between scaling up and scaling out (Millar and Connell, 2010). Scaling up relates to an increase in number of adopters of an innovation, while scaling out concerns expansion in terms of geographical area where an innovation is used. As regards the role of the CAP in the process of innovation implementation, we can state that there is need for policy action in these both dimensions. Yet, as mentioned by Wigboldus et al. (2016), scaling agricultural innovations to be beneficial for the agricultural sector and other stakeholders must take into account the complexity of links between environmental, social, economic and institutional factors, and to anticipate the potential consequences of scaling.

Moreover, it must identify the barriers to adopting innovations. There is a vast literature on the factors determining adoption of agricultural innovations (Ward and Singh, 2014). As might be expected. the economic factors prevail and the key barriers are generally the lack of funds or credit constraints. The unwillingness for changes is also a result of the asset structure already possessed (Latruffe et al., 2013). Yet, there are other factors relating to personal characteristics of a farmer such as the age or the level of education. As shown by the innovation diffusion literature, human and social capital, the agricultural knowledge system, socio-cultural norms, a close relationship with farming industry and specific macroeconomic factors are decisive for adopting innovation (Hansen, 2015).

However, there is also a growing literature on behavioural aspects shaping the decision making process related to adoption of innovations. The differences in farmers' behaviour prove also to be crucial for policy effectiveness. As shown by Läpple and van Rensburg (2011) there are significant differences between early, medium and late adopters of an innovation in their response to encountered economic and non-economic factors.

The key behavioural factors hindering farmers from undertaking innovations are: risk aversion, loss aversion, ambiguity aversion, status quo bias/default bias and choice overload[3]. Thus, a list of factors influencing adoption decisions is lengthy and includes different categories of variables (Table 1).

3 These terms are defined further in the text.

Table 1. Variables that may influence adoption decisions

Category	Variable
Farmer characteristics	Experience
	Risk aversion
	Age
	Village head
	Gender
	Education
	Farmers moral concerns and emotions
	Farmer health
	Farmer full-time
	Awareness of a problem that an innovation may solve
Household characteristics	Education of family members
	Family size
	Home consumption
	Relatives in and outside the village that a household can rely on for critical support
	Off-farm employment
	Illness or death
Farm characteristics	Availability of resources (machinery, labour etc.)
	Income
	Farm size
	Land tenure
	Distance to markets
	Hired labour
	Plot access
Farming context	Credit
	Modern environment
	Agro-climatic conditions
	Subsidies
	Pests and diseases
Acquisition of information	Contact with extension
	Participation in on-farm trials
	Participation in workshops
	Social network
	Membership in farmers' groups or associations
	Farmers confident in skill of extension agents

Source: Borges et al. (2015).

It is also necessary to look into the adoption process. It is a complex issue. The innovations do not necessarily lead to a fundamental change in the functioning of a farm – they do not change the regime within it operates, but they are adapted to the already established operation mode (Figure 2). Therefore, the attitude towards innovations and willingness to adopt them are strongly related to the types of innovations and their potential impact on the current functioning of a farm.

Risk aversion is manifested by avoiding choosing the option viewed as a riskier one despite its potential higher returns. In the case of loss aversion, a higher sensitivity to a potential loss is observed than to a potential gain. Ambiguity aversion relates to a situation of incomplete information which leads farmers to choose known risks instead of the unknown ones. Status quo or default bias is a preference to avoid changes and to choose an option that results in keeping everything unchanged. Choice overload is the situation where too many similar choices are available, thus making the decision difficult.

The studies on behavioural factors influencing decisions on adopting innovations commonly tackle two of the most often cited factors: risk aversion and either loss aversion or ambiguity aversion. The theoretical background used in the studies on risk and loss aversion is commonly based on expected utility theory, theory of planned behaviour or cumulative prospect theory. Yet, the prospect theory seems to be more useful as it tackles the problem of probability weighting and reference dependence (Bocqueho et al. 2014).

There are numerous studies concerning the link between individual's attitudes and technology adoption (Ahsanuzzaman and Norton, 2015). As stated by Knight et al. (2003), risk aversion is associated with lower probabilities of technology adoption. Also, Ghadim et al. (2005) and Takahashi (2013) showed that risk aversion tended to reduce adoption of innovations.

Liu (2013) concludes that higher risk aversion or higher loss aversion impede the adoption of new plant varieties. This is also shown by Brick and Visser (2015), who concluded that risk aversion leads farmers to opt for traditional farming. Yet, Engle-Warnick et al. (2007) found no correlation between risk aversion and adoption of new technologies, while Barham et al. (2014) stated that risk aversion had small impact on timing of innovation (in their study, innovation was an adoption of genetically modified soy). This shows the need for further research.

However, we also must take into account the type of innovation. An important group of innovations are those related to other than agricultural practices. They include financial management. With the growing risks related to conducting farming activity, risk management increases in importance. In the case of insurance, farmers' risk aversion is the factor significantly increasing the probability of buying an agricultural weather index insurance as showed by Jin et al. (2016). The authors also stated that among other factors leading to higher probability of buying an insurance was farmers' subjective beliefs concerning the probability of crop losses, that is farmers' loss aversion. Similar results were shown by Lyu and Barré (2017) in relation to crop insurance.

As stated by Klibanoff et al. (2005), ambiguity aversion is interlinked with risk aversion. Ambiguity aversion can have a positive impact on adoption of innovations speeding this process. This was shown by Barham et al. (2014), who suggest that their finding is a result of the fact that GM soy is insect resistant. Yet, as stated by Ross et al. (2012), ambiguity aversion limits the adoption of new technologies, despite the high level of expected profits. Also Alpizar et al. (2011) observed that both risk aversion and ambiguity aversion led to farmers deciding not to adopt innovations.

Absorption or adoption: niche emerges in the regime and is successfully incorporated (de Haan and Rotmans, 2011)			Constellation change: Empowerment (bottom up) or reconstellation (top down)
	Empowerment: niche co-evolves with the incumbent regime(van der Brugge, 2009)		
Fit and conform empowerment: niche conforms to a relatively unchanged selection environment (Smith and Raven, 2012)			Stretch and transform empowerment: innovations undermine regime
Asymmetrical process of adaptation: the incumbent regime exerts strong selection power (van Bueren and Broekhans, 2010)	Asymmetrical process of adaptation: niche adapt regime rules to benefit niche innovation; or niche adapts to regime rules	Mutual adaptations: niche frames lessons so that regime can use them, and attracts some lessons	Co-existence: parallel pathways
Translations of problems: pragmatic adaptation of niche elements into regime (Smith, 2007)	Translations that adapt lessons: niche lessons are interpreted from regime perspective	Translations that alter context: changes that bring the regime closer to the situation in the niche, or vice versa	
Symbiotic relationship: niches reinforce the regime by assisting with adaptive capacity (Geels and Schot, 2007)			Competitive relationships: innovation is in opposition to regime principles
Linking potential high: strong niche and regime compatibility (Smith, 2007)			Linking potential low: weak niche and regime compatibility

Figure 2. Extent of adoption process vs. the current regime
Source: Ingram (2015).

The presence of loss aversion among farmers was showed, inter alia, by Barnes et al. (2016) and, as presented by Bocqueho et al. (2014), farmers are twice as sensitive to losses as to gains. Loss aversion can support adopting innovations as indicated by the findings of Liu and Huang (2013). Their study showed that Chinese farmers characterised by higher loss aversion used smaller quantities of pesticides, while those with higher risk aversion used excessive amounts of pesticides.

It seems that the next step in research on innovation adoption should be the analysis of behavioural aspects of the decision making process in the context of characteristics of innovations that affect adoption identified by diffusion innovation theory.

There are five characteristics of innovations that affect their adoption: relative advantage, compatibility, triability, observability and complexity (Rogers, 2003). The relative advantage is the perception of a potential adopter of an innovation of its advantages. Compatibility relates to the assessment of compatibility between an innovation and needs of potential adopter. Triability is understood as the degree to which a potential adopter may experiment with the innovation, while observability relates to the visibility of results of the innovation and the complexity is the perception of difficulty in becoming familiar with the way innovation is to be used. Yet, as stated by Feola et al. (2015) understanding farmers' behaviour requires the knowledge concerning three aspects: (a) decision making model; (b) cross-scale and cross-level pressures; and (c) temporal dynamics. These three aspects must be simultaneously studied, which calls for the application of various research methods.

Discussion

The CAP is constantly evolving. In the recent reform of the CAP, 'Fostering knowledge transfer and innovation in agriculture, forestry, and rural areas' was named as one of the priorities of rural development. This is the next step in the process of extending the CAP's involvement in supporting innovation process. Apart from support for farmers to make use of extension services, the CAP offers support for launching cooperation between different stakeholders thus it plays a role of 'super-broker' of innovations.

The CAP has encompassed the concept of Agricultural Innovation Systems (AIS) and has an active role in supporting the establishment of multi-actor innovation platforms. It is also clear that the CAP is increasingly involved in so-called 'innovation brokering', involving not only agriculture as such but also of other sectors. This implies seeing innovation "as a process that is shaped by interactions between actors and institutions inside and outside the agricultural sector" (Schut et al., 2014, p.99).

As stated by Elabed and Carter (2015, p. 150) "policy reliance on these behavioural insights has been modest". This also applies to the CAP, which at this stage of its development should explore the decision-making process of the farmers and take into account the uncertainty they face. Intrinsic motivation and human responses, especially risk perception and its tolerance, are vital for policy effectiveness and innovation implementation. When designing specific policy measures, policy makers have to take into account not only of economic but also social and personal rewards expected by farmers.

It must be also underlined that the development of policy must be followed by changes in research focus. In relation to agri-environment policy the changes in policy priorities lead to changes in research priorities and this applies also to innovation policy (Table 2).

Table 2. Innovation policy and research priorities

Phase	Innovation policy priorities	Research priorities
Pilot/immediate	Maximising value of schemes; participation rates; payment vs. participation	Quantification of number of participants; uptake levels
Consolidation/ driving forces	Maximising environmental value for money; barrier to entry removal & additionality	Profiles of adopters/non-adopters; identifying barriers
Mature/ underlying processes	Innovation benefits; innovation mentality	Motives adoption/non-adoption; underlying processes; attitudinal shifts

Source: own elaboration based on Beedell and Rehman (2000).

Based on the presentation of key non-financial barriers related to implementing innovations, it can be argued that they are all related to different types of risk. Aversion to different types of risk is an important factor discouraging farmers from implementing innovations. Therefore, it is recommended that more attention is paid to insights from behavioural economics during the formulation of the post-2020 CAP as this may offer useful advice on the designing of an enabling environment for agricultural innovation. The results of the studies cited in this paper show that the assumption widely present in economic studies that farmers are expected utility maximisers may not be valid and that in fact farmers' behaviour should be looked at from the perspective of cumulative prospective theory (Babcock, 2015).

Making use of behavioural economics means conducting experiments to verify farmers' attitudes towards different forms of policy design. Such experiments serve not only to answer the question of the farmers' preferences towards different forms of policy measures but they also offer guidance on the ways of helping to alter farmers' attitudes towards implementing innovations. Moreover, it must be also borne in mind that some of the technological innovations can reduce farmers' exposure to risk and thus they can influence farmers' attitudes towards future implementation of innovations.

Notwithstanding the progress made in research on behavioural aspects of adopting innovations, there is still much to be done to make the research more useful for policy makers. The first item on the agenda for further research improvement is taking into account subjective probabilities as suggested by Hardaker and Lien (2010), who state that in the decision making process farmers use not objective probabilities but subjective ones.

As suggested by Liu (2013), the problems of risk aversion and loss aversion can be decreased by applying insurance measures within the agricultural policy. Yet, this requires not only additional financial resources but also handling the problem of moral hazard and adverse selection. Clot et al. (2014) emphasise that unintended behavioural responses to policy tools must be one of the key issues to be tackled in the design of new policy instruments.

To summarise, the first step to creating an enabling environment of agricultural innovations is to explore the farmers' decision making process concerning risk management. This can be done by applying tools of behavioural economics, taking into account the characteristics of innovations that affect adoption named by the innovation diffusion theory.

References

Ahsanuzzaman, A., Norton, G.W., 2015. *Social Exchanges, Attitudes toward Uncertainty and Technology Adoption by Bangladeshi Farmers: Experimental Evidence.* Available at SSRN. https://doi.org/10.2139/ssrn.2612167

Alpizar, F., Carlsson, F., Naranjo, M.A., 2011. *The effect of ambiguous risk, and coordination on farmers' adaptation to climate change – A framed field experiment*. Ecological Economics 70, 2317-2326. https://doi.org/10.1016/j.ecolecon.2011.07.004

Babcock, B.A., 2015. *Using Cumulative Prospect Theory to Explain Anomalous Crop Insurance Coverage Choice*. American Journal of Agricultural Economics 97(5), 1371-1384. https://doi.org/10.1093/ajae/aav032

Barham, B., Chavas, J-P., Fitz, D., Schechter, L., 2014. *The roles of risk and ambiguity in technology adoption*. Journal of Economic Behavior & Organization 97, 204-218. https://doi.org/10.1016/j.jebo.2013.06.014

Barnes, A., Sutherland, L-A., Toma, L., Matthews, K., Thomson, S., 2016. *The effect of the Common Agricultural Policy reforms on intentions towards food production: Evidence from livestock farmers*. Land Use Policy 50, 548-558. https://doi.org/10.1016/j.landusepol.2015.10.017

Beedell, J., Rehman, T., 2000. *Using social-psychology models to understand farmers' conservation behaviour*. Journal of Rural Studies 16, 117-127. https://doi.org/10.1016/S0743-0167(99)00043-1

Bocqueho, G., Jacquet, F., Reynaud, A. 2014. *Expected utility or prospect theory maximisers? Assessing farmers' risk behaviour from field-experiment data*. European Review of Agricultural Economics 41(1), 135-172. https://doi.org/10.1093/erae/jbt006

Borges, J.A.R., Foletto, L., Xavier, V.T., 2015. *An interdisciplinary framework to study farmers' decisions on adoption of innovation: Insights from Expected Utility Theory and Theory of Planned Behavior*. African Journal of Agricultural Research 10(29), 2814-2825. https://doi.org/10.5897/AJAR2015.9650

Brick, K.I., Visser, M., 2015. *Risk preferences, technology adoption and insurance uptake: A framed experiment*. Journal of Economic Behavior & Organization 118, 383-396. https://doi.org/10.1016/j.jebo.2015.02.010

Colen, L., Gomez y Paloma, S., Latacz-Lohmann, U., Lefebvre M., Préget, R., Thoyer, S., 2015. *(How) can economic experiments inform EU agricultural policy?* Sevilla: European Commission Joint Research Centre Institute for Prospective Technological Studies.

Clot, S., Andriamahefaz, F., Grolleau, G., Ibanez, L., Méral Ph., 2014. *Payments for Ecosystem Services: Can we kill two birds with one stone? Insights from a Natural Field Experiment in Madagascar*. Laboratoire Montpelliérain d'Economie Théoreque et Appliquée, Document de Recherche 2014-1.

de Haan, J., Rotmans, J., 2011. *Patterns in transitions: understanding complex chains of change*. Technological Forecasting and Social Change 78(1), 90-102. https://doi.org/10.1016/j.techfore.2010.10.008

Diaz-Bonilla, E., Orden, D., Kwieciński, A., 2014. *Enabling Environment for Agricultural Growth and Competitiveness: Evaluation, Indicators and Indices*. OECD Food, Agriculture and Fisheries Papers, No. 67. Paris: OECD Publishing. https://doi.org/10.1787/5jz48305h4vd-en

Elabed, G., Carter, R.C., 2015. *Compound-risk aversion, ambiguity and the willingness to pay for microinsurance*. Journal of Economic Behavior & Organization 118, 150-166. https://doi.org/10.1016/j.jebo.2015.03.002

Engle-Warnick, J., Escobal, J., Laszlo S., 2007. *Ambiguity Aversion as a Predictor of Technology Choice: Experimental Evidence from Peru*. Scientific Series 2007s-01, Centre interuniversitaire de recherché en analyse des organisation.

Feola, G., Lerner, A.M., Jain, M., Joseph, M. Montefrio, M.F.M., Nicholas, K.A., 2015. *Researching farmer behaviour in climate change adaptation and sustainable agriculture: Lessons learned from five case studies*. Journal of Rural Studies 39, 74-84. https://doi.org/10.1016/j.jrurstud.2015.03.009

Geels, F.W., Schot, J., 2007. *Typology of sociotechnical transition pathways*. Research Policy 36(3), 399-417. https://doi.org/10.1016/j.respol.2007.01.003

Ghadim, A., Pannell, D.J., Burton, M.P., 2005. *Risk, uncertainty, and learning in adoption of a crop innovation*. Agricultural Economics 33(1), 1-9. https://doi.org/10.1111/j.1574-0862.2005.00433.x

Greiner, R., Bliemer, M., Ballweg, J., 2014. *Design considerations of a choice experiment to estimate likely participation by north Australian pastoralists in contractual biodiversity conservation*. The Journal of Choice Modelling 10, 34-45. https://doi.org/10.1016/j.jocm.2014.01.002

Greiner, R., Patterson, L., Miller, O., 2009. *Motivations, risk perceptions and adoption of conservation practices by farmers*. Agricultural Systems 99, 86-104. https://doi.org/10.1016/j.agsy.2008.10.003

Grolleau, G., Mzoughi, N., Thoyer, S., 2015. *Les incitations monétaires dans la politique agroenvironnementale: peut-on faire mieux avec moins?* [Monetary incentives in agri-environmental policy: can we do better with less?] Revue d'Études en Agriculture et Environnement 96, 241-257. https://doi.org/10.4074/S1966960715012011

Hansen, B.G., 2015, *Robotic milking-farmer experiences and adoption rate in Jæren, Norway*. Journal of Rural Studies 41, 109-117. https://doi.org/10.1016/j.jrurstud.2015.08.004

Hardaker, J.B., Lien, G., 2010. *Probabilities for decision analysis in agriculture and rural resource economics: The need for a paradigm change*. Agricultural Systems 103, 345-350. https://doi.org/10.1016/j.agsy.2010.01.001

Higgins, J.P.T., Green, S. (eds), 2008. *Cochrane Handbook for Systematic Reviews of Interventions Version 5.0.1*. Available at: www.cochrane-handbook.org.

Impresa (2016). *Factors Fostering the Effectiveness and Performance of Agricultural Research*. Impresa Policy Brief.

Ingram, J., 2015. *Framing niche-regime linkage as adaptation: An analysis of learning and innovation networks for sustainable agriculture across Europe*. Journal of Rural Studies 40, 59-75. https://doi.org/10.1016/j.jrurstud.2015.06.003

Jin, J., Wang, W., Wang, X., 2016. *Farmers' Risk Preferences and Agricultural Weather Index Insurance Uptake in Rural China*. International Journal of Disaster Risk Science 7, 366-373. https://doi.org/10.1007/s13753-016-0108-3

Klibanoff, P., Marinacci, M., Mukerji, S., 2005. *A smooth model of decision making under ambiguity*. Econometrica 73, 1849-1892. https://doi.org/10.1111/j.1468-0262.2005.00640.x

Knight, J., Weir, S., Woldehanna, T., 2003. *The Role of Education in Facilitating Risk-Taking and Innovation in Agriculture*. Journal of Development Studies 39, 1-22. https://doi.org/10.1080/00220380312331293567

Läpple, D., Van Rensburg, T., 2011. *Adoption of organic farming: Are there differences between early and late adoption?* Ecological Economics 70, 1406-1414. https://doi.org/10.1016/j.ecolecon.2011.03.002

Latruffe, L., Dupuy, A., Desjeux, Y., 2013. *What would farmers' strategies be in a no-CAP situation? An illustration from two regions in France*. Journal of Rural Studies 32, 10-25. https://doi.org/10.1016/j.jrurstud.2013.04.003

Liu, E.M., 2013. *Time to change what to sow: risk preferences and technology adoption decisions of cotton farmers in China*. The Review of Economics and Statistics 95(4), 1386-1403. https://doi.org/10.1162/REST_a_00295

Liu, E.M., Huang, J., 2013. *Risk preferences and pesticide use by cotton farmers in China*. Journal of Development Economics 103, 202-215. https://doi.org/10.1016/j.jdeveco.2012.12.005

Lyu, K., Barré, T.J., 2017. *Risk aversion in crop insurance program purchase decisions: Evidence from maize production areas in China*. China Agricultural Economic Review 9, 62-80. https://doi.org/10.1108/caer-04-2015-0036

Marraa, M., Pannell, D.J., Ghadim, A.A., 2003. *The economics of risk, uncertainty and learning in the adoption of new agricultural technologies: where are we on the learning curve?* Agricultural Systems 75, 215-234. https://doi.org/10.1016/S0308-521X(02)00066-5

Millar, J., Connell, J., 2010. *Strategies for scaling out impacts from agricultural systems change: the case of forages and livestock production in Laos*. Agriculture and Human Values 27. 213-225. https://doi.org/10.1007/s10460-009-9194-9

Moreddu, C., 2016. *Public-Private Partnerships for Agricultural Innovation: Lessons From Recent Experiences*. OECD Food, Agriculture and Fisheries Papers No. 92. Paris: OECD Publishing. https://doi.org/10.1787/5jm55j9p9rmx-en

Rogers, E.M., 2003. *Diffusion of innovations (5th edition)*. New York NY: The Free Press.

Ross, N., Santos, P., Capon, T., 2012. *Risk, ambiguity and the adoption of new technologies: experimental evidence from a developing economy*. Selected Paper prepared for presentation at the International Association of Agricultural Economists Triennial Conference, Foz do Iguau, Brazil, 18-24 August 2012.

Schut, M., Rodenburg, J., Klerkx, L., van Ast, A., Bastiaans L., 2014. *Systems approaches to innovation in crop protection. A systematic literature review.* Crop Protection 56, 98-108. https://doi.org/10.1016/j.cropro.2013.11.017

Smith, A., 2007. *Translating Sustainabilities between Green Niches and Socio-Technical Regimes*. Technology Analysis and Strategic Management 19(4), 427-450. https://doi.org/10.1080/09537320701403334

Smith, A., Raven, R., 2012. *What is protective space? Reconsidering niches in transitions to sustainability*. Research Policy 41(6), 1025-1036. https://doi.org/10.1016/j.respol.2011.12.012

Takahashi, K., 2013. *The roles of risk and ambiguity in the adoption of the system of rice intensification (SRI): evidence from Indonesia*. Food Sector 5, 513-524. https://doi.org/10.1007/s12571-013-0270-z

van Bueren, E., Broekhans, B. 2010. *The Nitty Gritty of Going Green: Lessons from the Design Process of a Dutch Greentown Hall on Niche-regime Interaction*. Michigan, Constructing Green Conference.

van der Brugge, R., van Raak, R., 2007. *Facing the adaptive management challenge: insights from transition management*. Ecological Sociology 12(2), 33. https://doi.org/10.5751/es-02227-120233

Ward, P.S., Singh, V., 2014. *Risk and Ambiguity Preferences and the Adoption of New Agricultural Technologies*. Evidence from Field Experiments in Rural India. IFPRI Discussion Paper 01324. Washington DC: IFPRI.

Wieliczko, B., 2016. *Role of public policy in development and application of clean technology in the Polish agriculture*. Paper presented at the International Scientific Conference: Sustainable Agriculture and Rural Development in terms of the Republic of Serbia Strategic Goals Realization within the Danube Region – development and application of clean technologies in agriculture, Belgrade, Serbia, 15-16 December 2016.

Wigboldus, S., Klerkx, L., Leeuwis, C. Schut, M., Muilerman, S., Jochemsen, H., 2016. *Systemic perspectives on scaling agricultural innovations*. A review. Agronomy for Sustainable Development, 36-46. https://doi.org/10.1007/s13593-016-0380-z

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The LEADER Programme as a vehicle in promoting social capital in rural regions: a critical assessment and examples from the case of Greece[1]

Abstract: *The 'new rural paradigm' in Europe, applied through the Rural Development Programmes (RDPs), places at the centre of academic analysis and policy formation the concept of 'territorial dynamics' as an important vehicle for growth in rural regions. The term denotes "specific regional and local factors, structures and tendencies" which would facilitate the creation of 'smart places' among EU regions – according to the 2020 EU strategy terminology – competitive on a regional and global scale. As 'social capital' lies at the centre of the above intangible elements this paper critically examines the contribution of the LEADER axis in promoting it, through its bottom-up and place-based approach. After a brief presentation of the programme's philosophy and methods of application, its relationship with social capital elements is established. A discussion follows on the lack of sufficient attention to social capital in conventional evaluation methods of LEADER. LEADER's efficiency in stimulating aspects of social capital in rural regions is assessed with reference to case studies on Greece, which appears to be a good case for highlighting the difficulties in applying the bottom-up approach in rural regions but also the challenges that this process involves in inducing territorial/regional development. This is due to the country's*

[1] A different version of the paper was presented at the Regional Studies Association (RSA) workshop on the EU Cohesion Policy: Focus on the Territorial Dimension, held in Lisbon on 5-6 November 2015.

low overall level of social capital resulting from a number of structural/social characteristics. The paper concludes with pointing out the need for more in-depth research on this topic so that lessons for local strategies can be drawn.

Keywords: *Rural Development Programmes, regional development in Greece.*

Introduction

The 'new rural paradigm' in Europe, applied through the Rural Development Programmes (RDPs), places at the centre of academic analysis and policy formation the concept of 'territorial dynamics' (versus the sectoral approach) as an important vehicle for growth in rural regions. The term denotes "specific regional and local elements, structures and tendencies" which include factors such as "entrepreneurial traditions, public and private networks, work ethics, regional identity, participation and attractiveness of the cultural and natural environment" which would facilitate the creation of 'smart places' among EU regions – according to the 2020 EU strategy terminology – competitive on a regional and global scale (Camagni and Capello, 2013; Go et al., 2013; Pollermann et al., 2013). Such intangible elements constitute 'social capital' which is considered of paramount importance in delivering the objectives of local development programmes in the endogenous approach.

The concept of endogenous development stresses the contribution of bottom-up initiatives, reflected in the mobilisation of local public and private actors, in creating networks and participating in the design, implementation and evaluation of local development programmes. Thus, attention is not restricted to an assessment of quantitative impacts of local programmes (e.g. RDPs), resulting from an application of top-down decisions of central administration and an influx of external funding, both aimed at regulating the redistribution of resources and minimising market imperfections. The endogenous philosophy on the contrary gives special merit to the cooperative processes involved in determining the means and goals of these programmes for the effective use of local physical and human – especially environmental and cultural – resources. The local actors involved in this type of processes, i.e. the formulation of horizontal relations (at the local level) and vertical relations (between local actors and high tier administration bodies at the regional, national and supranational levels), constitute in essence the area's 'social capital'. As these relationships are considered innovatory, 'innovation' – not in the traditional sense of technical advancement, but as the creation of new institutions of social organisation and new structures of multi-level governance which combine bottom-up and top-down initiatives to the formation of networks and partnerships - becomes a major source for development (Anon, 2009; Caraveli and Chardas, 2013).

In the first place, rural areas themselves are generally considered as rich in social capital, broadly understood as network cooperation based on trust and regular face-to-face contact. This idea has been emphasised by Putnam (2000), who argues that urban areas have lower levels of social capital, as the small size of a community is better from a social capital point of view. OECD (2006) recognises social capital as "one of the few key assets of rural areas" (p. 3) and many writers acknowledge that, faced with difficulties of obtaining "a critical mass needed for effective public services, infrastructure and business development, rural areas are encouraged to focus on their existing assets, such as location, natural and cultural amenities and social capital" (Sorensen, 2012, p. 874). Secondly, the LEADER[2] approach of RDPs, whose "immaterial objectives" comprise "social attitude changes" (Pizani and Franceschetti, 2011), can be instrumental in promoting local development and hence overall regional cohesion through the promotion of social capital in rural areas.

This paper critically examines the significance of LEADER in this context. After a brief presentation of the programme's philosophy and methods of application, its relationship with social capital elements is established. The lack of adequate attention to social capital in conventional evaluation methods and the need to incorporate this dimension are then discussed. Thereafter, LEADER's efficiency in stimulating features of social capital is assessed for the case of Greece by referring to some studies' findings. This country was chosen due to its overall low level of social capital, a very centralised governance model, the prevalence of a sectoral (vs. a holistic) approach to rural regions and intense regional imbalances largely stemming from unexploited resources in marginal regions. It then appears to be a good case for pointing out the difficulties of applying the LEADER approach but also the challenges that it involves in inducing territorial/regional growth by stimulating social capital elements. Social capital's contribution in facilitating the shift from an agricultural-based development to a more integrative, place-based approach in rural regions (Horlings and Marsden, 2014) is emphasised in this context. Concluding remarks appear in the final section.

The LEADER programme and its contribution to social capital enhancement

LEADER was set to be the basic vehicle to carry out the neo-endogenous approach in rural areas, which shifted the focus from the 'agricultural sector' to 'rural territory', a concept comprising both tangible and intangible elements, specific to each locality, such as entrepreneurial tradition and regional identity (Caraveli and Chardas 2013; Go et al., 2013; Pollermann et al., 2013). This approach, which came to be known as the 'new rural paradigm', was incarnated in the Rural Development Policy (RDP) – now officially the Second Pillar – of the Common Agricultural Policy (CAP), implemented through Rural Development Programmes – RDPs). Farmers within this context are considered producers of public goods who safeguard the environment, the landscape and the cultural heritage of their localities through integrated and multi-sectoral

[2] Now replaced by the multi-funded Community-Led Local Development approach.

actions (Arabatzis et al., 2010; Thoidou, 2011; Caraveli and Doukas, 2012). At the heart of the new philosophy lies the enhancement of capacity-building of local actors through the activation of social capital, a process corresponding to social innovation (Ray, 2000; Nardone et al., 2010; Pizani and Franceschetti, 2011; Christoforou and Pizani, 2015). The programme's innovative character lies in the novel methods of tackling local development problems, by "building new forms of partnerships and synergies (horizontal or vertical) and linking activities across various economic sectors, social groups and levels of governance" (Christoforou and Pizani 2015). Evidently, the new strategy requires changes of social attitudes and governance systems.

Table 1. New Rural Paradigm

	Old approach	**New approach**
Objectives	Equalisation, farm income, farm competitiveness	Competitiveness of rural areas, valorisation of local assets, exploitation of unused resources
Key target sector	Agriculture Sector-based policies	Various sectors of rural economies (e.g. rural tourism, manufacturing, ICT industry etc.)
Main tools	Subsidies	Investments
Key actors	National governments, farmers Top-down initiatives	All levels of government (supranational, national, regional and local) Various stakeholders (public, private, NGOs) Bottom-up initiatives

Source: OECD (2006).

Contrary to conventional rural development measures and objectives – which aim at achieving quantitative targets initially set, without addressing social factors, such as values, institutions, local identity, power relations and participatory processes – LEADER explicitly addresses the premise that performance directly depends on the collective organisation of stakeholders through the establishment of the proper mechanisms. It thus introduces elements of integration, participation, networking and local governance capacities as rural development objectives alongside the enhancement of conventional socio-economic indicators like income, employment and competitiveness (metis, 2010). Local partnerships are at the core of LEADER initiatives and directly attached them to the concept and measures of social capital. These characteristics make LEADER an 'approach' rather than a mere 'programme', whose contribution lies in building up the 'human and social infrastructure', apart from the physical and natural infrastructure of the locality, that can also be used in other European and national development-related programmes relying on the mobilisation and collaboration of local social forces, such as cultural activities, the enhancement of natural environment, rural tourism etc. OECD (2006) distinguishes the old from the new approach to rural areas on the basis of the criteria presented in Table 1.

LEADER is implemented through state or private local organisations (representing many types of local actors), the so-called Local Action Groups (LAGs), "a consortium of public and private partners (local authorities, chambers, non-profit organisations, associations, rural cooperative and private entities), who design a common strategy and innovative actions for RD" (Arabatzis et al., 2010, p. 303). LAGs represent structural social capital, i.e. a new kind of socio-economic relationships of a private and public nature. The co-operation and networks features of the LEADER approach express the relational social capital, i.e. relations based on mutual trust and a social recognition of the LAG inside a network. The possibility of the LAGs to promote projects through different interventions expresses the capacity of individual/groups to co-operate with actors of different socio-economic sectors and the innovative character of the initiatives. This is bridging social capital. The involvement of local population of rural areas in LEADER initiatives can testify different types of social participation, expressing bonding social capital. Finally, the capacity of drawing resources from formal institutions is considered as linking social capital (Pizani and Franceschetti, 2011).

LEADER I, introduced in 1991 as a pilot programme for a three-year period, was considered as the first application of the new approach in rural areas. Aiming at stimulating small-scale innovative actions at the local level in disadvantaged areas of Europe through the bottom-up approach, the programme went beyond simple quantitative development criteria (as for example those expressed in the Lisbon Strategy) to include qualitative ones, as discussed above. The LEADERs that followed, i.e. LEADER II, LEADER+, LEADER 2000-06, LEADER 2007-13, as well as the current 2014-20 programme, consolidated and strengthened the neo-endogenous approach, reinforcing the local identity. Since the first LEADER, the programme has changed in emphasis and scope, eventually extending to all European rural areas, including the economically developed ones. Undoubtedly, the new approach became a model for rural development policies in Europe.

Caution should be given to LEADER mainstreaming which could alter its innovative and bottom-up character by what might be termed a 'banalisation' of projects. Dax et al. (2016) support that while LEADER's status has been upgraded by its integration into the RDPs as the fourth axis in the period 2007-2013, increased complexity of the scheme and a slowing down in its delivery have been witnessed, resulting from more EU regulation. Thus, many of the strategic priorities of LEADER in the previous period lost relevance and more 'standard' agricultural measures were applied. Furthermore, the reduced autonomy of LAGs, due to the rise in the level of bureaucracy, constrained their ability to respond to particular local needs, distancing the programme from its 'area-based' content.

Social capital in the evaluation process

LEADER's contribution in the enhancement of social capital that supports further the programme's overall objectives should be appraised in the evaluation processes. In particular, evaluations should stress the 'process' aspect of local development methods as opposed to strictly tangible and quantitatively measurable targets. The following criteria should then be set (EC, 2010): (i) building local governance capacities; (ii) adopting an area-based and bottom-up approach; (iii) mobilising local action groups; (iv) implementing an integrated (multi-sectoral) pilot (innovative) strategy to rural development; (v) promoting cooperation and networking between local actors across various groups and communities.

It is widely recognised that evaluation reports of 'conventional' rural development programmes focus solely on quantitative objectives, namely the increase in incomes and employment, the diversification of the rural economy and the improvement of the natural environment (metis, 2010; Pizani and Franceschetti, 2011; Papadopoulou et al., 2011, 2012). Problems with such reports might include: "insufficient tools for evaluating the dimension and context of social capital, such as intangible inputs/outputs of cooperation and participation; disproportionate focus on outputs (competitiveness, growth, employment) compared to processes (social innovation, cooperative networks, participatory and multilevel governance structures); weaknesses in institutional dynamics – power structures; marginalised groups" (Christoforou and Pizani, 2015).

Some reports however recognise the social capital aspects of LEADER. For example, metis (2010), adopting Bourdieu's (1980, 1986) definition of social capital, sees it as the basis for local economic development and incorporates it in the evaluation matrix. The report relates social capital to 'soft' actions which encourage trust and reciprocity among local people and attempts to assess it through changes in the mindsets and behaviours of key local stakeholders that are connected with each other by bonding, bridging and linking ties. This classical distinction of social capital originates from the writings of Woolcock (1998) and Putnam (2000). Bonding social capital is conceived here as the strengthening of local identity and coherence with a focus on the beneficiaries or project owners; bridging social capital refers to networking and openness particularly in the formation of regional networks across local LAGs; and linking social capital covers the coordination between different levels of governance and the quality of governance.

Pizani and Franceschetti (2011) point to the lack of a simple and standardised index for measuring social capital promotion in different RDPs measures and they propose the Relative Index of Social Capital Promotion (RISCP), an output index based on the different dimensions of social capital. Papadopoulou et al. (2012) stress the fact that while evaluation criteria became stricter in the 2007-2013 period and a more effective system of RDP assessment was introduced, this process is still inadequate, regarding its ability to "capture less obvious and less tangible effects of RDPs, especially when synergies among measure objectives are concerned". The latter could probably be measured through a number of qualitative indicators. They support, in particular, that as rural development is becoming more 'participatory' at all stages – with LEADER's bottom-up approach the most prominent example – a participatory evaluation system is required, meaning "an endogenous evaluation…based on the participation of local institutions and indigenous knowledge systems, providing an opportunity for the enhancement of local society and experience" (ibid.). They then propose the use of "mixed-method approaches to the assessment of social dimensions of development projects, because these methods combine the qualitative and the quantitative, the individual and the structural, the economic and non-economic means and ends to the development process" (ibid.).

A combination of quantitative and qualitative approaches is also proposed by other authors. Nardone et al. (2010) point to problems caused by the systematic use of qualitative methods in case-studies of different localities, namely, the difficulty in considering "the findings representative, comparable and generalisable". Bambeger et al. (2010) emphasise the significance of 'mixed methods' in evaluating the role of social capital in local development programmes and in assessing the neo-endogenous approach. According to these authors, such methods correspond to a 'process analysis', which "looks at the internal organisational procedures through which the project is implemented", without however dismissing external factors, such as "political pressures to provide benefits to non-eligible groups or problems within partner agencies that can affect the provision of certain services".

LEADER and social capital in Greece

Social capital in Greece

Greece, along with other southern European countries, is widely considered poor in social capital and thus in strength of civil society. This is due to its centralised, but simultaneously weak, central state structure, which constitute its primary characteristics. The latter reflect: economic and political instability prevailing in most of the country's modern history, including the post-dictatorship period; a strong tradition of authoritarian statism with a dominant role of political parties and interference of special-interest groups, leading to patron-client relationships and widespread corruption (Lyberaki and Paraskevopoulos, 2002; Christoforou, 2005). The country's social capital index, measured by membership in associations has been estimated to be the lowest among the EU-15 Member States. This, according to recent World Bank reports, reflects the low quality of institutions (relative to other EU Member States) and a strong perception of corruption, leading to a low degree of trust and confidence in public institutions, which has become a dominant feature of public life. Greece's tradition of strong, nuclear, family ties and/or hierarchical clientelistic networks have been considered basic obstacles to social capital-building. The latter has, in turn, been considered the main factor blocking reform in the long-term (Christoforou, 2005, 2011; Featherstone and Papadimitriou, 2015). Combatting clientelistic practices and establishing impersonal procedures, for example, evaluations, competitive examinations etc. would constitute a step toward modernisation and social capital creation (Lyberaki and Paraskevopoulos, 2002).

Social capital elements (e.g. trust, culture and joint decision-making) are equally weak in rural areas (see, for example, Thoidou, 2011; Karelakis et al., 2013). There, the old-type 'sectoral' (vs. the holistic development) approach continues to dominate agricultural policy, while local decisions have traditionally been dominated by the central state, with subnational actors lacking the opportunity to participate in RDPs in their localities. This is reflected in the reluctance of actors involved (representing vested interests in agricultural lobbying) to abandon the 'old' approach to rural development, while the regulations and initiatives of these programmes have been more used for distributing financial help to eligible holdings rather than as a tool for developing a strategy (Papadopoulos and Liarikos, 2007; Karanikolas and Hatzipanteli, 2010).

It can then be assumed that the LEADER approach, if adopted after overcoming some of the above obstacles, could prove instrumental to stimulating social capital in establishing a more territorial-based decision-making. This could in turn lead to the revival of a number of rural areas and the amelioration of internal cohesion problems.

I now turn to the examination of LEADER's contribution to social capital-building in Greek rural regions, based on a number of studies that have explicitly or implicitly addressed the topic. Where explicit analyses do not exist, I attempt to draw some conclusions on social capital enhancement from implicit references on RDPs' impacts.

Case study findings

Different case studies concerning LEADER's success in social capital building lead to different, often contradictory, conclusions. Efstratoglou and Mavridou (2003) used five evaluation criteria to assess LEADER II, namely: the territorial dimension, the bottom-up approach, the innovative character, transnational co-operation, and networking and financing. They concluded that the programme had an overall positive impact on Greek rural areas, bringing about substantial progress in rural development processes, especially in declining or depopulated areas, through changes in mentalities and attitudes, establishing an alternative to the top-down approach to rural development (ibid.). Its innovative character was evident in the "the effective partnership of local actors", already introduced by LEADER I, which was largely due to the "homogeneous designated area that allowed for a thematic integrated approach (based on tourism and culture) and competent LAGs that mobilised local population" (ibid., p. 310). This innovative programme was not always welcome by the local population, which showed lack of trust and willingness to respond, due to the LAGs' lack of experience in bottom-up approaches as up to then only top-down approaches existed. Obstacles to the bottom-up approach were in some cases the outcome of LAGs' efforts to use the available funding for promoting projects with short-term tangible results (e.g. an increase in employment), rather than encouraging local actors to engage in long-term strategic and multi-sectoral planning. Despite difficulties, overall the implementation of the programme by 56 LAGs in Greece had a learning effect, as "the LAG proved to be a necessary and innovative instrument that contributes to sustainable rural development, in a centralised administrative context with long tradition in top-down policy delivery" (ibid.).

Examining the implementation of LEADER projects in Lake Plastiras (a designated 'less favoured area' in central Greece) in Greece, Koutsouris (2008) concluded that only bottom-up processes, in which local stake-holders participate in the construction of strategies and solutions for the area, can lead to sustainable development, as opposed to a local development approach based on top-down expert and managerial knowledge. Agri-tourism and various forms of alternative/soft tourism that go hand-in-hand with other productive local activities - mainly primary production – emerged as the only way for reversing the declining socio-economic trends and became a major investment outlet for local authorities and private businessmen, who took advantage from EU and national funding (ibid.). With its innovative and multi-sectoral character, manifested in the promotion of "co-operation and self-government" by the LAG, LEADER was recognised as the best programme to promote sustainable development strategies (ibid.). This approach and the kind of knowledge it adds to the area "runs contrary to the 'old' approach of using EU funding to set businesses for short-term profit without quality considerations (like taverns or 'rooms to let') or organisational, management and marketing skills" which "lack a spirit of co-operation" (ibid.). The latter inevitably leads to erosion of the area's social capital.

Arabatzis et al. (2010) evaluated the implementation of LEADER+ in mountainous, disadvantaged and insular areas of Greece characterised by severe developmental problems. Using data on the budgets per measure and intervention area pertaining to each LAG, they concluded that LEADER+, just like the previous programmes, "conveyed a new form of governance to rural areas, by bringing together many different types of local stakeholders at each level and between various levels of decision-making, in combination with strategic planning and the management of natural, cultural and agricultural resources … Integrated rural development [was then] achieved through the participatory cooperation of rural stakeholders at all levels of rural life" (ibid.).

Greek MAs generally share the above views. LEADER+, in particular, was believed to have "addressed a large number of needs of rural areas, serving as an important complement to mainstream policies and agencies and contributing to economic diversification, quality of life and preservation and enhancement of the natural and built environment". It has done so, by "promoting sensitivity to local needs and small scale, potentials considered unreachable by larger and more traditionally run organisations". This is what has "distinguished LEADER from other governmental structures …". Furthermore, "the implementation of the LEADER method promoted multi-sectoral and integrated development and contributed to strengthening local economy and social capital in rural areas. Mobilisation of entrepreneurs was a key success factor…" (metis, 2010, p. 15).

Generally positive results from LEADER implementation were also found in a case study conducted in south-eastern Peloponnese (the southern peninsula of Greece) by Caraveli and Chardas (2013), where they examine this programme's chances of success in promoting localised development through bottom-up approaches. They draw on information from published documents and personal communication with local actors, represented by the Regional Development Company of Parnonas Mountain (RDC) – the local LAG – concerning the implementation of LEADER+ (2000-06) and LEADER (2007-2013). In these reports, the programmes' achievements were assessed by comparing strategic targets to tangible results, such as the degree of: (i) local diversification through rural tourism - measured by the number of investments in this sector; and (ii) bottom-up encouragement, assessed by the number of people responding to calls for 'demonstrative actions' by LAGs - i.e. actions that inform the population of the prospective investment opportunities (Caraveli and Chardas 2013). These activities could be interpreted as bringing about: (i) increased interaction among actors (through, for example, collective investments) inducing a sense of place and community ties; (ii) improved economic performance through co-operation; (iii) enhanced actors' capacity to identify and take-up new innovative ideas and actions (Christoforou and Pizani, 2015). They could then be considered to be satisfying the evaluation criteria for social capital enhancement. In particular, (i) and (ii) provide evidence for bonding social capital, i.e. of strengthening local identity and coherence. As these can be considered innovative, in the sense that they differ from traditional strategies, they also contribute to criterion (iii). No strong evidence is on the other hand provided for bridging social capital through networking and openness, or linking social capital which would bring about "flows of finance and knowledge" (ibid.).

The inadequate support, let alone the obstacles raised by the State in the adoption of new strategies, which contradicts the innovative and risky character of LEADER, has been pointed out by almost all researchers. According to Koutsouris (2008, p. 245), though "the State provides the institutional framework for the implementation of the programmes, its main purpose is to absorb the available EU funding" as it creates disincentives for LAGs and potential investors through bureaucratic rules; and despite its rhetoric on SD, it does not have a fully articulated development strategy for LFAs". Thoidou (2011, p. 9) further remarks: "a diminished territorial dimension of structural programmes characterises each of the successive CSFs", which implied "a more bureaucratic and complicated decision making process, with a more limited role of local governments" (ibid., p. 11). This is so, despite the basic aim of the National Strategic Reference Framework (NSRF) of the fourth period, "to strengthen the competitiveness of regional economies with sustainable development, taking into consideration the lack of sufficient social and human capital in most of the country's regions" (ibid., p. 10). The limited positive impacts of LEADER to just a few areas with a greater access to external funding used to mobilise the endogenous/local resources, underlined by the absence of a state-supported local strategy was also remarked by Caraveli and Chardas (2013).

Table 2. Summary of case study results of LEADER programmes in Greece: Impact on rural development processes through social capital building

Approaches (qualitative –questionnaires/ interviews/ published documents) Evaluation criteria	LEADER I (applied in LFAs)	LEADER II (applied in LFAs)	LEADER + (2000-2006) (applied in LFAs)	LEADER IV (2007-13) (applied in all areas)	Obstacles to all LEADERs
Territorial (integrated, multisectoral actions based on rural tourism) -new forms of governance	Positive	Positive (adding value to LEADER I)			● bureaucracy (disincentives for LAGs) ● state centralisation/ clientelism ● prevalence of old sectoral approach in RD and agri-tourist services: using EU funding without quality considerations; lack of 'local' or 'traditional' character; lack of synergies and cooperation ● lack of national strategy for RD and agri-tourism in particular
Bottom-up		Positive: mobilisation of local population, changes in attitudes, cooperation (bonding social capital)			● lack of trust and willingness to respond by local actors ● emphasis in quantitative results (e.g. no. of persons, no. of investments) rather than attitude change in LAGs' reports
Innovative character	Positive (effective partnership of local actors)	Positive (effective partnership of local actors)	Positive (effective partnership of local actors)	Positive (effective partnership of local actors)	Emphasis on quantitative results
Transnational cooperation & networking	Positive	Positive in some cases, extra-local networks by young entrepreneurs engaged in quality production or tourism (bridging social capital)	Positive but with no strong evidence	Positive but with no strong evidence	lack of trust and willingness to respond by local actors
Funding	Positive	Positive in some cases (linking social capital)	Positive but with no strong evidence	Positive but with no strong evidence	

Source: own composition.

The state's indifference in the significant area of agro-tourism, manifested in the lack of local strategies for this sector, is stressed by Kizos and Losifides (2007), who warn about the risks of relying on agro-tourism and actions supporting it as the major drive for diversification in rural areas. By making comparisons among a number of countries, the authors find that "the trajectory of agro-tourism in Greece does not comply with the theoretical framework of contemporary rural development practices" (ibid., p. 60). They point to some general reasons for this failure, which highlight the state's role: the lack of a 'local' or 'traditional' character of agro-tourist services; the lack of activities related to farming or the natural environment and the cultural heritage; the lack of synergies and cooperation with other holdings and of local networking which would assist rural development in general.

Table 2 attempts to summarise the impacts from the application of LEADER on social capital building and through it on local growth on the basis of the above case studies. The last column lists the major obstacles that the bottom-up approach, the most manifested social capital measure, faces at the local level. Future research must focus on these impediments to the change in attitudes and types of governance and define possible ways to overcome them. This in turn requires the establishment of the proper mix of analytical methods (quantitative and qualitative) and the construction of the most appropriate indicators which would be applied to the areas most in need for the new approach.

Concluding remarks

Place-based strategies, underlining the bottom-up processes promoted by LEADER programmes, lie at the heart of the 'new rural paradigm' in the EU, reflecting the endogenous or neo-endogenous development approach. The latter emphasises the contribution of local public and private actors in designing and implementing development strategies in their territories, making also the best use of external assistance (e.g. funding) stemming from top-down decisions. Bottom-up methods involve a substantial role for social capital, expressed in the building of networks of the bonding, bridging and linking type to enable a wider segment of the local/rural population to actively and collectively participate in local management processes. Accordingly, the success of local development programmes, such as the LEADER of RDPs, should be assessed on the basis of their ability to apply this broader development approach, which comprises qualitative with quantitative targets. Evaluation reports should then use indicators that go beyond the assessment of narrowly-defined economic targets of territorial competitiveness, employment or financial management, resulting from an application of top-down decisions. This is often not the case, as many such reports across the EU lack any clear 'social capital' dimension. As social capital is difficult to measure directly, in many studies proxies are used. Alternatively, the means and results of measureable targets are interpreted as resulting from social capital enhancement. Obstacles to the adoption of the bottom-up strategy in rural areas and the recognition of social capital's significance, can be posed by the institutional setting, i.e. the state, but also by the lack of willingness on the part of local actors at all levels to adopt it. These factors should also be given sufficient consideration in evaluation reports and other studies along with the proposed means to overcome them.

The findings of case studies and evaluation reports on the application of LEADER in designated areas of Greece reveal positive impacts in generating local growth through the promotion of a number of social capital features. Establishing a new type of local governance based on bottom-up initiatives is particularly important for a country with low levels of social capital, weak subnational representation and the prevalence of a top-down approach to rural regions. These characteristics inhibit the successful application of the LEADER approach in most of the presented cases, but pose a challenge for the programmes' managing authorities and social actors at all levels. Future research must focus on the ways to deal with these issues both at the policy-making and the implementation levels.

References

Anon., 2009. *Social Capital and Cohesion: Towards a Common Good*. Policy implications of SOCCOH, an EU-funded research project involving eight institutions led by the London School of Economics and Political Science, European Policy Brief, June 2009.

Arabatzis, G., Aggelopoulos, S. Tsiantikoudis, S., 2010. *Rural Development and LEADER+ in Greece: Evaluation of Local Action Groups*. Journal of Food, Agriculture & Environment 8(1), 302-307.

Bambeger, M., Vijayendra, R., Woolcock, M., 2010. *Using Mixed Methods in Monitoring and Evaluation – Experiences from International Developmen*t. Policy Research Working Paper 5245, The World Bank Development Research Group, Poverty and Inequality Team, March 2010.

Bourdieu, P., 1980. *Le capital social, notes provisoires* [Social capital, provisional notes]: Actes de la recherche en sciences sociales 31, 2-3.

Bourdieu, P., 1986. *The forms of capital*, in J.G. Richardson (ed.), Handbook of Theory and Research for the Sociology of Education, New York NY: Greenwood: 241-258.

Camagni, R., Capello, R., 2013. *Regional Competitiveness and Territorial Capital: A Conceptual Approach and Empirical Evidence from the European Union*. Regional Studies 47(9), 1383-1401. https://doi.org/10.1080/00343404.2012.681640

Caraveli, H., Doukas, J., 2012. *Rural Development Policy: an alternative development strategy for the case of Greece*. Region and Periphery 2, 21-36 (in Greek).

Caraveli, H., Chardas, A., 2013. *Rural Development Policy and Local Governance: Implementing the LEADER Axis in South-Eastern Peloponnese-Greece*. Discussion Paper 15. Athens: Athens University of Economics and Business.

Christoforou, A., 2005. *On the Determinants of Social Capital in Greece Compared to Countries of the European Union*. The Fondazione Eni Enrico Mattei Note di Lavoro Series Index, http://www.feem.it/Feem/Pub/Publications/WPapers/default.htm

Christoforou, A., 2011. *Social Capital across European Countries: Individual and Aggregate Determinants of Group Membership*. American Journal of Economics and Sociology 70(3), 699-728. https://doi.org/10.1111/j.1536-7150.2011.00793.x

Christoforou, A., Pisani, E., 2015. *Social Capital and Rural Development in Southern European Regions: The Case of EU-funded LEADER Projects*. Presentation, First World Congress of Comparative Economics, Rome, 25-27 June 2015.

Dax, T., Strahl, W., Kirwan, J., Maye, D., 2016. *The Leader programme 2007--2013: Enabling or disabling social innovation and neo-endogenous development? Insights from Austria and Ireland*. European Urban and Regional Studies 23(1), 56-68. https://doi.org/10.1177/0969776413490425

Efstratoglou, S., Mavridou, S., 2003. *Geographical Report on Greece, Ex-post Evaluation of the Community Initiative LEADER II, Final Report*. Brussels: European Commission.

EC, 2010. *European Evaluation Network for Rural Development (ENRD), Working Paper on Capturing Impacts of LEADER and of Measures to Improve the Quality of Life in Rural Areas*. Brussels: European Commission.

Featherstone, K., Papadimitriou, D., 2015. *Prime Ministers in Greece: The Paradox of Power*. OUP. https://doi.org/10.1093/acprof:oso/9780198717171.001.0001

Go, F.M., Trunfio, M., della Lucia, M., 2013. *Social Capital and governance for sustainable rural development*. Studies in Agricultural Economics 115, 104-110. https://doi.org/10.7896/j.1220

Horlings, L., Marsden T., 2014. *Exploring the 'New Rural Paradigm' in Europe: Eco-economic strategies as a counterforce to the global competitiveness agenda*. European Urban and Regional Studies 21(1), 4-20. https://doi.org/10.1177/0969776412441934

Karanikolas P., Hatzipanteli, S., 2010. *The decentralisation process of rural development policy in Greece*. European Planning Studies 18(3), 411-434.

Karelakis, C., Zafeiriou, E., Galanopoulos, K., Koutroumanidis, T., 2013. *Natural Resources in Regional and Rural Development: Moving from Public Perceptions to Policy Action*. New Medit N., 56-64. https://doi.org/10.1080/09654310903497710

Kizos, Th. and Losifides, Th., 2007. *The Contradictions of Agrotourism Development in Greece: Evidence from Three Case Studies*. South European Society and Politics 12(1), 59-77. https://doi.org/10.1080/13608740601155443

Koutsouris, A., 2008. *The Battlefield for (Sustainable) Rural Development: The Case of LakePlastiras, Central Greece*. Sociologia Ruralis 48(3), 240-256. https://doi.org/10.1111/j.1467-9523.2008.00465.x

Lyberaki, A., Paraskevopoulos, C., 2002. *Social Capital Measurement in Greece*. OECD-ONS International Conference on Social Capital Measurement, London, UK, 25-27 September 2002.

Nardone, G., Sisto, R., Lopolito, A., 2010. *Social Capital in the LEADER Initiative: a methodological approach*. Journal of Rural Studies 26, 63-72. https://doi.org/10.1016/j.jrurstud.2009.09.001

OECD, 2006. *The New Rural Paradigm: Policies and Governance.* Paris: OECD.

Papadopoulos, A., Liarikos, C., 2007. *Dissecting changing rural development networks*. Environment and Planning C: Government and Policy 25, 291-313. https://doi.org/10.1068/c0509j

Papadopoulou, E., Hasaganas, N., Harvey D., 2011. *Analysis of rural development policy networks in Greece: Is LEADER really different?* Land Use Policy 28, 663-673. https://doi.org/10.1016/j.landusepol.2010.11.005

Papadopoulou, E., Papalexiou, C., Hasaganas, N., 2012. *Participatory Evaluation of Rural Development Programmes: A Qualitative Approach in the Case of Modernization of Agricultural Holdings in Greece*. Regional Science Inquiry Journal IV(1), 81-94.

Pizani, E., Franceschetti, G., 2011. *Evaluation of social capital promotion in rural development programmes: a methodological approach*. Paper presented at the 122nd EAAE Seminar 'Evidence-based agricultural and rural policy making: Methodological and empirical challenges of policy evaluation', Ancona, Italy, 17-18 February 2011.

Pollermann, K., Raue, P., Schnaut, G., 2013. *Rural Development Experiences in Germany: opportunities and obstacles in fostering smart places through LEADER*. Studies in Agricultural Economics 115, 111-117. https://doi.org/10.7896/j.1228

Putnam, R.D., 2000. *Bowling alone: The Collapse and Survival of American Community.* New York NY: Simon & Schuster. https://doi.org/10.1145/358916.361990

Ray, C., 2000. *The EU LEADER Programme: Rural Development Laboratory*. Sociologia Ruralis 40(2), 163-171. https://doi.org/10.1111/1467-9523.00138

Sorensen, J., 2012. *Testing the Hypothesis of Higher Social Capital in Rural Areas: The Case of Denmark*. Regional Studies 46(7), 873-891. https://doi.org/10.1080/00343404.2012.669471

Thoidou, E., 2011. *The Territorial Approach to EU Cohesion Policy: Current Issues and Evidence from Greece*. SPATIUM International Review 25, 7-13. https://doi.org/10.2298/spat1125007t

Woolcock, M., 1998. *Social Capital and Economic Development: Toward a Theoretical Synthesis and Policy Framework*. Theory and Society 72(2), 151-208. https://doi.org/10.1023/A:1006884930135

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Understanding the initiators of social innovation in rural areas

Abstract: *As in the social innovation literature, the role of initiators / agentic engines is highlighted, the purpose of the paper is to deepen the understanding of initiators in the social innovation process and to further develop its evaluation. Accepting that the role of individuals is one of the most important aspects of the social innovation process, the main question posed in this study is how to develop the evaluation of this aspect further, and how to make it more objective. To get a deeper understanding of agentic engines, beyond literature review a group profile of selected social innovators is analysed. The results are based on their Profile XT personal competence assessments (provided by Profiles International Hungary) as well as in-depth interviews with them. The research reveals four elements for rating initiators: having a vision (purpose driven), being interested in serving people (Relationship System Intelligence), being proactive (positive attitude) and having a diverse network (outsider and insider).*

Keywords: *evaluation, social innovators, Profile XT, vision, network*

Introduction

An earlier study by one of the authors (Katonáné et al., 2016) examined the 'how' / the process of social innovation. This study and other literature were based on the analytical framework offered by Lawrence et al. (2013) for the analysis of social innovation. This introduced four aspects of the social innovation process, namely: the role of individuals, the impact of context, the sectors contribution and, finally, the way groups and networks are involved. Katonáné et al. (2016) examined these four aspects and their effects and beneficiaries through case studies in rural regions, using the Internal and External Factor Evaluation Matrix (EFEM). The relative importance of each aspect (context, initiator, sectors involved, group and networks involvement, effects and beneficiaries) was indicated by assigning a weight ranging from 0.0 (not important) to 1.0 (very important). The sum of all assigned weights was 1.0, where the role of individuals/initiator was rated as the second most important aspect (after the context with a weight 0.4), with a weight of 0.3. The next step in the comparison of different types of social innovation was to rate the aspects from 1 to 4, which captured whether the factor represented weakness (rating = 1) or strength (rating = 4). A question in the study by Katonáné et al. (2016) was how the rating could be more objective alongside the evaluation. This current paper follows the earlier research aims to improve the understanding and the evaluation of initiators / agentic engines in the social innovation process.

Pue et al. (2015, p.15) states that "the agentic engine of social innovation begins (Figure 1) when a (1) social entrepreneur (or social entrepreneurs, either individuals or organizations) devises a (2) socially creative strategy – that is, when an actor:

(A) driven by a particular MOTIVATION
(B) and possessing a set of VALUES,
(C) draws on his individual FACULTIES (i.e. creativity, knowledge, and experience)

to put into practice an idea which reconfigures society's approach to a given (3) social problem".

Dees (2001) describes social entrepreneurs as 'entrepreneurs with a social mission' and briefly defines them as follows: "social entrepreneurs play the role of change agents in the social sector, by:

- Adopting a mission to create and sustain social value (not just private value),
- Recognizing and relentlessly pursuing new opportunities to serve that mission,
- Engaging in a process of continuous innovation, adaptation, and learning,
- Acting boldly without being limited by resources currently in hand, and
- Exhibiting heightened accountability to the constituencies served and for the outcomes created".

This definition combines an emphasis on discipline and accountability with the notions of value creation taken from Say, innovation and change agents from Schumpeter, pursuit of opportunity from Drucker, and resourcefulness from Stevenson.

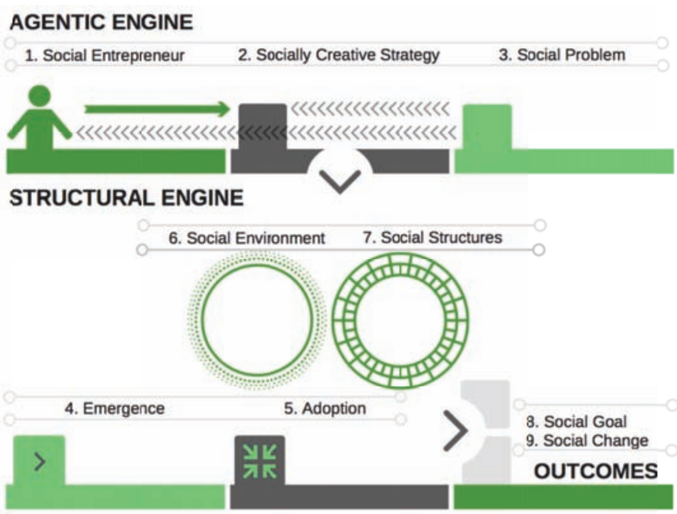

Figure 1. The agentic engine of the social innovation process
Source: Pue et al., 2015.

Lawrence et al. (2013, p. 5) refers to papers where the role of individuals in managing social innovation has been highlighted. "A review of historical cases, such as the initiatives of Benjamin Franklin (Mumford, 2002, in Lawrence), identify the importance of individuals who were able to develop ground-breaking ideas out of their everyday experiences and a willingness to experiment". They draw attention to two overlapping skills (Lawrence et al., 2013, p. 5) "Social innovators appear able not only to diagnose causes of social problems, but also to consider the 'downstream consequences' of any proposed solution. This diagnostic ability may come from having a unique combination of outsider and insider knowledge (Marcy and Mumford, 2007, in Lawrence). Second, successful social innovators seem distinctively able to garner elite support and financial resources: Franklin, for instance, was able to enrol supportive elites who provided him with ideas and finances (Mumford, 2002)".

According to Bass and Avolio (1994), transformational leadership is constituted from the following behavioural components: inspirational motivation (articulating an appealing and/or evocative vision), intellectual stimulation, (promoting creativity and innovation), idealised influence (charismatic role modelling), and individualised consideration (coaching and mentoring). Leaders of organisations communicate their personal beliefs, and these become implanted into an organisation's culture (Schein, 1992). Successful social innovators or movements succeeded because, when their ideas became shared with many minds, they outlasted their originators in the long run (Mulgan, 2006). Moreover, successful innovators are those who have the deep knowledge of organisational culture (Lave and Wenger, 1991) and break some established organisational patterns and rituals (Battilana, 2006). Crucial is also an ability of institutionally-embedded actors to distance themselves from institutional pressures and to take strategic actions (DiMaggio, 1988).

In the literature, attention is frequently paid to both organisational settings and individual features of organisations' leaders. Profoundly, studies emphasise an embedded character of leadership: the effectiveness of an individual in leading the change is strongly rooted in her / his situation within the organisational framework. This can be explained as Bourdieu's (1990) 'habitus' and 'fields', which are structured systems of social positions within which struggles take place over resources, stakes and access. Individuals are socially constituted agents, thus their social position can be considered as the key variable of change and innovation (Battilana, 2006). "The social entrepreneur is influenced by the social environment and existing social structures" (Pue et al., 2015, p. 12)

An organisation is placed within a broader context of many agents: other organisations and networks, with varying power and resources enabling social innovation. Particularly, network type of organisations seem to be good accelerators for innovative processes. They often cross various organisational and hierarchic boundaries and sectors, thus sometimes are difficult to be described clearly as a legal or organisational entity. Attempting to explain this, Obstfeld (2005) examined microprocesses in social networks dealing with organisational innovation and the ways they connect individuals in the networks, with the innovation occurring both within and outside organisations. The study revealed that innovation is more likely to be triggered by individuals in the organisations with lower status than higher. The key to success was access of an individual to the strategic resources, controlling decision making, and her / his position in the organisation's hierarchy. However, an individual could be more likely to be successful as an innovator when he / she belongs to organisations favoured by the existing socio-economic regimes (Battilana, 2006).

Interorganisational mobility can be a significant factor to speed up innovation processes. Moving in between organisations and bridging different knowledge regimes (intermediation) is considered as the key asset of an innovation broker (Aldrich and von Glinow, 1992; Howells, 2006). Individuals with more informal contacts outside the organisation (gatekeepers) may be critical for importing novel information and connecting an organisation with its environment (Alien, 1977). In addition, Alvord et al. (2004) consider the perception of individual's risk as an essential factor for inducing social innovation: when the financial risk for social entrepreneurs is low and their individual material situation stable, they are more likely to make an effort to innovate. Often, they are supported with established networks and contacts but at the same time avoid losing their established credibility.

The hypothesis of this paper, based on the literature review and the experience of the authors, is that the following elements have to be considered when understanding and evaluating agentic engines of social innovation:

- social innovators have vision – MOTIVATION;
- they have people-serving interest – VALUES;
- they are proactive, agreeing with results from the literature that they can enrol support if it is needed, if they do not have – FACULTIES;
- they have diverse networks – STATUS IN STRUCTURAL ENGINE.

Methodology

"Arriving at measurable characteristics that define an entrepreneur generally and a social entrepreneur in particular, remains an elusive task" (Pue, 2015, p. 16). On the other hand, in business sector there are more and more tools developed for personality assessments, such as DISC four aspects of behaviour, MBTI Myers-Briggs Type Indicator or the Profile XT personal competence assessments used in this study. Dennard (2009) notes that information on skills, experience, education gives just 10 per cent (i.e. the tip of the iceberg) of the whole picture measuring the total person, while thinking styles, behavioural traits and occupational interests measured by Profile XT give the other 90 per cent.

To get a deeper understanding of social innovators and answers to some of the hypothesis statements (linked to values and faculties), firstly Profile XT (Table 1) personal competence assessments (provided by Profiles International Hungary) was carried out among three social innovators who were ready to take part in the two-hour survey and the interview following it. The Ashoka database (specifically, its map of Hungarian social innovators) was the source for the selection of social innovators. Bill Drayton founded Ashoka in 1980, based on the idea that the most powerful force for good in the world is a social entrepreneur: a person driven by an innovative idea that can help correct an entrenched global problem (Ashoka, no date). Between July and October 2015, the Hungarian regional team of Ashoka carried out snowball research to create the map of Hungarian social innovators. This research involved three of those social innovators selected by Ashoka and living in the eastern regions of Hungary. In these regions of Hungary, the GDP per inhabitant purchasing power standard, by NUTS2 region, is below 75 per cent of the EU-28 average (Eurostat, 2016).

After the personal Profile XTs, the group profile of the three social innovators was analysed to define the common characteristics which give the key competencies of social innovators.

As a third step, to find answers to the hypothesis linked to motivation and status, in-depth interviews were conducted with them.

Strengthening the findings of the group profile, five colleagues (involved in social activities) of one of them a participating social innovator, filled out the Profile XT as well.

Table 1. Structure of Profile XT

Thinking style										
Learning index	1	2	3	4	5	6	7	8	9	10
Verbal skill	1	2	3	4	5	6	7	8	9	10
Verbal reasoning	1	2	3	4	5	6	7	8	9	10
Numerical ability	1	2	3	4	5	6	7	8	9	10
Numeric reasoning	1	2	3	4	5	6	7	8	9	10
Behavioural traits										
Energy level	1	2	3	4	5	6	7	8	9	10
Assertiveness	1	2	3	4	5	6	7	8	9	10
Sociability	1	2	3	4	5	6	7	8	9	10
Manageability	1	2	3	4	5	6	7	8	9	10
Attitude	1	2	3	4	5	6	7	8	9	10
Decisiveness	1	2	3	4	5	6	7	8	9	10
Accommodating	1	2	3	4	5	6	7	8	9	10
Independence	1	2	3	4	5	6	7	8	9	10
Objective judgment	1	2	3	4	5	6	7	8	9	10
Occupational interest										
Enterprising	1	2	3	4	5	6	7	8	9	10
People service	1	2	3	4	5	6	7	8	9	10
Creative	1	2	3	4	5	6	7	8	9	10
Financial/Administrative	1	2	3	4	5	6	7	8	9	10
Technical	1	2	3	4	5	6	7	8	9	10
Mechanical	1	2	3	4	5	6	7	8	9	10

Source: own illustration based on Dennard (2009).

Results

Profile XT

The results (Table 2) of the Profile XT were introduced and checked with the social innovators.

Table 2. One of the social innovator's occupational interests – result from the Profile XT

Occupational interest										
Creative	1	2	3	4	5	6	7	**8**	9	10
Enterprising	1	2	3	4	5	**6**	7	8	9	10
People service	1	2	3	4	**5**	6	7	8	9	10
Mechanical	1	2	3	**4**	5	6	7	8	9	10
Technical	1	2	**3**	4	5	6	7	8	9	10
Financial/Administrative	1	**2**	3	4	5	6	7	8	9	10

Source: own data collection based on Profile XT.

Thinking style

As far as the social innovators' thinking style is concerned, their cognitive skills (both verbal and numerical) are above average. They can process information and learn quickly, and prefer to work on difficult tasks requiring thinking. They communicate in a sophisticated style and are able to draw conclusions quickly from verbal or written texts. They easily recognise and apply connections between concepts. They are quick problem solvers.

Behavioural traits

An assessment of the behavioural traits of social innovators is as follows:

- Energy level – social innovators have mid to high energy levels as compared to the entire working population. They use their working time effectively and generally work in a dynamic pace. They are regularly inclined to multitask which is required to run this social business often parallel to doing their 'normal' everyday work.
- Cooperation and managing conflicts – social innovators are balanced in handling conflicts. They strive to come to win-win agreements. They are friendly and cooperative but occasionally they can be critical, too. (Both their assertiveness and accommodating are of average level as compared to the entire working population). They are keen to undertake a leadership role but are also happy to follow others if necessary. They are enthusiastic team players.
- Sociability – social innovators are fairly sociable. They are rather extroverted, very likable and open. They like to share their ideas with other people. They tend to involve others in implementing their ideas. They constantly need to interact with other people on a personal level. They like to give feedback and expect to receive it, too. They have friendly characters. They are happy to participate in group work. They are good public speakers.
- Manageability – they are able to work effectively even under less structured circumstances than the average working environment. They prefer to create their own working conditions. They do not require (nor tolerate) a high level of direct control.
- Attitude – they are continuously very positive and express their positive attitude. They believe in the cause they work for. They trust other people easily. Also, they believe in their own capabilities and skills. They use an encouraging and optimistic voice when communicating. This is a key factor why other people follow them.
- Decisiveness – social innovators are quite thorough decision makers. They prefer to make well informed decisions. They react on time to requests but require a relatively long time and an extensive amount of information to study their options before making their final decisions.

- Independence – they more or less require a framework for their work. They prefer to work independently and flexibly, and expect others to let them do so as well as to work on their own, too. They are very supportive to their colleagues.
- Objective judgment – they make decisions and communicate based on both objective and rational information and their intuitions.

Occupational interests

Based on the data from the Profile XT assessment reports as well as the interviews, social innovators are driven by:

- Creative interest – They have new ideas all the time and get excited by brainstorming. They are good at problem solving. They are motivated by putting down the foundations of a new system or organisation. They are not very good in maintaining or operating an organisation by a routine since they have an inner drive to innovate. They always try new ways of working, discover new opportunities and plan how to make their dreams come true.
- People service interest – they like to help other people, support them or facilitate processes. They have a high sense of justice. They are very good listeners. Other people tend to find them with their problems. Saying 'no' is a great challenge for them as is asking others to do favours for them.
- Enterprising interest– they are result oriented and practical. They have a strong inner drive and need to get ahead constantly. They have a strong vision with regard to their cause. They like to lead other people toward their goals and other people just like to follow them. They handle business and money issues effectively, as opposed to 'traditional' non-profit fellows.

Interviews

The most important common points of the interviews are linked to the motivation, the sector they mainly act and their network:

- Motivation – all three social innovators are purpose driven in the field of education, but working with different groups. One of them is focusing her actions on talent development and personality development with an emphasis on children from underprivileged backgrounds. The other purpose is to increase human and social capital in her region through developing entrepreneurial mind-set, and the purpose of the third social innovator is to develop the culture of community-based enterprise, and start a development programme for local actors, with special regard to farmers. An interesting message from the interview was "I brought the idea, become the 'face' of it. I cannot pass this role over. This system was born in my head and I put the others in it".
- Civil sector – all of them work as a social innovator in the form of an association and they are residents, not incomers. Although they use associ-

ation as a legal form, as it was mentioned earlier they handle business and money issues effectively, they have customers from the market as well. Transparency is an important issue in their social enterprise.
- Network – they have a diverse and strong network inside and outside their region, addressing all four sectors at different levels (academia, government, industry/business and civil society). There are different possibilities for networking with business for example, getting knowledge in the field of IT and developing the homepage, or supporting with equipment such as a printer. Or they organise meetings for brainstorming with different actors. Two of them speak English as a foreign language and have connections from abroad as well, with international organisations, such as Ashoka, Observatoire Social International (OSI), Impact HUB network, and TEDx community.

It is also an interesting result that administrative interest is their lower interest.

Discussion

The literature review and also the primary research underlined our hypothesis that during the evaluation of agentic engines of social innovation the following aspects of social innovator could be considered:

- purpose driven, innovation and creation or not – MOTIVATION;
- people service interest or not – VALUES;
- proactive with a positive attitude and responsibility or not – FACULTIES;
- have diverse network or not – STATUS IN STRUCTURAL ENGINE.

Taking in mind the EFEM and rating the aspects of initiators from 1 to 4, which captured whether the factor represented weakness (rating = 1) or strength (rating = 4), each of these four elements could be evaluated separately. Evaluating the aspects of initiator (taking the four elements as equally important), whether the element represented weakness (rating = 0) or strength (rating = 1) and the sum could give the total evaluation of the initiator / the agentic engine within the social innovation process.

The results from the group profile showed that people service is a high interest of social innovators. This could be one of the most important characteristic to emphasise. As rural regions normally have low capacity to develop genuine technological or market innovations, social dimensions and, within those social innovation, should receive more attention. Thr literature on intelligent, high performing teams, such as the results from Rød and Firdjhon (2016) draw attention to the fact that we need to shift our attention away from the traditional focus of individual performance to the human relationship system itself and what it creates. Through interaction with others and being part of human relationship systems, individuals are able to release more of their resources and creative energy. By shifting from ‘I’ to ‘we’, the personal focus is deflected, thus empowering the human systems as a whole to find ways forward. They also emphasise that only by redirecting the focus from the individuals in the human relationship system to the system itself, and all the possibilities this offers in terms of leadership, creativity, wisdom, awareness and choice, can we tap into the true potential of human beings in action. We can create intelligent teams. They use the term Relationship System Intelligence (RSI). RSI is the capacity to read, understand and intentionally interact with the dynamics of human relationship systems. In order to develop a high-performing human relationship system, a leader and his or her team need to become aware, responsive, accountable and intentional about the dynamics of their team system. Moving from Emotional Intelligence to RSI, from self-awareness to systems awareness, from 'me' to 'we' (collectively), from self-focus to system focus.

The message of Lencioni (2016) is that ideal team players are humble. They lack excessive ego or concerns about status. Humble people are quick to point out the contributions of others and slow to seek attention for their own. They share credit, emphasise team over self and define success collectively rather than individually. According to Pue et al. (2015), connecting communities and empowering individuals is one of the three goals served by nurturing social innovation. The final item of literature to emphasise why the aspects of people service interest and networks of social innovator are important, is from Pentland (2014). His sociometric data showed that the pattern of idea flow by itself was more important to group performance than all other factors and, in fact, was as important as all taken together. Individual intelligence, personality, skill, and everything else together mattered less than the pattern of idea flow.

Finally, the cooperation of different sectors (academic, business, civil) in this research has to be emphasised as a good practice. The corporate social responsibility activity of the business sector carrying out the Profile XT and group profile assessment for free helped the awareness of the social entrepreneurs involved in the research and also supported the academic sector by deepening the understanding of social innovators.

References

Aldrich, H., von Glinow, M.A., 1992. *Personal networks and infrastructure development*, in D.V. Gibson, G. Kozmetsky, R.W. Smilor (eds), The Technopolis Phenomenon: Smart Cities, Fast Systems, Global Networks. Lanham MD: Rowman & Littlefield Publishers, 125-145.

Alien, T.J., 1977. *Managing the Flow of Technology*. Cambridge MA: MIT Press.

Alvord, S. H., Brown, L.D., Letts, C.W., 2004. *Social entrepreneurship and societal transformation an exploratory study*. The Journal of Applied Behavioral Science 40(3), 260-282. https://doi.org/10.1177/0021886304266847

Ashoka, no date. *History of Ashoka* [www document]. https://www.ashoka.org/en/ashokas-history (accessed 11 November 2016).

Bass, B.M., Avolio, B.J., 1994. *Improving Organizational Effectiveness through Transformational Leadership*. Thousand Oaks CA: Sage.

Battilana, J., 2006. *Agency and institutions: The enabling role of individuals' social position*. Organization 13(5), 653-676. https://doi.org/10.1177/1350508406067008

Bourdieu, P. 1990. *The Logic of Practice (translated by R. Nice)*. Cambridge: Polity.

Dees, J.G., 2001. *The Meaning of "Social Entrepreneurship"* [www document]. https://entrepreneurship.duke.edu/news-item/the-meaning-of-social-entrepreneurship/ (accessed: 24 August 2016).

Dennard, D. 2009. *Profile XT-Sales Employee Assessment*. Available online at http://www.slideshare.net/daviddennard/pxtsales-rept-ppt (accessed 6 October 2016).

DiMaggio, P. 1988. *Interest and agency in institutional theory*, in L. Zucker (ed.), Institutional Patterns and Organizations. Cambridge MA: Ballinger, 3-22.

Eurostat, 2016. *Statistical Atlas: Eurostat regional yearbook 2016* [www document]. http://ec.europa.eu/eurostat/statistical-atlas/gis/viewer/?year=&chapter=06&mids=2,52&o=1,1&center=48.11952,20.30409,4& (accessed 11 November 2016).

Howells, J., 2006. *Intermediation and the role of intermediaries in innovatio*n. Research Policy 35(5), 715-728. https://doi.org/10.1016/j.respol.2006.03.005

Katonáné, Kovács, J., Varga, E., Nemes, G., 2016. *Understanding the process of social innovation in rural regions: some Hungarian case studies*. Studies in Agricultural Economics 118(1), 22-29. https://doi.org/10.7896/j.1604

Lave, J., Wenger, E., 1991. *Situated Learning: Legitimate Peripheral Participation*. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511815355

Lawrence, T.B., Dover, G., Gallagher, B., 2013. *Managing Social Innovation. The Oxford Handbook of Innovation Managemen*t. Oxford: Oxford Handbooks Online.

Lencioni, P., 2016. *The Ideal Team Player. How to Recognize and Cultivate the Three Essential Virtues*. Hoboken NJ: Jossey Bass.

Mulgan, G., 2006. *The process of social innovation*. Innovations 1(2), 145-162. https://doi.org/10.1162/itgg.2006.1.2.145

Obstfeld, D., 2005. *Social networks, the tertius iungens orientation, and involvement in innovation*. Administrative Science Quarterly 50(1), 100-130. https://doi.org/10.2189/asqu.2005.50.1.100

Pentland, A., 2014. *Social Physics: How Social Networks Can Make Us Smarter*. New York NY: The Penguin Press.

Pue, K., Vandergeest, C., Breznitz, D., 2015. *Toward a Theory of Social Innovation*. Innovation Policy Lab White Paper No. 2016-01. Available at Social Science Research Network.

Rød, A., Firdjhon, M., 2016. *Creating Intelligent Teams*. Randburg, South Africa: KR Publishing.

Schein, E.H., 1992. *Organizational Culture and Leadership*. Hoboken NJ: Jossey-Bass.

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LEADER Local Action Groups and their innovative approaches to rural development in South Bohemia in the post-crisis period

Abstract: *The article is focused on the role of regional identity and local organisation in rural development during and after the global economic crisis. The relationship among these phenomena was investigated on LEADER Local Action Group development documents 2007-2013 and 2014-2020 in the South Bohemia Region of the Czech Republic. The methodology is based on discursive analysis of text and socio-economic analysis.*

Keywords: *innovation, local organisations, regional identity, rural development, South Bohemia*

Introduction

The success of rural development in localities depends on many factors. These factors are of internal and external origin, which should be reflected in development documents. For this article, we have chosen the global economic crisis as an external factor affecting rural development. The crisis influenced the 2007-2013 European Union (EU) programming period. Within the planning of development strategies for 2014-2020, the consequences of that crisis are already known. Therefore, a shift from dysfunctional to functional innovation processes in strategic documents can be assumed. As development documents, the strategic plans of LEADER Local Action Groups (LAGs) in the Southern Bohemia Region (SBR) were selected. According to EU methodology, SBR is categorised as 'predominantly rural'. In the analysed documents, we look at the role of regional identity and the organisations operating there. We assume that a comparison of the development documents for both programming periods will reveal the elements of transformation of rural society in the post-crisis period.

Organisations in the course of modification surroundings

Organisations as systems with a certain structure, including formal and informal elements, are influenced by external and internal surroundings (Armstrong, 1999). This is especially reflected during a crisis period, because the actions of every organisation are affected by what is happening externally (Keller, 2007). In this connection, there is a whole range of possible scenarios. Organisations are under the influential values of the social environment in which they occur. From the external surroundings, inputs are drawn and outputs provided. Internal and external pressures can often cause the surrender of some of the programme goals, in order to maintain at least some of them. They begin to have a life of their own, regardless of the interests of the founders. These ideas are included in the Crozier Concept (Selznick, 1949).

Within the population theory, organisations are likened to an animal species, which similarly may strive for survival in a form strategy based on generalisation or specialism. Specialists focus on the rapid adaptation to surrounding organisations, generalists proceed carefully and leave spare capacity in the case of need (Freeman and Hannan, 1983). Organisations contend with each other for limited resources and only a few survive (Hannan and Freeman, 1989).

Organisations are able to adapt and react to the pressures of the surroundings. Apart from competition, they can also use co-operation. (Emerson, 1964) Pressures of surroundings, according to the rendition of the concept by Scott (1992), can be managed by using bumpers and bridges strategies (theory of dependence on sources). Both strategies manipulate the boundaries of self-demarcation of the organisation, thereby increasing their chances of survival. A bumpers strategy builds borders and protects the central core against influences from the surroundings. The second strategy expands the borders and through co-operation creates a bridge between organisations and partners in the environment. These theories stress the limitations of resources and the limited capacity of the surroundings on which we depend and which cannot be exceeded.

In regional development, structures arise to facilitate coordination and stakeholder cooperation, as a result of the process of organisation. Efforts to achieve a common goal lead to the organisation of relationships between community actors. An organisation should be present to form a bridge between public and private interests. Mutual trust and common goals are important (Ježek, 2007). The particular case mentioned is LAGs that arise on the principle of local cooperation. They originated in the Czech Republic in 2004, when the association began to be developed for the purpose of drawing from EU funds and thus bringing together citizens, municipalities, NGOs and entrepreneurs. Collaboration is conducted on the principle of the partnership of local sectors, in order to achieve the strategic goals of the region.

Regional identity as a prerequisite for the development of the region

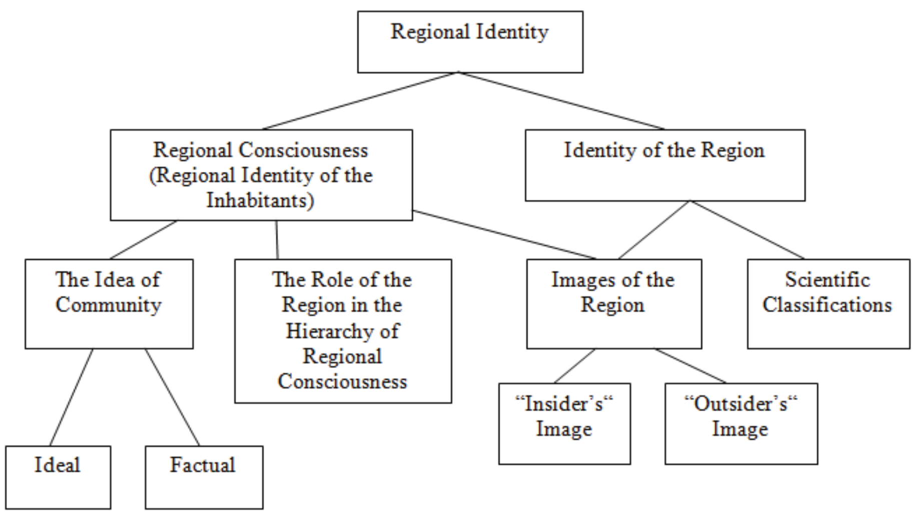

Figure 1. Dimensions of regional identity
Source: Paasi, 1986.

Regional identity is an oft-discussed concept, especially in the context of regional development (Paasi, 1986, 2002; Raagmaa, 2002; Chromý, 2008), cultural and historical geography and cultural economy (Ray, 1998; Kneafsey, 2001; Kneafsey et al., 2001). This article deals with identity, with respect to the spatial and regional aspects (Fialová et al., 2010), knowing that even this definition is an unavoidable overlap of the concept of identity with the individual and collective levels. Paasi (1986, 2002) attempts to explain this by differentiation between identity of the region and regional identity of the inhabitants (Figure 1).

Identity of the region, according to Passi, can be understood on two levels. The first level refers to the social, cultural, environmental, economic and other characteristics of the region that allow it to be distinguished from other regions within current scientific knowledge. The second level can be understood in terms of perception – how the region is perceived, not only by its own population but also by citizens living outside its borders. As further noted by Zimmerbauer (2011), identity of the region is a mechanism that allows a distinction based on highlighting its own characteristics and their articulation by communicative means.

The second component is the *identity of the inhabitants* (also known as regional consciousness), which reflects the degree of identification of the population with the image of the region and its characteristics. According to Chromý et al. (2009), both dimensions of identity are connected and influence each other. A strong regional identity of the population can support the reproduction of identity of the region. However, in areas with weak regional identity consciousness, regional identity is rather shaped from the outside than by its own inhabitants. This may lead to the identification of the population with a negative image of the region and thereby promote its marginalisation and exclusion – which unfortunately can mean a loss of identity of the region. Formation of regional identity takes place during the institutionalisation of the region. According to Paasi, institutionalisation of a region is a 'socio-spatial process during which some territorial unit emerges as a part of the spatial structure of a society and becomes established and clearly identified in different spheres of social action and social consciousness'. This process consists of several stages (Paasi, 2002): (1) acquiring the shape of the geographical region; (2) formation of symbolic significance; (3) the emergence of institutions of the region; (4) stabilisation of regional identity in the minds and behaviour of inhabitants of the region and the outer region of acceptance.

A region, however, may not become an administrative unit, but nevertheless can have a strong symbolic significance for a number of residents. The reason is, for example, the persistence of cultural traditions in the area. The formation of a region from the 'top' is just one approach to forming a region, but not the only one (Paasi, 2002; Chromý et al., 2014). In keeping with the theory of endogenous development, a bottom-up approach is increasingly advocated, which leaves the territorial communities a high degree of autonomy in coordinating their own developmental directions. For this reason, there is also the strengthening of regional identity, including its implementation in development strategies. In this context, we emphasise the mobilisation functions of local actors and sourcing development (Raagmaa, 2002).

Regional development is influenced by four fundamental crisis tendencies: (1) economic crisis; (2) crisis of rationality; (3) crisis of legitimacy; (4) crisis of motivation (Koselleck 1988; Habermas, 2000). The causes of the crisis of the social system (in our case the crisis in the development of a locality/region) can be seen generally in two ways. The first one involves permanent fault system integrity. It arises from the lack of options for addressing problems (Jänicke, 1975). And the second refers to an internal causes stemming from a systematic hazing management capacity of such system and the lack of opportunity to resolve the overloading (Habermas 2000). Koscheleck and Habermas agree that the crises in social systems are not accidental. On the contrary, crises are created by 'structurally defined imperatives'. The crisis must therefore necessarily occur if the dynamics of accretion of problems in society (regardless of internal or external origin formation) is faster than coping (Suša, 2010).

In order not to collapse of the society, the unsolved and unsolvable problems, causing the emergence of crises and anaemic states, lead to start of the transformation of the original system to the new one. There are already appeared enough options to eliminate most of the issues and problems (Kabele, 1998). Although every problem will not necessarily result in a crisis or crisis situation, every problem hides in itself such potential. The global economic crisis in this respect can play a role in strengthening the factors resulting in deepening regional identity and in stabilisation of the organisation. But it can also lead to a weakening of regional identity and ending of the organisation. Assessment of this fact can bring a fundamental knowledge of key factors influencing the successful development of the region.

Objective and methodology

The aim of the paper is to verify the impact of the economic crisis on the regional identity of the SBR rural population, including the identification of critical indicators in connection with identity factors and the influence of organisations operating there.

Analytical procedures are based on a critical discourse analysis of texts (in this case, the LAG development documents on the territory of SBR) and analysis of statistical data. Within the context of discourse analysis, the authors seek shared meanings and approaches to the social reality of the South Bohemian countryside. The creators of strategic documents are viewed in terms of an expert authority in the public debate on rural development in SBR and the findings made are considered as expert discourse. For example, according to Vepsäläinen and Pitkänen (2010), the country is becoming increasingly dependent on the social construct of its importance.

Based on the investigation of the interaction and conflicts of different social representations, images, meanings and values, certain recurring patterns are identified, or frameworks according to the Goffman's analysis of frames (Goffman, 1974). Existing limits manifested by the fact that the very discourse is not simply a reflection of other real social reality according to authors, such as Fairclough (1992, 2003), Wodak (2002), van Dijk (1991), Jäger (2002) and others, are compensated for by adding the socioeconomic analysis of the region.

Results

Socioeconomic characteristics of the South Bohemian Region

The SBR is located on the border of the Czech Republic, Austria and Germany (Figure 2). It has an area of over 10,000 km2 (approximately 13 per cent of the territory of the Czech Republic), and has more than 630,000 inhabitants. This is the region with the lowest population density in the Czech Republic – 63 inhabitants per km^2. According to Czech Statistical Office (CZSO) data, in the past 15 years the number of inhabitants and their average age (42 years) has shown an increasing trend. The Region is also characterised by a high number of small municipalities (up to 500 inhabitants). The rural population is one third and its share is an increasing trend.

Figure 2. Geographical map of the South Bohemian Region
Source: CZSO, 2015.

The Region has no available mineral resources. The only mining carried out is that of gravel, building stone and brick clay. An important role is played by the timber industry and fish farming (fish breeding represents half of the fish production of the Czech Republic). Agriculture is focused on arable farming, especially cereals, oil plants and potatoes. Within the prevailing manufacturing industry, it is necessary to mention the production of food, beverages, textiles, machinery and equipment and the manufacture of vehicles. The SBR is one of the least industrial areas in the country. (SBR, 2014). The Region is also a recreational and tourist area. The tourist industry has shown the greatest increase in entrepreneurial activities, according to CZSO data. Numerous protected areas (including the Šumava National Park) have the potential to be used for tourism. An important energy source – the Temelin nuclear power plant – is situated in the Region.

From a socioeconomic analysis of the SBR, it follows that the Region could not (and still cannot) become an area concentrated on heavy industry. There are no large urban agglomerations in the Region which could provide enough technically educated workers.

Analysis of LAG development documents in SBR

Local resources

The rural and agricultural character of the SBR led the authors of strategic LAG documents to identify the following sources of local development: local culture, regional production, natural resources and social resources.

Local culture is presented in draft form to promote the conservation of traditional living culture (festivals and celebrations related to local customs and habits, including religious holidays). Furthermore, the emphasis is on the preservation of cultural heritage in the form of the maintenance of historical monuments and education on important native inhabitants. The renewal of association, club and cottager activities and cultural events related to the current period (concerts and exhibitions by contemporary artists) are taken into account as components of modern rural culture.

Image, as an important part of the development area, is stressed in support of local production. Notably the proposals associated with building a regional brand, allow for the export of local culture beyond the Region. Furthermore, the development of traditional crafts is supported, which positively affects the employment of less employable population groups in the labour market. Finally, there is the development of short food supply chains. which is in line with the promotion of endogenous development potentials.

SBR territory, which is mostly known as the ‘Poor Sudetenland’ (Perlín et al., 2010), is politically and economically oriented towards light manufacturing, services and agriculture. It has preserved a unique combination of natural resources and technical works. This comprises the local ponds, rivers and forests, in addition to traditional economic exploitation, as well as resources for the development of tourism, sport and education. The natural characteristics of the Region are therefore seen as an additional source of image building for the area.

The above-mentioned groups of resources may be used only if there are functioning social capital and social networks available. According to the analysed documents, only synergistic interaction processes of local government, local businesses, local organisations and residents can bring about identifiable resource utilisation. Therefore, development proposals are always conditioned to the wider participation of local actors.

Local entrepreneurs

The business sector is perceived by the creators of strategic documents as crucial for the development of individual locations, with each sector having a positive or negative influence on this development.

Agriculture is carried out in areas where there are not very favourable climatic conditions (in comparison with other regions of the Czech Republic). However, from the perspective of the subsidy policy, these areas cannot be included in the higher subsidy sphere. It is also not entirely clear how the activities of farmers could contribute to the development of the area. On the one hand, specific documents contain recommendations to increase the specialisation, in order to strengthen the competitiveness of agricultural enterprises and reduce the aforementioned climatic handicap. The reason for these suggestions is the existing technical obsolescence of equipment, including dilapidated farm buildings and low productivity. However, on the other hand, support for LAGs focuses on innovation leading to the diversification of farming activities – to enable farm owners to resist the market situation. The document does not completely resolve the issue of which businesses are suitable for specialisation and diversification. Another effort of LAGs is also the elimination of the negative impacts of agricultural activities on the surrounding environment. Activities associated with agrotourism are supported, although there is by no means any evidence that tourists prefer this type of tourism.

The role of the traditional fisheries sector and fish farming is valued not only from the perspective of economic results, but also for its cultural contribution – the traditional festive fishing out and carp as a typical meal for Christmas dinner. The purity of ponds is criticised, as they can thus not be used for creating natural swimming areas for the promotion of tourism in the country.

The Forestry Policy appears to strategy makers as an industry with low added value, which negatively affects the economy and natural environment of the whole area. It is proposed that, besides the traditional economic role (logging), forests also fulfil a social role. For this reason, their utilisation could also be for environmental education, sport and tourism.

The current situation of the manufacturing industry is evaluated negatively. The reason is the lack of a qualified workforce and the business entities who could add greater value to primary production. Improvement of the situation in this industry is perceived as increasing the development potential of the territory.

The tourism industry is highly preferred in the perspective of potential development. According to the authors of the documents, the strategy has the potential to maintain an educated population in the Region, preserve local culture, strengthen the local economy and protect the environment from unilateral economic use. This sector is mentioned in all parts of the documents as a factor contributing to the improvement of the situation in other sectors of the Region's development. On the other hand, strategy makers agree that there is still no saturation in this sector, due to the shortage of accommodation and restaurant capacity, inconvenient quality of transport infrastructure, the poor state of tourist attractions, and individual enterprises which are not interconnected. Efforts to support lesser cultural events in villages (under 500 inhabitants) do not only concern the preservation of traditions and increase the number of tourists, but the point is also to increase togetherness and social capital in the area – these events are held mainly by local residents.

The interrelation of individual activities is lacking in all parts of the Region's economy. Currently, there is no potential for the establishment of clusters in the Region, because investment incentives and systematic collaboration among entrepreneurs, as well as among businessmen and self-government or LAGs, are non-existent. Problems are solved individually. For entrepreneurs, the emphasis on competitive negotiations outweighs the discovery of the synergic effects of cooperation. For example, the primary sector does not form the basis of higher added value and the service sector does not generate sufficient jobs for skilled workers, due to the failure to keep tourists in the area for longer periods.

The aforementioned disorganised system leads to a relative lack of investment, which means a poorer quality of life for inhabitants. The small number of employers and employers requiring lower skills (especially in agriculture) lead to increased commuting, or to people directly leaving the productive population of the Region.

Regional identity

The most distinctive natural features in the landscape, such as the names of rivers (Vltava – Vltavotýnsko, Lužnice – LAG Lužnice etc.) are used to identify areas and the image of areas. Furthermore, the identity of the territory consists of historical aspects – fish farming (especially in the Třeboň area), the Hussite history (especially the area around the city of Tábor), and architecture – in many communities, the 'Peasant Baroque' style is still present. In general, for most LAGs, the typical use of the expression, 'picturesque South Bohemian countryside' refers to the harmonious interplay between the cultural and economic exploitation of the natural landscape.

To summarise, LAGs greatly appreciate the landscape of the region, which is a priority for LAGs to be preserved. In this context, it is necessary to point out their evaluation of the presence of the Temelin nuclear power plant which is the dominant element, and significantly affects the landscape in the adjacent areas of the Region. An analysis of the development documents shows that assessment of Temelin is subject to the time of recognition of the document (pre-crisis, or post-crisis). While in the pre-crisis period, actors emphasise the economic and social benefits of the power plant (inflow of investment into the Region, job creation), in the post-crisis period, in addition to these positive benefits, a statement about its negative impact on the Region's environment also appears.

The perception of the Region as 'South Bohemia' has further undergone a major shift in favour of the term 'South Region'. According to Paasi (1986, 2002), this can be considered a logical step, since the name of the Region is an important element in the symbolic level of institutionalisation, mainly because of its unifying character. The name 'South Bohemia' is indeed more tied to the regional consciousness of the population (both residents and non-residents) than the name 'South Region', which instead refers to the administrative unit (which was established during the 2001 administrative territorial reform). In this context, it may be noted that, until 30 May 2001, the Region was originally called the 'Budejovicky Region', according to the statutory city of České Budějovice. However, residents of the Region feel that they are 'South Bohemians' and the name change of the Region was the logical outcome.

Support of community activities is a pillar for the identity building of each LAG. LAG representatives consistently point out the passivity of residents, which has to be transformed into an active approach. Voluntariness without financial support and some degree of professionalisation is not sustainable. This is because various forms of support are suggested – from marketing activities, which include a proposal for a local brand, and direct subsidies to associations. The aforementioned passivity is also evident in the lack of interest in joining the government, which weakens the innovative potential of each municipality.

Organisation

During analysis of the activities of the organisations, a series of facts that can be connected with the effects of the crisis was identified. Reactions of the organisation to environmental changes are presented in the documents in accordance with the strategy of bridges (Scott, 1992) – in the direction of increasing cooperation and collaboration.

In the documents, LAGs themselves are defined as creators of the bridges mentioned in the theory of Ježek (2007). It emerged from individual suggestions that they become mediators of partnerships among the private, public and non-profit sectors. In the proposals for the first period, efforts to support the integrity of the territory of the LAG can be traced back –cooperation is focused within the area. For the second period, proposals already appear to expand collaboration with surrounding LAGs, including cross-border cooperation. In suggestions for the second period, organisations with disturbing influences, opposing the planned development, ceased to appear, which may be connected with the impact of the crisis.

Within the first period, new associations arose, whose support of the LAG was increased in the second period. There is also a shortage of financial resources, as in all non-profit organisations of the Region. Their needs were not covered, nor were there subsidies from the regional authority. So it was necessary to search for additional subsidies, grants and own resources.

Associations focusing on culture and leisure time in general were identified more frequently in larger cities, while active volunteer fire brigades played an important role in smaller communities. Local schools represented specific organisations. Those, according to Kadeřábková and Trhlínová (2006), have always played an important role in rural development. Their extra-mural activities contribute to the strengthening of local identity.

The lack of financial resources is reflected in the deterioration of kindergartens and primary schools. Schools struggle for existence due to the outflow of children to cities. In some cases, municipalities agreed to subsidise teachers' salaries. To LAGs, the closure of schools represents a threat of the degradation of community life. In some areas, however, there is a gradual increase in population, due to a boomer generation which is beginning to start families. This is reflected in the implementation of the capacity of kindergartens. This fact is particularly true of the border LAG – Sdružení růže. The same situation is expected for other locations in future years.

Community life and projects engaged in the South Bohemia region also include libraries. These are focused mainly on people at risk of social exclusion – the elderly, single mothers and the long-term unemployed. Also supporting the socialising effect is the creation of the University of the Third Age for seniors – virtual studies in towns outside of regional cities.

Crisis elements in SBR development

The conflict of public and private interests can be traced back to several specific situations. On the one hand, Temelin destroys the landscape character and always involves a certain risk arising from the technology of energy production. On the other hand, Temelin creates jobs and contracts for local companies, does not reduce the air quality and contributes to the energy stability of the Czech Republic.

Further conflict is based on the utilisation of fishponds. Intensive fish farming does not allow the use of the ponds for summer holidays, to coincide with the efforts of LAGs (to create the image of the Region as a leisure and recreational locality). Another problem is seen in the restoration of cultural monuments. The private sector must think of the cost of repairs within the context of regulations required by the Preservation Office. This Office has the task of preserving the historical and cultural heritage for future generations, regardless of financial costs. In practice, this leads to the deterioration of the objects mentioned and the loss of the historical and cultural heritage.

A poor area image negatively affects both residents as well as visitors (tourists, cottagers etc.). Accessibility plays an important role in this respect. There is a poor road infrastructure, as well as a lack of public transport, leading to the isolation of individual parts of the territory. Municipalities without good connections to surrounding regions have a very low potential for development. However, very good transport accessibility does not only mean a positive factor for development. When there is a lack of basic amenities, social activities and other sociocultural activities, it means that the village is merely a place to sleep in and not to enjoy a higher quality of life.

An inadequate level of education and the age structure of the population also threaten the development of the locality. If the younger and more educated population of productive age leave for other regions, this entails multiple burdens for the locality. Companies have no suitable workforce, and therefore cannot develop business activities with higher added value. Care of the elderly population in these areas is also increasingly transferred to the State, replacing the usual intergenerational solidarity in the country. And if the original residents of the Region return when they are older, localities lose the benefits of their productive life, but ‘gain’ the aforementioned costs associated with older age. In this case, the building of the Region’s image as a place of rest and recreation is transformed from its original intent – to increase revenues in the Region.

In addition, the educational structure does not address the regional development without the appropriate characteristics. The priority is not merely to achieve the highest level of education for the population, but mainly to achieve the education which is most appropriate for the Region. If residents with higher education cannot find employment in the Region, they leave for elsewhere. When their qualifications do not play an important role (in older age), they return.

Discussion

Similar problems can be described in the smaller municipalities of SBR. These are reflected in other rural areas of the Czech Republic – where there are inferior municipal infrastructural facilities, an aging population and depopulation of the smaller municipalities of up to 200 inhabitants. Owing to the settlement and demographic characteristics of the Region, the need to commute to work is also demonstrated. Lack of transport connections is a problem which is articulated to the higher level of decision makers (regional authorities) as well as to lower levels in both programme periods. As a consequence, among other things, there is the problem of migration from these areas. The Regional Authority declares its efforts to solve problems in the field of transport services in rural communities within the 2014–2020 Regional Development Programme, in the form of attempts to introduce alternative modes of public transport. This is a new and innovative approach to serving the Region in line with the DRT (Demand Responsive Transport) concept. This is emphasised in a number of international research studies (e.g. Davison, 2014; Ryley et al., 2014; Wang et al., 2015).

In terms of implementation in SBR, the 'Buses on Call' services resulted, specifically in the Milevsko micro-region. In connection with economic issues (in the context of tourism), a statement was issued that, during the crisis period, there was a stagnation or reduction in the number of tourists. On the other hand, some areas (such as the LAG Vltavotýnsko locality) have a higher accommodation capacity than what is required. The responsibility also lies at higher levels of the decision-making sphere. There is a proposal to use the marketing term 'South Bohemia' and a new definition of the border tourist region.

However, trying to implement innovative approaches can run into the stated problems, such as the undersized infrastructure for tourism and unsystematic cooperation between actors in tourism etc. In times of crisis, statements also appear that the educational level (namely in foreign languages) is reflected by an inferior knowledge. In addition, the level of utilisation of Information Technologies is low. From this point of view, the Region rather has the characteristics of a Gemeinschaft community, manifesting passivity towards acquiring this kind of knowledge. As a consequence, this can mean difficulties in implementing innovative approaches in the field of tourism. However, efforts to introduce modern innovative methods in the field of new information technologies, and the need to promote the characteristics of the Region, are articulated by the Regional Office.

For the diffusion of innovation in the SBR territory, urban centres have the key influence. Centres, in the context of the theory of growth poles (e.g. in Blažek and Uhlir, 2002) provide sufficient job opportunities and amenities, which are lacking in small communities. They become information centres to mediate the transfer of information and innovation to less developed areas of SBR. Areas with no connection to these centres have a lower development potential. Centres are growth poles, but also become competitors. Tourism promotion is directed towards major cities. Businesspeople in the countryside are at a competitive disadvantage in the form of lower productivity, lower demand and outdated technologies. A lack of amenities, including a lack of employment in small villages, and traffic-excluded localities cause their bankruptcy (e.g. small municipalities of up to 500 inhabitants in the north-western part of SBR).

The combination of a lack of funds and awareness of the aforementioned deficiencies in small municipalities leads to a shift in the declarations of development documents. When comparing proposals, the first and second periods, e.g. in the case of innovations in information technologies, their content and real practical benefits for the Region are highlighted. The solution of problems, such as transportation exclusion, demand for goods and services and education, has always formulated the goals relating to the specific local definition with regard to the expected impacts.

Proposals for the first period are reviewed based on their real impact. A shift in the perception of the LAG is already noticeable. Initially, its purpose was to defend and justify its existence. However, in the next period, LAGs did not address questions about themselves, but evaluated the development tools used during the first programming period. An example might be a regional brand when it departs from its strategy to build itself up individually. The suggestion appears that the regional brand is the result of cooperation between LAGs and the private sector. Entrepreneurs, during the first period, found this not too beneficial for their activities.

For the protection of cultural heritage, the conclusion is worded that it is necessary to combine the traditional role (witness to a legacy of the past) with new cultural experiences, so as to provide funds for their repair (unusual performances, adventure tours etc.). In the case of association activities, there is an obvious shift from voluntariness to professionalism. This particularly exacerbated area needs analysis, the results of which are reflected in grant support for such activities — the support association action is selective with respect to the content of the activity.

In the proposals for the second programming period, there were projects that could not be implemented due to a lack of funding during the first period. There was therefore no check of their functionality. In contrast, for projects related to strengthening the region, each LAG agreed that this component was even more emphasised for the second period. Relationship to the area has the potential for dampening the conflict of private and public interests, editing the content of the organisations operating on the spot and has a positive impact on maintaining productive educated populations in the Region.

Conclusion

According to the analysis of documents, the global economic crisis has influenced regional development in SBR in both positive and negative ways. It is possible to evaluate positively that each LAG is intensifying the search for methods of strengthening the relationship with residents of the area and for systematically developing this relationship. They suggested the elimination of unsystematic and randomness in the process of cooperation and the implementation of innovation. Each proposed measure is targeted towards a specific location and represents a starting point for subsequent measures. At the same time, these measures always respect the genuine resource base of the territory – local culture, natural resources, local production and social resources. In order to promote these sources, various types of innovation have been implemented – for example, in the field of public transport, information technology, culture, change of regional image (including. its name), educational content and content of cooperation between LAGs and other actors in rural development.

However, the crisis complicates the situation especially in excluded communities and those with inferior infrastructure. Their development potential is even more diminished, because the lack of job opportunities and transport exclusion has led to the migration of population to the centres. Efforts to reverse this negative trend hint at a lack of funding. Proposed projects for the first period have not been realised and it is thought that their implementation in the next period might come too late for some communities.

Within the context of document analysis, we can generally state that regional identity is one of the key elements of regional development and a factor of stability during the economic crisis. Organisations, whose focus of activities is at least partially close to the promotion of public interest, produce positive benefits to regional development during the crisis period, only if their activities are specifically aimed at the strengthening of regional identity.

References

Armstrong, M., 1999. *Personální management* [Personnel management]. Praha: Grada Publishing.

Blažek, J., Uhlíř, D., 2002. *Teorie regionálního rozvoje* [Theory of regional development]. Praha: Karolinum.

Chromý, P., 2008. *Regiony v proměnách času a prostoru: Úvaha o metodických přístupech nové regionální geografie* [Regions in time and space changes: consideration of methodological approaches to new regional geography]. Miscellanea Geographica 14, 57-64.

Chromý, P., Kučerová, S., Kučera, Z., 2009. *Regional identity, contemporary and historical regions and the issue of relict borders – the case of Czechia*. Region and Regionalism 9, 9-19.

Chromý, P., Semian, M., Kučera, Z., 2014. *Regionální vědomí a regionální identita v Česku: Případová studie Českého ráje* [Regional consciousness and regional identity in the czech republic: case study of bohemian paradise]. Geografie 119, 259-277.

Davison, L., 2014. *A survey of Demand Responsive Transport in Great Britain*. Transport Policy 31, 47-54. https://doi.org/10.1016/j.tranpol.2013.11.004

van Dijk. T.A., 1991. *Racism and the Press: Critical Studies in Racism and Migration*. London: Routledge.

Emerson, R.M., 1962. *Power-Dependence Relations*. American Sociological Review 27, 31-41. https://doi.org/10.2307/2089716

Fairclough, N., 1992. *Discourse and social change*. Cambridge: Polity.

Fairclough, N., 2003. *Analysing discourse: Textual Analysis for Social Research*. London: Routledge.

Fialová, D., Chromý, P., Kučera, Z., Spolková, J., Štych, P., Vágner, J., 2010. *The forming of regional identity and identity of regions in Czechia – introduction to the research on the impact of second housing and tourism*. Acta Universitatis Carolinae 1-2, 49-60.

Freeman, J., Hannan, M., 1983. *Niche Width and the Dynamics of Organizational Populations*. American Journal of Sociology 88, 1116-1145. https://doi.org/10.1086/227797

Goffman, E., 1974. *Frame analysis: an essay on the organization of experience*. Cambridge: Harvard University Press.

Habermas, J., 2000. *Problémy legitimity v pozdním kapitalismu* [Legitimation problems in late capitalism] (translated from German). Praha: Filosofia.

Hannan, M.T., Freeman, J., 1989. *Organizational Ecology*. Cambridge MA: Harvard University Press.

Jäger, E., 2002. *Discourse and knowledge*, in R. Wodak, M. Meyer (eds), Methods of Critical Discourse Analysis. London: SAGE Publications.

Jänicke, M., 1985. *Vor uns die goldenen neunziger Jahre?: Langzeitprognosen auf dem Prüfstand* [Before us the golden nineties?: Long-term prognoses on the test]. München: Piper.

Ježek, J., 2007. *Budování konkurenceschopnosti měst a regionů v teorii a praxi*. [Building the competitiveness of cities and regions in theory and practice]. Plzeň: Západočeská univerzita.

Kabele, J., 1998. *Přerody: Principy sociálního konstruování* [Transformations: Principles of social design]. Praha: Karolinum.

Kadeřábková, J., Trhlinová, Z., 2006. *Participace občanů na ochraně a využívání kulturního dědictví na českém venkově* [Citizens' participation in the protection and use of cultural heritage in the Czech countryside], in V. Majerová (ed.), Venkov je náš svět. Praha: Česká zemědělská univerzita v Praze.

Keller, J., 2007. *Sociologie organizace a byrokracie* [Sociology of organization and bureaucracy]. Praha: Sociologické nakladatelství.

Kneafsey, M., 2001. *Rural Cultural Economy: Tourism and Social Relations*. Annals of Tourism Research 28, 762-783. https://doi.org/10.1016/S0160-7383(00)00077-3

Kneafsey, M., Ilbery, B., Jenkins, T., 2001. *Exploring the Dimensions of Culture Economies in Rural West Wales*. Sociologia Ruralis 41, 296-310. https://doi.org/10.1111/1467-9523.00184

Koselleck, R., 1988. *Critic and crisis: enlightenment and the pathogenesis of modern society* (translated from German). Oxford: New York: Hamburg: Berg.

Paasi, A., 1986. *The Institutionalization of Regions: A Theoretical Framework for Understanding the Emergence of Regions and the Constitution of Regional Identity*. FENNIA 164(1), 105-146. https://doi.org/10.11143/9052

Paasi, A., 2002. *Bounded Spaces in the Mobile World: Deconstructing 'Regional Identity'*. Tijdschrift voor Economische en Sociale Geografie 93, 137-148. https://doi.org/10.1111/1467-9663.00190

Perlín, R., Kučerová, S., Kučera, Z., 2010. *Typologie venkovského prostoru Česka*. Geografie 115, 161-187.

Raagmaa, G., 2002. *Regional identity in regional development and planning*. European Planning Studies 10, 55-76. https://doi.org/10.1080/09654310120099263

Ray, C., 1998. *Culture, intellectual property and territorial rural development.* Sociologia Ruralis 38, 3-20. https://doi.org/10.1111/1467-9523.00060

Ryley, T.J., Stanley, P.A. Enocha, M.P., Zannia, A.M., Quddusa, M.A., 2014. *Investigating the contribution of Demand Responsive Transport to a sustainable local public transport system*. Research in Transportation Economics 48, 364-372. https://doi.org/10.1016/j.retrec.2014.09.064

SBR, 2014. *Příloha č. 3 socioekonomický profil Jihočeského kraje* [Annex 3 presents the socio-economic profile of the South Bohemian Region]. České Budějovice: Program rozvoje Jihočeského kraje 2014-2020.

Scott, W.R., 1992. *Organizations: rational, natural, and open systems*. Englewood Cliffs: Prentice-Hall.

Selznick, P., 1949. *TVA and the Grass Roots: a Study in the Sociology of Formal Organization*. Berkeley: University of California Press.

Suša, O., 2010. *Globalizace v sociálních souvislostech současnosti: diagnóza a analýza* [Globalization in the social context of today: diagnosis and analysis]. Praha: Filosofia.

Vepsäläinen, M., Pitkänen, K., 2010. *Second home countryside. Representations of the rural in Finnish popular discourses*. Journal of Rural Studies 26, 194-204. https://doi.org/10.1016/j.jrurstud.2009.07.002

Wang, C., Quddus, M., Enoch, M., Ryley, T., Davison, L., 2014. *Exploring the propensity to travel by demand responsive transport in the rural area of Lincolnshire in England*. Case Studies on Transport Policy 3(2), 129-136. https://doi.org/10.1016/j.cstp.2014.12.006

Wodak, R., 2002. *What CDA is about*, in R. Wodak, M. Meyer (eds), Methods of Critical Discourse Analysis. London: SAGE Publications.

Zimmerbauer, K., 2011. *From Image to Identity: Building Regions by Place Promotion*. European Planning Studies 19, 243-260. https://doi.org/10.1080/09654313.2011.532667

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New ways of partnership in rural development planning

Abstract: *In the programming period 2014-2020 the LEADER Local Action Groups (LAG) are facing new challenges in finding new ways for effective planning, management and creating synergies to be prepared for the implementation of multi-funded community-led local development approach. The Faculty of Landscape Architecture and Urbanism of Szent István University carried out several landscape planning processes on rural areas with strong territorial focus, handling environmental and societal conflicts in a sustainable manner in the course of its educational programme. The Faculty members and the LAG for Living Balaton Uplands (Éltető Balaton-felvidékért Helyi Akciócsoport) have established a flourishing partnership to share information and gain practice in landscape based planning management and science communication among all the actors of rural development such as farmers, business people, local government, civil organizations, and of science, including researchers, planners and advisors. In our paper we highlight the results and experiences of this multiple co-operation in complex and integrated rural development planning process in two pilot micro-regions in Hungary.*

Keywords: *rural development, planning, partnership, knowledge sharing*

Introduction

Local Action Groups (LAGs) in Hungary have just elaborated their development strategies for programming period 2014-2020. The local rural development strategies try to generate effective and productive projects with fewer financial resources based on local conditions and resources, structures of co-operations generating synergies. The working organisations of LAGs in Hungary cannot undertake the role of a multi-funding agency yet, but members know that, beyond the well-defined projects financed by LEADER, there is a need for place-based plans as well. The colleagues of the Living Balaton Uplands LAG (Éltető Balaton-felvidékért Helyi Akciócsoport, Figure 1) noticed the rural development research and planning projects of Department of Landscape Planning and Regional Development of the Faculty of Landscape Architecture and Urbanism, Szent István University (the former Faculty of Landscape Architecture, Corvinus University of Budapest). Based on the good relations among the University teachers and the LAG members, the head of the LAG's working organisation invited Faculty members to take part in common projects. The projects were carried out in two pilot micro-regions in frames of educational projects. By using the results of research activities of the university we were focusing on a place- or rather landscape-based approach, taking into consideration not only the needs covering by the LEADER programme but all the development needs of the project area. This more complex approach in rural development planning presents opportunity to learn the multi-funding approach for stakeholders in rural development.

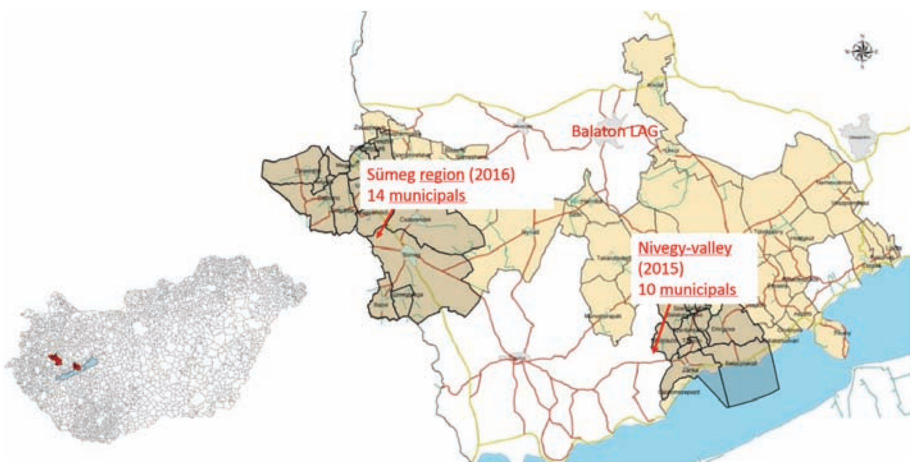

Figure 1. The study areas

Source: own construction.

The main principles of our work were derived from the European Landscape Convention of 2000 and from the National Rural Strategy 2012-2020[1]. According to the Convention, landscape interpretation and the management of the action and interaction of natural and/or human factors resulting landscape shall act "from a perspective of sustainable development […] so as to guide and harmonise changes which are brought about by social, economic and environmental processes" (Art. 1. Definitions). Landscape is not only a sum of natural features but "is an important part of the quality of life for people" and "is a key element of individual and social well-being" (Preamble). This interpretation of the landscape connects landscape planning to the rural development. The National Rural Strategy 2012-2020 is the most complex rural development document in Hungary which specified the main goal of rural development for the country: to improve the ability for keeping the population of rural areas. The National Rural Strategy presses the complex, integrated, bottom up organised and the landscape based planning as well. Knowledge transfer, namely the use and application of research results in the practice in the field of rural development and agriculture, is one of the main priorities of the Hungarian National Rural Development Programme 2014-2020[2] according to the Common Strategic Framework of 2012. These principles are the basis of our common knowledge and the planning goals in the pilot projects.

Methodology

Our programme aimed the development of pilot rural areas were organised as an educational project, which has a long-standing tradition in education (Verók and Vincze, 2011). In the 19th century, the so-called project method was applied by several researchers in the field of architecture and engineering in the United States, then spread to other countries and to more diverse study areas (Knoll, 1997). The term of project in pedagogy has its roots in the American reform pedagogy, which emerged around 1900. William B. Rogers, Calvin M. Woodword, and Charles R. Richards, as significant experts in this development, used the word project as a synonym for 'practical problem solving' (Knoll, 1997, Hortobágyi, 2002). The project method is a way of acquiring knowledge by elaborating a product (in our case a study and a poster), during which students aim to discover as many connections and links as possible to each individual problem. Such a method seems to be supporting the complex and integrated planning process with several stakeholders.

Participants of the projects

The Faculty members and the LAG have established a flourishing partnership to share information and gain practice in landscape-based planning management and science communication among all the actors of rural development such as farmers, business people, local government, civil organisations, and of science, including researchers and planners.

[1] http://videkstrategia.kormany.hu/download/4/37/30000/Nemzeti%20Vid%C3%A9kstrat%C3%A9gia.pdf

[2] https://www.palyazat.gov.hu/az_europai_bizottsag_altal_elfogadott_operativ_programok_2014_20

The lead partner of the project is the Faculty of Landscape Architecture which is the only institution in Hungary educating landscape architects. The first landscape plans to increase crop yields were elaborated at the Faculty of Landscape Architecture by Professor Mihály Mőcsényi in late 1960s in Hungary. After the political changes (i.e. since 1990), land use planning, regional and rural development, green infrastructure planning and development as new topics were added to landscape planning. On the basis of European traditions in the frames of landscape planning, we pay attention to the involvement of local people, farmers, owners of the land and the local government. Development plans are carried out considering a wide range of topics such as: land use, water management, traffic, agriculture and local economy, tourism, social well-being, climate, heritage, environment and nature protection. We try again and again to improve the education since the new challenges and to put into practice our research experiences to give them further to the students and the stakeholders in the planning projects as well. Our expectations from the common planning projects were to:

- get complex, real world experience and planning task for the students;
- practice the integrated, multifunctional approach in team work;
- have one project from analysis to plan;
- get planning experience in an interesting environment;
- have a low cost budget, involving additional sources into education.

The LAG for Living Balaton Uplands was established in 2008 with the partnership of 134 NGOs, communities and enterprises. Its main goals of the association in the recent planning period are (HVS, 2013):

- exploring, mapping, protection and propagation of the cultural and natural heritage of Balaton Uplands;
- increasing public participation, enhancing local identity, common thinking and working;
- marketing of local products and services;
- development of quality of tourism services;
- discouraging young people from out-migrating.

However, the local development strategy has been elaborated by considering the requirements of the LEADER programme, LAG's colleagues were open to think in a wider context to solve problems and find new ways to reach their objectives. They were particularly engaged with the landscape-based development using local resources of the planning area. Unfortunately, there is no opportunity to enlarge the LAG's working organisations so they cannot manage any other project by using funds other than LEADER. Their expectations from the common planning projects were to:

- have better knowledge of the landscape values and inner resources;
- get new, fresh ideas and views for the local development strategy and project generation.

The other stakeholders of the pilot region were connected with the university people through the head of LAG at the beginning. Later, good working connections evolved among all the participants of the project. During field trips, interviews and workshops university people met the mayors and other stakeholders of municipalities, such as major farmers, food manufacturers, local people and civil organisations.

Pilot regions

For the analysis of the land use changes and the stable land use forms of the micro-region we used historic descriptions, open access historic military maps (18th and 19th century) and data of the Hungarian National Spatial Planning Database. Our survey areas were the Nivegy Valley and the micro-region of Sümeg situated in West-Hungary. Most of the villages have a population of fewer than 1000 residents.

The Nivegy Valley is a part of one of the most important tourist destinations of Hungary, the (Lake) Balaton region. The whole Nivegy Valley is a protected landscape area and part of the Balaton Uplands National Park. This is a beautiful hilly landscape, termed the ‘Hungarian Mediterranean’. Within the Nivegy Valley, tourism is not common, the locals mostly work in agriculture in vineyards. However, the short distance to Lake Balaton and the beautiful panorama on the lake and the surrounding hills could make the valley a favourite destination for tourists. Forests fragment the landscape characterised by vineyards with old cellars and pastures. The locals, however, wish tourism only to have a smaller, complementary role to agriculture, horticulture (in addition to the traditional grape cultivation, orchards have emerged and wine production has advanced in the last two decades) and livestock farming (cheese production), thus retaining the fundamentally cultivation-focused character of the land. This is different from the aims of the communities located directly by the lake, as local developments there primarily aim to promote wide-scale tourism causing overuse of the shore villages. The goal of the common planning project in the Nivegy Valley was to:

- develop landscape and tourism to diversify the local economic activities;
- strengthen the local population’s identity.

The micro-region of Sümeg is a backward region in Transdanubia made up mostly of small villages. The centre of the micro region is the town of Sümeg with fewer than 7000 residents. In the southern part of the region and in Sümeg there is considerable tourism related to the Balaton recreational area. The region is mostly of agrarian character with a share of arable land above the county average. During socialism the agricultural associations employed the majority of local population. After the collapse of the regime many people lost their jobs and the share of population employed in agriculture fell to 8% in the pilot region. The surrounding small towns cannot provide enough jobs for the mostly uneducated labourers. Since the long-lasting decline, many people became demotivated and seems to have dropped out of the job market permanently. The population decrease and the out-migration from the micro-region is significant. The goal of the common planning project in the Sümeg micro region was to:

- develop rural tourism and the local economy through sustainable landscape management;
- protect the landscape ecological values;
- develop 'greening' proposals.

Method of the projects

Landscape Architecture MSc students of the second study year usually carry out a complex planning project. The whole programme is composed of a semester study with two weeks of practical training. In the spring semester of 2014/15 we held a workshop focusing on five settlements of Nivegy Valley and in 2015/16 we elaborated plans for 14 settlements of Sümeg micro-region. The areas were examined from more aspects and the students worked out a landscape development concept on a regional scale, which implied a sort of viewpoints specified by the teachers (and LAG) participating in the educational model project. In all projects we define specific aspects based on research results (especially Illyés, 1997; Kabai, 2009; Máté and Kollányi, 2011; Filepné, 2013; Jombach and Egyed, 2013; and Filepné et al., 2014).

The students solved different problems in the framework of subjects during the term that all focused on the Nivegy Valley and micro-region of Sümeg. The integrated semester courses were: Land use planning and regional development, Rural development, Green infrastructure, Tourism, Heritage protection, GIS and Digital planning techniques. During the semester, students worked in the framework of the subjects doing preliminary desk studies, and a one-day visit on the spot. At the end of the semester we had the possibility to spend one week in the planning area. Finally, students worked out the development concept in the workshop focusing on new and appropriate ways for evaluation of landscape values and conflicts, for development of agriculture based on landscape conditions, and sustainable rural tourism.

SWOT analysis was elaborated to assess and highlight the complex environmental, economic, ecological problems and possibilities (Figure 2). The local economy in Sümeg micro region was assessed by students from Pannon University too. We can use their results in revealing the local strengths, weaknesses, and potentials and to create proposals harmonising land uses with natural and cultural environment.

Students tried to collect, structure, evaluate the goals and requirements related to all local needs using problem tree and planning goal tree method (Figure 3). At the end of the planning process maps and plans were elaborated using GIS programs. In each case, comprehensive landscape management studies were elaborated (ca. 170 pages with maps). The last challenge of the project was for the students to present the results and proposals to the municipalities and other interested people.

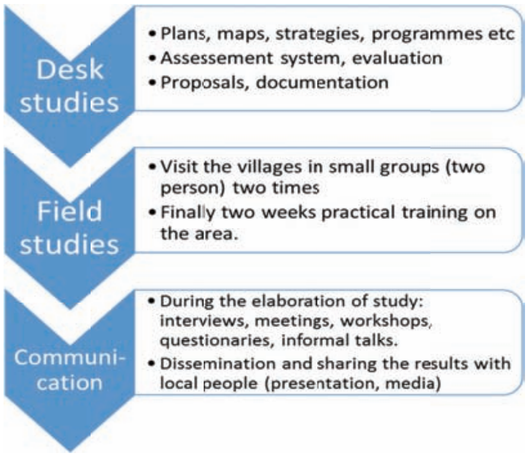

Figure 2. The planning process

Source: own construction.

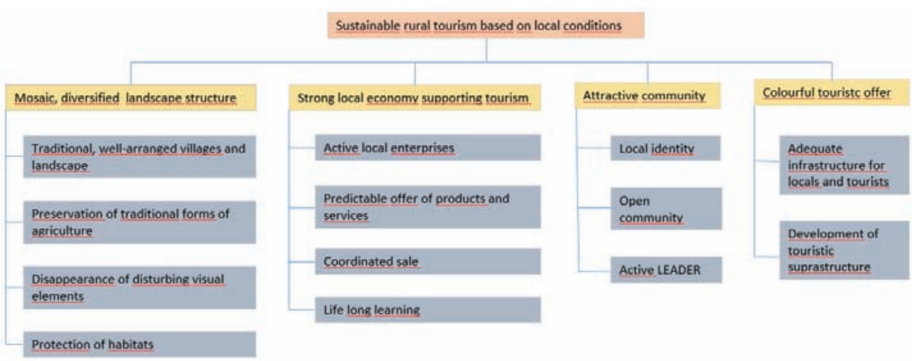

Figure 3. The planning goal tree composed for Nivegy Valley

Source: own construction.

Results

The local governments and the LAG appreciated the studies, and were surprised by the comprehensive holistic, cross sectional approach of the students. We carried out a detailed landscape analysis, which is usually skipped in the general planning process in Hungary. Examined, related themes, topics were:

- landscape history – stable land uses, trends of land use changes, sensitive (rapidly changing) areas, possible ecologically optimum state (help to greening);
- land uses, land covers recently;
- cultural and natural values of the region;
- local economy: agriculture and forestry, manufacturers, market possibilities;

- social conditions;
- water management issues;
- landscape functions and existing and potential ecosystem services: economic and agricultural potentials; nature conservation priorities; accessibility; landscape aesthetics; tourist potentials.

In the scientific literature the term of landscape functions is usually referred to the goods and services offered by regions, landscapes, land use systems and all the technological, cultural and economic aspects of land use are stressed besides the abiotic and biotic components (Lamarque et al., 2011). In our project we applied a method based on the research of Bastian (1997) and modified by Filep-Kovács (2013).

Targeted assessment was carried out to reveal the real natural base for agriculture and the local economy (related to the landscape) in order to find the optimal land uses and the best agricultural techniques to keep the ecological values of the landscape. Farmer's expectation was to get proposals on greening measures to fulfil the demands of the Common Agricultural Policy. It included an invasive plants survey and finding techniques to avoid their rapid spread. Moreover, protection measures and management advice for sensitive, valuable lands. Beyond and through greening, green infrastructure became one of the main project objectives.

The European Commission adopted the Green Infrastructure Strategy in 2013[3]. The strategy highlights the role of green infrastructure in spatial cohesion using the place-based approach. Green infrastructure preserves local values enhances local identity as during green infrastructure planning aspects of regional development, heritage protection and built infrastructure are considered as well. (Benedict and McMahon, 2001). Because of this multifunctional approach, green infrastructure planning is an effective rural development tool.

A local green infrastructure typology was set up in our project according to land use forms and land covers. We found that:

- green infrastructure is beneficial both for agriculture and for protection of ecologically sensitive areas;
- green infrastructure development contributes to tourism and recreational development as well.

However, as the scale of the planning task was regional we elaborated detailed greening proposals for farmers to make clear the real opportunities and possible economic and ecological benefits of development of green infrastructure.

The land use conflicts were evaluated and presented on maps (Figure 4) in particular in the themes of landscape values and heritage applying Hungarian

[3]http://eur-lex.europa.eu/resource.html?uri=cellar:d41348f2-01d5-4abe-b817-4c73e6f1b2df.0014.03/DOC_1&format=PDF

methods elaborated at the university (Csemez, 1996). These methods reflect the local conditions but are based on international research results (de Groot and Braat, 2012; Constanza et al., 1997). An important issue was the heritage protection and development of thematic routes (greenway network, wine route, pilgrimage route, proposals for the national blue line hiking trail) with detailed line sections, hot spots, catering possibilities, values along the road. On the one hand the goal of this work was to contribute to local economic development through new tourism development possibilities and on the other to local heritage inventarisation and protection.

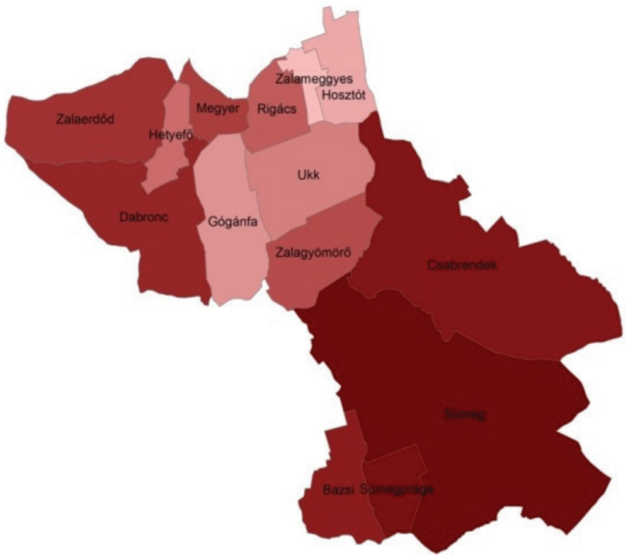

Figure 4. The inhomogeneous Sümeg micro region. Different areas – different potentials – different proposals

Source: own construction.

The ecological mapping was focused on connectivity and gap analysis of ecologic network. Students provided site specific planning proposals for each village. The main proposals are summarised in Table 1.

This analysis can be a basis for further planning in order to better utilise landscape resources. For effective rural development it is highly important to fit, adapt land use to landscape conditions especially in agriculture and tourism. The colleagues of the LAG can utilise the landscape analysis and study in their day-to-day life. The formulated project ideas based on local natural and cultural resources such as the elaborated plan of a greenway can be used directly in project generation, also serving as a good basis for bottom-up development. In the landscape architect education these workshops were really successful as our students were able to face challenges from real life. The co-operation meant a win-win situation for the locals, the LAG and Szent István University as well (Table 2).

Table 1. The main proposals developed by the university people

Type of proposal	Detailed proposals
Land use change	Tree plantations of native species Land use change to pasture Spontaneous shrub growing change back to pastures New forest plantations Planting small scale orchards with local varieties Vineyards plantation
Green infrastructure connectivity proposals	Forest belts Tree lines along roads Rehabilitation of degraded waterways Rehabilitation of small mining sites Rehabilitation of farms Buffer zones around plantations
Protection and maintenance	Shore management of lakes Protection of reed beds Maintenance of drainage water channels Mechanical cutting of invasive plants Protection of wetlands Protection of solitaire trees and groups of trees Protection of high value forests
Municipal green infrastructure	Intensive maintenance of city green Plants fitting to local character Tree supply at city alleys Setting up ecologically valuable areas on the settlement edges Historic park restoration

Source: own compilation.

Table 2. Benefits for university and the Leader Local Action Group (LAG) of the common project

Benefits for the university	Benefits for the LAG
• Up-to-date knowledge development in education: • course material developments; • cooperation between faculties and universities. • Students could work in a real life environment getting real experience about: • problems in rural development planning; • how to avoid communication hardness and solving methods; • team work and communication with others; • integrated thinking, cross-sectoral • problem solving; • putting theory into practice and finding the optimum solution; • new analysis and documentation methods; • project management experience. • Low university budget with the involvement of local natural resources (providing free data, means of transportation, free accommodation, supported catering).	• A comprehensive rural development study was made/provided; • The study is a very good starting point or source (also a digital database) for later development studies (ecological plans, land use plans, greening plans, rural development studies, tourism plans etc.); • Detailed plans (project proposals were formed) for example thematic routes; • Detailed survey for highlighting the disparities of the region; • New possibilities for public works involvement; • Detailed cultural, natural heritage inventory for local values raising the local patriotism; • It was almost free research for the LAG; • Draw attention to the importance of cooperation.

Source: own compilation.

The common projects carried out in the two micro regions have resulted in useful lessons beyond the practical results. Such cooperation shows for students how general principles of rural/regional development can work. The basic principles we would have liked or were able to convey to all of actors are listed in Table 3. Experiences can strengthen all the participating partners to believe and to adopt principles in their practical work.

Table 3. Working principles in the partnership

General principles	Putting theory into practice during the common planning process
Equality, solidarity	• The urban-rural relation becoming horizontal, mutual, interconnected in a regional planning aspect. • There are elements, good patterns to be followed by people living on local society periphery.
Free of charge, voluntary work	• To be able to complete a task without high investment if the local knowledge, interest, data, contribution available.
Interrelation	• Bilateral learning process were started between experts, teachers, students, local people, decision makers, farmers etc.
Maximum effort benefit	• Students could gain real life work experience. Local people can get programmes, plans based on local research. • Contribution to public work programme.
Reflection	• Revealing the local values strengthens local identity.
Sustainability and value protection	• All sustainable rural planning should be based on local landscape conditions and local land uses, landscape potentials. • Students were trained to recognise and understand these values.
Complexity	• In the local development plans, complexity means that next to partial interest all economic, ecological, sectoral interest are taken into consideration.
Sensibility and making sensible	• Local patriotism draws attention to local values and minor details of landscape in students. • Understanding different interest of different local groups. • Developing communication skills.

Source: own compilation.

Discussion

The majority of the principles listed in Table 3 are also listed in one of the Cork Declarations. We propose the following statements based on our experiences for further discussion:

- Previously, several plans and studies were elaborated for the research area but these were not really approved by the local population so the realisation was not successful. Rural development plans based on local landscape conditions are expected to be realised rather than plans without such roots. In our opinion, additional analysis would be important in rural development programmes to explore landscape history, land use changes, potential land use forms and landscape functions. Stronger spatial focus is necessary in the planning process.

- The stakeholders of rural development shall consider open access and volunteering much more important. Very often behind the unsuccessful project is the lack of money. Our project would not have been realised if any stakeholders had to pay for it. Cooperation and successful projects can be realised based on local resources and common efforts. (Of course it does not mean that there is no need for financial resources).
- The viability of rural regions depends on the active and engaged local community and not on investments. The local value inventories which enhance identity, and successful land use forms reflecting the local landscape conditions can mobilise local actors.

Conclusion

The multidisciplinary project was a real success for the university and the stakeholders of the study area because it created a win-win situation for all the partners. The application of the project method in education was very useful for the students, because it made it possible for them to use and apply their theoretical knowledge in practice. The settlements got a real complex, well-founded development programme and ideas for their future development. The method presented in our paper is especially useful for those regions which lack financial and human resources.

References

Ángyán, J., Menyhért, Z. (eds), 2004. *Alkalmazkodó növénytermesztés, környezet- és tájgazdálkodás*. Budapest: Szaktudás Kiadó Ház.

Bastian, O., 1997. *Gedanken zur Bewertung von Landschaftsfunktionen – unter besonderer Berücksichtigung der Habitatfunktion*. Schnevedingen, Germany: Alfred Toepfer Akademie für Naturschutz.

Benedict, M.A., McMahon, E.T., 2006. *Green Infrastructure. Linking Landscapes and Communities*. *The Conservation Fund*. Washington-Covelo-London: ISLANDPRESS.

Costanza, R., Arge d', R., Groot de, R., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O'Neill, R.V., Paruelo, J., Raskin, R.G., Sutton, P., Belt van den, M., 1997. *The Value of the World's Ecosystem Services and Natural Capital*. Nature 387, 253-260. https://doi.org/10.1038/387253a0

Csemez, A., 1996. *Tájtervezés – tájrendezés*. Mezőgazda.

Filepné Kovács, K., 2013. *Tájhasználati szempontok a vidéki térségek versenyképességének értelmezéséhez*. PhD dolgozat, Budapesti Corvinus Egyetem Tájépítészeti és Tájökológiai Doktori Iskola. pp. 86-124. https://doi.org/10.14267/phd.2013048

Filepné Kovács, K., Valánszki, I., Jombach, S., Csemez, A., Sallay, Á. 2014. *Rural regions with different landscape functions: Comparison analysis of two pilot regions in Hungary*. Applied Ecology and Environmental Research 12(4), 867-886. https://doi.org/10.15666/aeer/1204_867886 de Groot, B., 2012. *The ecosystem services agenda: bridging the worlds of natural science and economics, conservation and development, and public and private policy*. Ecosystem Services 1(1), 4-15. https://doi.org/10.1016/j.ecoser.2012.07.011

Hortobágyi, K., 2002: *Projekt-kézikönyv*. Budapest: IF Alapítvány OKI.

HVS, 2013. *Helyi vidékfejlesztési stratégia felülvizsgálata*. Balaton-felvidéki Akciócsoport LEADER Közösség, Éltető Balaton-felvidékért Egyesület.

Illyés, Zs., 1997. *Tájváltozási folyamatok Magyarországon*. Budapest, Kertészeti és Élelmiszeripari Egyetem.

Jombach, S., Egyed, A. (eds), 2013. *Tájkezelési módszerek és megoldások az „Élő Tájak" projektben*. Budapest: Budapesti Corvinus Egyetem.

Kabai, R., 2009. *Tájépítészeti eszközök alkalmazása a helyi örökségen alapuló turisztikai fejlesztésben*, in G. Michalkó, T. Rátz (eds), A tér vonzásában: a turisztikai termékfejlesztés térspecifikus vonásai. Székesfehérvár; Budapest: Kodolányi János Főiskola; MTA Földrajztudományi Kutatóintézet, pp. 234-243.

Knoll, M. 1997. *The Project Method: Its Vocational Education Origin and International Development*. Journal of Industrial Teacher Education 34(3), available online at http://scholar.lib.vt.edu/ejournals/JITE/v34n3/Knoll.html, accessed 21 February 2016.

Máté, Zs., Kollányi, L., (eds), 2011. *Rejtőzködő kincsek*. Budapest: Budapesti Corvinus Egyetem,

Veress, D.Cs., 2014. *Nivegy-völgy falvainak története (Balatoncsicsó, Óbudavár, Szentantalfa, Szentjakabfa, Tagyon*). Balatoncsicsó: Balatoncsicsói Német Kisebbségi Települési Önkormányzat

Verók, A., Vincze, B., 2011. *Projektmunka*. Eszterházy Károly Főiskola, available online at http://www.tankonyvtar.hu/hu/tartalom/tamop425/0005_41_projektmunka_scorm_02/232_a_projektmunka_els_formi.html, accessed 21 February 2016.

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Polish experience of social farming in Bory Tucholskie area

Abstract: *After Poland's accession to the European Union, there was an accelerated process of diversification of the income situation of farms in Poland. Many of them have problems to make a living from agricultural production. At the same time, the problem and the scale of the whole society becomes a demand for care in old age. This article describes the possibility of providing care on farms in the formula of care farm. The various forms of care farms quoted in the article are part of a wider trend of social farming. The first attempt to create a Polish care farm in Tuchola Forest offers hope for real development of this form of economic activity in the country.*

Keywords: *farm welfare, agriculture, care farm, outplacement farmers, new profession for the farmer*

Introduction

Several years ago, Polish village were associated only with agriculture and food production. Almost 15 million people (38.2 per cent of the Polish population) live in rural areas, but more important is the fact that 27 per cent of Poles of working age are connected with agriculture, although only 18 per cent make a living out of it financially. The results of the Agricultural Census in 2010 shows that, of the 1,583,000 Polish farms larger than one hectare, up 92.3 per cent has an area not exceeding 20 hectares (MRRW, 2010). In most of these households at least one person should look for additional sources of income outside agriculture. Such a process has been taking place among the smallest farms for a long time. There remain hundreds of thousands of households (in the size group from 5 to 20 hectares are as many as 576,000) where for the owners and family members the process of finding additional sources of income outside agriculture has yet to start. Many of them still do not realise the seriousness of their situation, do not see a viable alternative, or have adopted a strategy of survival.

The need for vocational/ professional/occupational reorientation for farmers and their family members results from the changes in the social and economic structure of the countryside. In general, the development of modern agricultural production technologies supported by European Union (EU) funds has resulted in a great diversity of circumstances on farms. Working solely on their own farm is no longer a sufficient source of income for most farmers and their family members. There are one million unemployed in non-farming families (approximately 150 thousand) and about 850 thousand people who create the so-called hidden unemployment. A further increase in farming efficiency will result in the number of unemployed rising from a few hundred thousand to a million people.

Every year the traditional definition of what the countryside is as given by Szczepański (1983) seems to be less valid. According to his definition, the countryside is a place for food production where work is integrated with the household and the results of the activity are mainly dependent on the forces of nature. For the traditional countryside, the cultural aspects and relationships between the work carried out and the style of life were crucial. The future of the Polish countryside is connected with the need to implement a diversity of economic development projects for the local inhabitants. It is evident that farming will be a primary income source for less than half of the inhabitants over the next few years. Farmers who want to make a living solely or primarily from agricultural production have no choice but to implement essential modernisation and investment programmes. Many of them will have to look for additional sources of income in terms of alternative non-farming production or services. Most villagers, including the farmer's family members, will have to find completely new sources of income. According to the guidelines of the EU development model for the countryside and agriculture, non-farming or non-agricultural development means promoting the countryside as a good place to live (a residential function), to take rest and for tourism, protection of the natural environment and landscape, the promotion of local culture and cultural identity, as well as providing other services. Finding new ways of mobilising the inhabitants of the Polish countryside to find their proper place in society in the future is a huge challenge.

The process of vocational reorientation differs considerably from other methods of education of adults (e.g. of unemployed persons). There is a proposal to create a new opportunity for farmers and household members based on the skills and abilities gained by them within the frame of work on a farm. The ability to operate different machines for field work, work in a garden, preparation of traditional dishes, care for children and elderly persons, are the skills very often encountered in a village which, in order to constitute an opportunity in the labour market, require their formal confirmation, certification, supplementation or acceptance[1]. The process of reorientation means mainly individual consultancy for a farmer, and sometimes for the whole family, within the frames of which there sometimes follow a new glimpse on own professional position and an attempt to find a positive solution. In view of the inability of most farms in Poland to develop their area, a big social problem arises from the necessity to secure substantial additional sources of income from outside farming. This was the subject of this study conducted in the kujawsko – pomorskie region – a typical agricultural area of Poland. The study aimed to recognise farmers' and household members' readiness for vocational reorientation[2]. The results show most farmers are not ready for reorientation. Analysing the main reasons why farmers do not want to reskill to another profession, it emerged that those polled mentioned the lack of time connected with an excess of work on the farm; a lack of financial means, as well as the distance from educational centres. On the other hand, women stressed their obligations to provide care for children and elderly relatives. However, special attention should be given to the lack of belief amongst those polled that they could get a job. From 2009, a special programme of vocational reorientation more than 4000 farmers and members of their families operated in kujawsko – pomorskie region (Kamiński and Sass, 2013). One of the solutions for a certain group of farms and farmers is the development of social farming, including the care function within the farm.

Social farming

The origins of care farms can be found even in the Middle Ages. One of the most famous examples comes from the village of Geel in Vlaanderen, currently in Belgium (Roosens and van de Walle, 2007). The assistance there was provided to those in need who, under their specific therapy, were involved in the daily agricultural activities. More examples of functioning farms, dealing

[1] See http://www.rkk.no/en/INTERNATIONAL/European_projects/Euro_Validation

[2] http://ifmaonline.org/contents/pr-vocational-reorientation-of-farmers-and-members-of-their-families-a-new-challenge-for-rural-poland/

at the same time with care, must be sought in the second half of the nineteenth century, when people with intellectual disabilities, and sometimes physically, were placed in special care institutions located in rural areas and in the areas enclosed by parks and forests on the outskirts of large cities (Bird, 2007). The most important reason for placing disabled persons in such places was to isolate them from the rest of society, because they were considered as an embarrassing social problem. Even then, however, it was noted that the natural environment soothed the patients. A common phenomenon in these institutions was the foundation of one or more farms producing basic foods, which helped to reduce operating costs. Where indicated, patients could participate in agricultural work. Apart from the obvious financial benefits, it was observed that the work had a beneficial effect on patients. In the mid-twentieth century, the first special therapeutic communities known as 'community Camphill' or 'movement Camphill'[3], were founded which carried out therapeutic work with disabled children, and nature was recognised as a key element of the therapy.

In the meantime, according to the European Economic and Social Committee (EESC) report of 2013, an increasingly innovative attitude is developing in Europe which links two seemingly disparate areas, those of multifunctional farming and social services, in particular that of health care at the local level. In practice it has been found to enhance the feeling of self-worth of the participants and to encourage the social integration of people with special needs. The term social farming includes many activities referred to as farming for health, care farming, green care or green therapies (Figure 1).

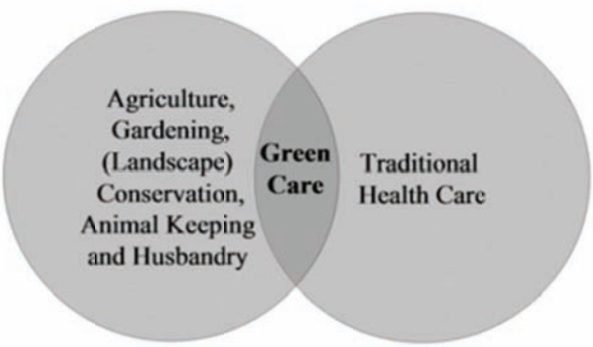

Figure 1. Green care and traditional health care

Source: Haubenhofer et al. (2010).

Green care is a link between traditional healthcare and other sectors of human societies, such as agriculture, gardening, landscape and nature conservation, animal keeping and animal husbandry, and different combinations lead to different types of green care. These terms refer to various activities connected with

[3] http://www.camphill.org.uk/about/camphill-history

care, social reintegration, training, social and vocational rehabilitation for people with difficulties and training for people with special needs. Implementation of such activities provides improved feelings of self-esteem for those who find themselves in a difficult situation. It also improves both the state of their health and their social integration. Regular contact with nature and with production activities can improve learning, enhance self-esteem and make it easier to participate socially. According to the EESC, social farming is a set of activities using agricultural resources, both plants and animals, in order to provide social benefits. Allowances in the countryside or in the suburbs such as rehabilitation, therapy, protected work places, life-long learning, and other activities which aim at enhancing an individual's social integration. Specifically, it means creating a suitable farming environment which facilitates the participation in everyday agricultural activities of people with special needs to cater to their development and progress as well as improve their feeling of self-worth. Haubenhofer et al. (2010) (Figure 2) presents a classification of most common sectors of green care in Western Europe. The sectors are categorised into the healthcare aims they follow (health promotion, therapy and the combination of labour and care), the sorts of natural elements they are built on, and the way use these elements: AAA: animal-assisted activities, AAT: animal-assisted therapy.

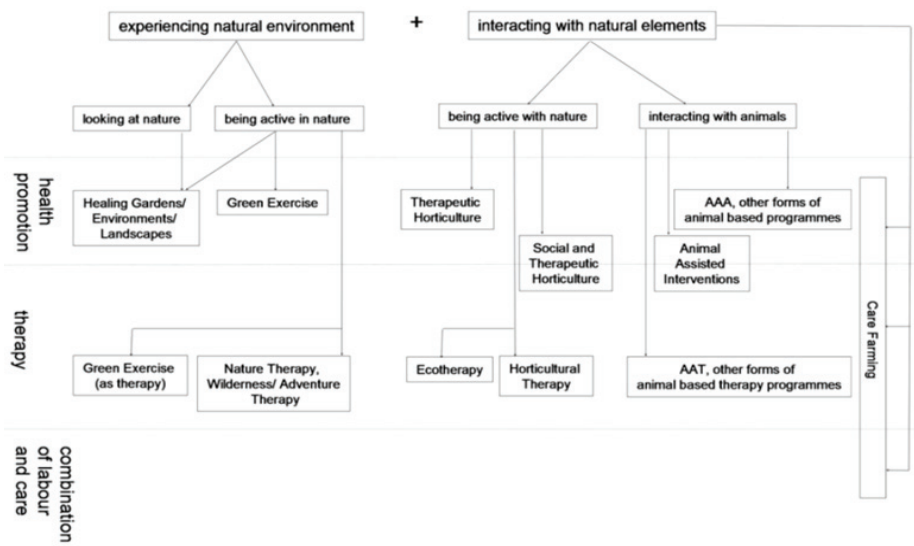

Figure 2. Overview of sectors of green care

Source: Haubenhofer et al. (2010).

Social farming includes most often the following areas of activity:

- Re-education and therapy classes;
- Integration in the world of work as well as social integration;
- Pedagogical activities;
- Care services.

The benefits of care on a farm are manifold (Sempik et al., 2010). It is often a combination of factors that support clients and they can be summarised as follows:

- A Care Farm can provide a rural and peaceful environment. This offers many clients an opportunity of freedom from disturbance.
- Working with plants and animals stimulates the feeling of responsibility for other creatures; this in turn can also help the individual to feel more responsible for themselves. An important effect can be a marked increase in self-esteem.
- Owing to its dependency on factors which cannot be controlled, such as the climate or soil quality, farm life can help to develop an easy-going attitude. This, in turn, can contribute to developing true peace of mind.
- The character of the Care Farmer or Care Farming family determine to a great extent how they deal with the basic values of life, i.e. caring for plants and animals. This is a principal element for a client to build their sense of trust and self-confidence.
- Despite its rural location, a farm is also an economic enterprise, which needs to be considered in order to ensure its survival. This requirement stimulates a realistic viewpoint.

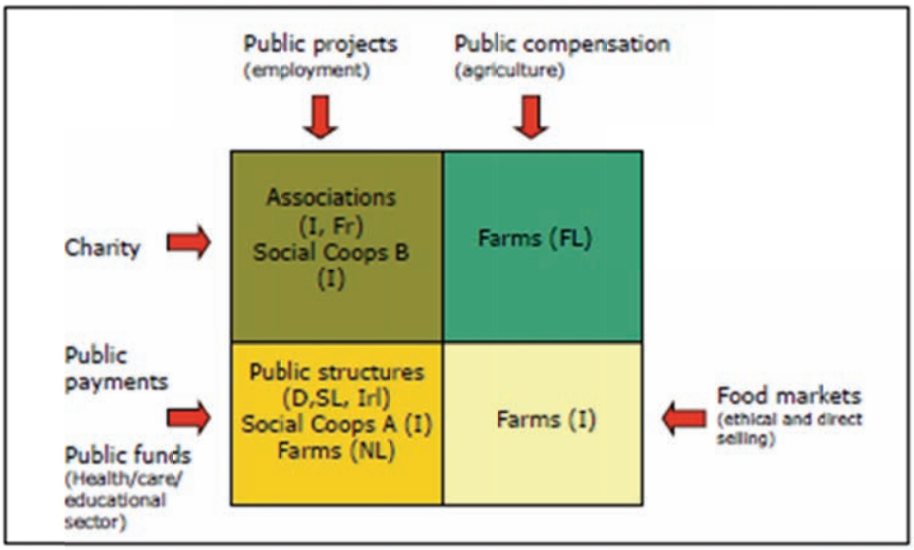

Figure 3: various European social farming regulations

Source: the Project So Far.

While analysing the systems of social farming in Europe, Hassink (2009) pointed out varying attitudes in different countries. The Netherlands is the primary reference point for the activities described in this article and the dominant model for implementing Care Farming. Similar mechanisms are popular in Vlaanderen, the Dutch speaking part of Belgium, Public institutions and health care institutions in social farming dominate in Germany, France and Ireland. In Italy the system is mixed since there are both private farms and publicly-funded developments. In the Netherlands social farming is closely allied to the care sector, while in Germany, the United Kingdom, Ireland and Slovenia it is divided between the social and the health support sectors.

In terms of financing, in both Italy and France, the dominant funding comes from publicly-funded projects and from projects implemented by charities and (primarily in Italy) social associations. In the Netherlands, financing comes from public funds from the health and welfare sectors. In Germany, Ireland and Slovenia, financing for social farming is implemented by public institutions, and financed by public funding for health care and education (Hassing 2009).

Polish context of social farming

Social farming is not well known in Poland, and it is difficult to find any direct references to it in the literature, or to encounter any practical applications. Information about social agriculture and rural areas in general, as a raditionally friendly place for the elderly, are consistent with the demographic forecasts for both Western Europe and Poland. According to Błędowski (2012), in the period 1950-2011 the share of people aged 75 years and older increased from 1.6 to 6.5 per cent, while in 2035 this figure will reach 12.3 per cent. According to forecasts by the Central Statistical Office (GUS), in 2030 up to 53.3 per cent of single-person households will be composed of a person aged at least 65 years, including 17.3 per cent for those aged 80 and over (GUS, 2010). This means that 2,740 thousand people aged 65 and older will remain alone in their households, including 887 thousand people aged 80 years and older (Table 1). The calculations of the Ministry of Labour and Social Policy confirm these trends. According to the population forecast published by the GUS an increase the number of people aged over 60 years old is expected in the next ten years (2015-2024). The population of people aged 60+ will increase by approximately 1.8 million people, i.e. 21 per cent. Currently (2014), the contribution of older people in society is 22 per cent, and in the forecast period it is expected to grow regularly to a level of 27 per cent in 2024.

The above-described change, sooner or later, will force the necessity of creating new solutions to cope with an aging population. The use of the new features of agriculture, as agriculture and social contribution on the one hand to the development of entrepreneurship in rural areas in innovative directions, and the other will solve the problems associated with the care and the social exclusion of the elderly and disabled.

Table 1. Single-person households conducted in Poland by people aged 65 years and more in the years 2002-2030

Age group	Years		
	2002	2030	
	%	%	thous.
65 – 69	9,4	9,5	487,5
70 – 74	10,7	12,9	663,5
75 – 79	9,5	13,7	702,3
80 and more	9,2	17,3	886,9
Total	38,7	53,3	2740,3

Source: Błędowski (2012)

Innovative project of KPODR Minikowo

In 2008, the Kuyavian-Pomeranian Agricultural Advisory Centre (KPODR) undertook activities related to the reorientation of farmworkers and their family members. The direct inspiration of actions for developing care farms in the Kuyavian-Pomeranian region were attempts of this type of activity undertaken in 2002-2004 in Podkarpacie and Lubelszczyzna region. In 2013, the Kujawsko-Pomorski Agricultural Advisory Centre in Minikowo (KPODR Minikowo) began talks with the owners of agri-tourism farms from the area of Tuchola Forest affiliated to the Association of Agrotouristic Farms 'Tuchola Forest' about the possibility of extending their activities with caring functions. In 2014, KPODR Minikowo started to create care farms in Tuchola distict based on the Dutch experience. According to Manintveld (2014), care farms in the Netherlands provide a variety of services for the following target groups:

- Mentally disabled;
- People with reduced mobility;
- The elderly disabled mentally / physically;
- People with brain damage resulting e.g. as a result of accident or illness such as dementia;
- People with mental health problems;
- Reintegration of (former) prisoners;
- Reintegration of addicts (e.g. drugs, alcohol);
- People suffering from autism;
- Child care (before and after school hours);
- Difficult youth;
- The long-term unemployed;
- People with occupational burnout;
- People seeking asylum.

Initially, there was a local vision of a Dutch expert and workshops with owners of farms and institutions from the Tuchola district. This was followed by a study visit to the Netherlands, where farmers with Polish specialists had the opportunity to visit several care farms and have direct conversation with the owners and their charges. They became acquainted with the ways of care farms conduct and operation. Each of the households had a different character. A visit to the Dutch farms helped to plan the operation of such farms in Polish conditions. Particularly important was the realisation of specifics and requirements for the care of different target groups. After returning from the Netherlands, during several days of workshops and visits to each of the farms a founding concept of care farms in Tuchola district (Individual Care Farms Plans – IPUGO) and an overview of farms for compliance with the technical requirements of individual rooms and all space offered for charges were developed. Also was made a preliminary analysis of the financial transformation from agricultural farm to care activities.

The primary effect of the above actions was to develop several models incorporate a farm in the provision of care. After analysing the formal and legal situation for interested farms in Tuchola district, the following target groups and forms of care were determined:

- *Care for children and adolescents*. For this group care farms can function as a foster family or a family orphanage. One of the farms participating in the project within a few months after returning from the Netherlands and developing a plan (IPUGO) decided to take the difficult challenge of the function of a foster family (initially non-professional), with later plans for setting up a professional family or emergency family, and even a family child care home. In the following months, two other families started preparations for the function of care towards children.
- *People with intellectual or mobility disabilities*. Many tourist farms are ready to provide this type of support; participants of project gained formal qualifications to care for people with disabilities.
- *Older people requiring support*. Older people needing all-day support are generally single or sick people whose family members are no longer able to provide care. The elderly and sick people very often do not have constant care, which undoubtedly needed. Creating care farms in the form of family in assistance to large social care homes can meet the expectations of older people who need warmth, interest and closeness with others. This business model of care farms is possible in accordance with applicable laws and several farms are now preparing for this form of care.
- *Inactive elderly people who do not require care but interesting forms of spending free time*. Care farms can offer in this case the creation of a self--help club and 'Tucholskie Forest for Seniors' was developed as a joint offer tourist product aimed at older people.
- *Day care for the elderly*. This type of care farm is the most popular in western countries and completely absent in Poland.

In 2016 KPODR Minikowo started the implementation of a new project with the objective of forms of day care under the Regional Operational Programme 2014-2020 (Sub 9.3.2: Development of social services). Fifteen care farms will be created in the counties Brodnickie, Mogilno, Świeckie, Tuchola and Wąbrzeźno in the years 2017-2018. Wards are dependents, who will benefit from the support and activities for eight hours a day, five days a week (in groups of 3-8 person). Each person in the project will make use of care help for half a year (a total of 225 people). The project will provide advice for households to support their functioning and development of the offer, for adapting lessons to individual needs of clients. Training supporting the establishment and development of this activity will be also organised. So far in Poland individual care for the elderly is dominating, which usually does not cover the period of eight hours. The project will expand the care in small groups which, by a factor of social relations will help solve associated with loneliness psychological problems of the elderly.

The future of this form of care known has in Poland a lot of prospects. This follows on the one hand with the growing needs of older people, and on the other the potential of farms, as a good place for senility.

Concluding remarks

The formation of care farms as a new trend associated with the so-called social agriculture or socially-engaged agriculture is still a very little known issue in Poland. Taking such initiatives by farmhouses is quite a natural progression or specialisation because it is not far from the reception of guests at the farm to care for them in a situation where they become more dependent. Social farming as an undiscovered functioning direction of private farms in Poland is currently at the experimental stage. Already in Poland there are public institutions involved in health care which use the benefits of the natural environment as a supporting element of therapy However, the opposite approach, involving the creation of new services on the basis of farms, is basically pioneering.

As a result of the described actions under the international component, farmers in Tuchola district attempt to create care farms, in some cases very advanced, and are already taking the first wards. The described models in this article are possible to implement in existing legal status in Poland. Complement requires only the function of care in the form of day care, which is most common in the Netherlands.

Giving care in the Tuchola Forest are the experiment and basis for creating other solutions of implementing social farming in Poland. For many tourist farmhouses the direction of specialisation may become a real opportunity for development in the future, while acting in an alternative form of care for the growing number of older people requiring support. So after appropriate preparation of farms and villages, they can become a good place for old age.

References

Bird, W., 2007. *Natural Thinking: Investigating the links between the Natural Environment, Biodiversity and Mental Health*. Sandy, Beds: Royal Society for the Protection of Birds.

Błędowski, P., (ed.), 2012. *Report on the situation of the elderly in Poland.* Warszawa: Institute of Labour and Social Affairs.

Hassing, J., 2009. *Social farming across Europe, Overview*, in: F. Di Iacovo, D. O'Connor (eds), Supporting Policies for Social Farming in Europe. Progressing Multifunctionality in Responsive Rural Areas. SoFar project: Supporting EU agricultural policies. Firenze: Arsia.

Haubenhofer, D.K., Elings, M., Hassink, J., Hine R.E., 2010. *The Development of Green Care in Western European Countries*. The Journal of Science and Healing 6(2), 106-111. https://doi.org/10.1016/j.explore.2009.12.002

Kaminski, R., 2014. *Care farms as part of social farming*, in: Care farms in Tuchola, a Dutch experience. Kujawsko-Pomorski Agricultural Advisory Centre in Minikowo, Minikowo.

Kaminski, R., 2015. *Village good place for old age. Polish and foreign examples of social farming*, in: Miroslaw Janoś–Kresło (ed.), the social exclusion of older people in rural areas myth or reality? Warszawa: Warsaw School of Economics, 217-235.

Kamiński, R., Sass, R., 2013. *Vocational reorientation of farmers and members of their families – a new challenge for a rural Poland*. 19th International Farm Management Congress Volume 1.

Manintveld, K., 2014. *Care farms in the Netherlands*, in: Care farms in Tuchola and the Dutch experience. Kujawsko-Pomorski Agricultural Advisory Centre, Minikowo.

MRRW, 2010. D*irections of Development of Rural Areas assumptions to the 'Strategy of Development of Rural Areas'* [Kierunki Rozwoju Obszarów Wiejskich założenia do 'Strategii Rozwoju Obszarów Wiejskich']. Warszawa: Ministerstwo Rolnictwa i Rozwoju Wsi.

Resolution of the Council and of the Representatives of the Governments of the Member States, meeting within the Council of 21 November 2008 on better integrating lifelong guidance into lifelong learning strategies. (2008/C 319/02).

Roosens, E., van de Walle, L., 2007. *Geel revisited after centuries of mental rehabilitation*. Antwerpen-Apeldoorn: Garant Publishers.

Sempik, J., Hine, R., Wilcox, D., (eds.), 2010. *Green Care: A Conceptual Framework*. A Report of the Working Group on the Health Benefits of Green Care, COST Action 866, Green Care in Agriculture. Loughborough: Loughborough University.

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Innovation on agroforestry education, training and practice to develop rural living and environment supported by the AgroFE Leonardo and Agrof-MM Erasmus+ projects

Abstract: *Agroforestry can be applied to all agricultural systems, in all parts of Europe. Europe has a unique heritage of traditional agroforestry systems with a high environmental and cultural value and high potential for innovative modern agroforestry systems developed by research centres across Europe during the last two decades. In recent years, following scientific research, the development of structures and professional experiments in agroforestry has gained national and European recognition. In some European countries, namely Belgium, France and the UK, professional organisations and training organisations have begun to reintroduce agroforestry with training of agricultural students and adults in further education. The main objective of the AgroFE and Agrof-MM projects is to develop an agroforestry training system based on a common framework and core content, and to promote training at European level. The knowledge databank is a component of the project training system. It aims to gather and share a set of documents, resources that partners can use and which will have been accessed by learners and the public users. The core content of different levels of training and the knowledge databank has been developed and the distribution of the results are in progress across Europe by innovative ICT tools.*

Keywords: *agroforestry, education, training, innovation, knowledge databank, environment*

Introduction

Agroforestry systems are traditional land use systems that were and are used in Europe. They can be defined as those land use systems which involve two main components – trees/shrubs and an agricultural crop (which could also be pasture) and are artificially managed. Agroforestry systems can be implemented at a temporal and spatial scale for a land owner, who can use different agroforestry practices.

Agroforestry systems can be exclusively formed by either one or a combination of agroforestry practices (the most common situation) and practised at the same time or at different times during the year on any one farm. Agroforestry practices can also be combined in a temporal (transhumance – Helle, 1995; Bunce et al., 2008) and at a spatial (Mosquera-Losada et al., 2005; Moreno and Pulido, 2008; Moreno et al., 2007) scale.

The agricultural system has experienced a strong abandonment of agroforestry (Nair, 2005) in the 20th century, to count today only a few million hectares in Europe (Price, 1995). Depending on the countries, states or professional organisations and training actors (Jamnadass et al., 2014) try to reintroduce agroforestry in the course of training and qualification in initial training and in adult education (Jongmans, 1996). Based on the results of scientific research, development structures and those of the ‘farmer-researchers’, experimental courses were conducted in different countries, including Belgium, France and the UK on a small scale as resources, trainers and available skills are scarce.

The AGFORWARD research project (January 2014-December 2017), funded by the European Commission, is promoting agroforestry practices in Europe that will advance sustainable rural development. This initial analysis of the AGFOEWARD project suggests that there are at least 52 million hectares of agroforestry, including reindeer herding, across Europe. Excluding the reindeer herding system, the estimate is at least 10.6 million hectares, which is equivalent to about 6.5 per cent of the utilised agricultural area in Europe (den Herder at al., 2015).

The AgroFE (http://www.agrofe.eu) project partners have identified training needs in the short term. These needs are, on the one hand, operators and future operators, adults and pupils/students, teachers and counsellors, tutors. These requirements therefore relate to two levels of qualification, L4 and L5/L6, and two types of learners: students and adults, farmers and future farmers on the one hand (mainly L4/L5), and advisors, level L5/L6. In the short term, the project will address these two publics through a system established by the partners based on innovative teaching practices training, occupational situations providing access to recognised qualifications (NQF, EQF, ECVET and ECTS). Fortunately, the information and communications technology (ICT) tools have been increasingly developed nowadays, so there are tools and methods for e-learning and e-collaboration (Bustos et al., 2007; Herdon and Lengyel, 2013; Herdon and Rózsa, 2012). One of the important parts of the project is to apply innovative solutions for building and using the websites, social media and knowledge repositories for teaching and learning agroforestry. The Agrof-MM (http://agrofmm.eu) project extends the education and training to Mediterranean and mountain areas in Europe.

The term e-learning is widely understood to refer to the use of ICT in learning and teaching. E-learning systems can be observed at both the institutional and the local level in higher education. Institutional systems include learning management systems (LMS), used primarily to manage delivery of course material to enrolled students, and the platforms that support massive online open courses (MOOCs) (Porter, 2015). Local e-learning systems are observed at the level of a single course, class, lesson or learning activity. While investments at both levels can contribute to improvements in learning and teaching (Gunn, 2010), each has its own goals, methods and challenges.

Economics in agroforestry

The importance of agroforestry systems at a global scale are highlighted in Agenda 21 of the Rio Convention, where agroforestry systems, and therefore agroforestry practices (Nair, 1993; Mosquera-Losada et al., 2008), are mentioned as a sustainable land management option (Figure 1). If we compare the income generated from a forest, agricultural or agroforestry land managed system during a whole cycle of tree development, it can be seen that these profits not only vary because of the type of product obtained (tree and crop), but also because of the period of time when economic benefits are obtained within the different systems. Agroforestry productivity depends on the type of tree and tree management in the long term. Tree profitability is usually higher with fast growing species because the time required to obtain a return is shorter compared with slow growing tree species. It is important to highlight that nowadays, it is more widespread silvicultural practice to promote high stock densities at planting as the aim is to increase tree volume per hectare (Evans, 1984).

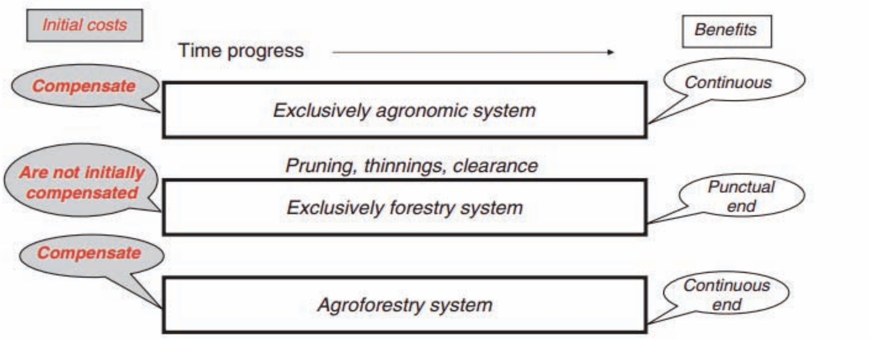

Figure 1. Initial costs and benefits obtained with an exclusively agronomic system, exclusively forestry system and with an agroforestry system for a stand life (time progress goes from plantation to harvesting) and varies with the type of tree

Source: EEA, 2005.

European policy

European policy has traditionally been based on production. For example, land use in Europe is classified as being either agriculture or forestry, and the Common Agricultural Policy (CAP) has therefore tended to encourage the removal of scattered trees, particularly from arable land (Lawson et al., 2005). The ecosystems approach suggests that there is need for a more integrated approach to land management. At present, agricultural land within the European Union (EU) must be kept in 'good agricultural and environmental condition'. In the future the focus may be on the provision of a broad range of ecosystem services. Such a change would encourage the creation of more mixed cropping systems. In Spain and Portugal, the cultural and environmental importance of agroforestry systems has been recognised. In both these countries, oak trees in dehesas and montados are protected by national policy and, at a European level, various directives and initiatives have sought to enhance such areas through social and environmental programmes (Shakesby et al., 2002; Pereira and Pires da Fonseca, 2003; Gaspar et al., 2007; Pleininger, 2007). In the new European Rural Development Regulation agroforestry is specifically mentioned as receiving special support. However, in some countries there is uncertainty over whether areas of agroforestry remain eligible for Single Farm Payments. For example, some guidelines focus on agroforestry in terms of the continuing use of agriculture within the tree canopy, whilst others focus on specific definitions related to the number of trees per hectare. These issues are currently being debated, particularly by those wishing to promote agroforestry systems in Europe at a broader scale and in as wide a range of scenarios as possible.

Existing research indicates that appropriate application of agroforestry principles and practices are a key avenue to help the EU to achieve more sustainable methods of food and fibre production that produce both profits for farmers and environmental benefits. Agroforestry practices have been overlooked by previous CAP schemes, resulting in billions of trees being destroyed across Europe. Recently incentives for establishing agroforestry plots have been introduced and in the new CAP agroforestry will receive support through Pillar II. Article 23 of Rural Development Regulation 1305/2013 is devoted to the establishment of agroforestry systems and it now depends on Member States and regions to use this article to adopt agroforestry measures in their Rural Development Programmes.

Rural development, environment, social benefits and agroforestry

McAdam et al. (1999) and Sibbald (1999) reviewed the rationale behind agroforestry (largely as practiced in the British Isles) being viewed as a sustainable land use option, and concluded that, because of the employment created by multi-functional systems, it can have a positive impact on sustainable rural development, in comparison with conventional farm woodlands.

The main environmental benefits which agroforestry systems deliver are the improvement of use of nutrients through the reduction of losses at a farm level (including erosion) but also by the enhancement of carbon sequestration, the reduction of fire risk and biodiversity enhancement. There is an acknowledgment of the importance of woodland grazing to improve biodiversity (Finck et al., 2002; Redecker et al., 2002) and regeneration (Mayer, 2005; Smit et al., 2005; McEvoy et al., 2006) in forestry areas if an adequate animal stocking rate is used (Zingg and Kull, 2005). Social benefits of agroforestry systems for owners and people in general are based on their productive and environmental advantages (Figure 2).

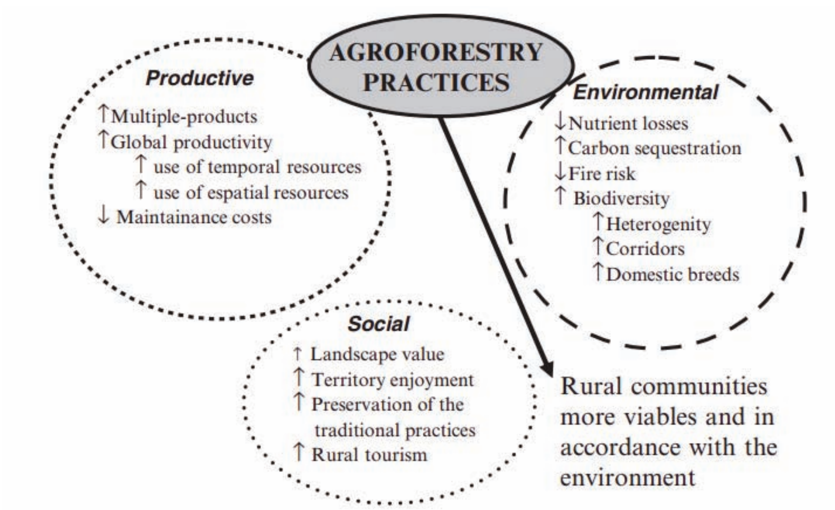

Figure 2. Productive, environmental and social benefits of agroforestry system practices

Source: not stated.

Methodology

Building a Core Content

The method is the backbone of an organised, planned process, from training design to transfer after development, experimentation and assessment. The partners have established a common professional referential whose training declination is a solid and enforceable core, also called 'Core Content', which aims to prepare for the exercise of the profession of agroforester. The training will therefore be declined to operational aims, taking into account the diversity of possible context for the necessary adaptations, each project being a particular case. The process of developing such a 'European Professional referential of Agroforester' is composed of three stages and is based on the French professional methodology of referential development. A professional referential is called professional reference book as well.

1) Collecting of information from actors and stakeholders, based on:
   - Investigation(s) of literature, of business documents, from testimonies of experimenters, experts, researchers, technicians, developers etc.;
   - Questionnaires and interviews including questions such as (examples): What major agro-ecological principles the agroforester must master to design a viable project? What reasoning on the place and role of agroforestry on the scale of the farm, the scale of the territory (interest, complementarity, implementation, conduct etc.), reasoning the farmer should be able to hold and its impact on the management and daily practice? What an agroforester should know concerning the CAP applied to one particular country?

2) Organising of the information collected in a structured document:
   - Either structured under the form of 'significant professional situations, SPS';
   - Or structure under the form of 'core competencies' (or Main Competencies) by country or by actors.

3) Validating the professional referential (professional reference book) in a process involving all the domain actors, all the stakeholders.

The list of actors and stakeholders involved in the production process-validation of the AgroFE is available.

Building the knowledge databank

In computing, a database is gathering highly structured data, a well-defined organisation, based on different types of structures: relational, hierarchical. This is absolutely not the case in a databank in which we store structured tables of numbers as well as illustrated text or video or emails, external knowledge or those from the project in their various forms. But it should be noted that the KDB in the prototype of the AgroFE project is based on a software, RUBEDO developed in PHP and RUBEDO is built on different components (a database management software (DBMS), type 'NoSQL', MongoDB and the user interface uses the ElasticSearch search engine). The development phases were the following:

- Building the prototype, winter 2014–2015: Spring 2015 (interactive online training via Vidyo system with screen sharing, the partners had to provide five documents in their national language, provide metadata in a file according to the process involving intermediate files.
- Started the test with students, trainees and stakeholder in the AgroSup, Dijon. These presentations tests resulted maintenance for the assessment of the list of documents.

- Presentation test librarians. The responsible resource centres have raised several comments and judicious remarks. This type of resource matches to a need for teachers, trainers and pupils, apprentices, students, soon in that the information (documents) are of quality and content validated, somehow certified. Some of the materials/content did not respect the rules of quotations and intellectual property. The access of KDB was released in late October 2015.
- During the development work of the KDB, an evaluation of the interface and the organisation of the access will be organised with the participation of master students, Hungarian and French consultation conducted by students in Master AgroSup Dijon. A first phase resulted in proposals for interface and aspects. The thesaurus and taxonomy are very important part of KDB, it can be the basis of the search strategy.

Results

The AgroFE Leonardo project

In the AgroFE project, in partner countries there is a need for conversion and development of about 15,000 to 20,000 farms, in the next 5–7 years, which means training of the same number of operation managers. To achieve these goals more advisors and trainers in agroforestry are needed.

The main project objective is the development of an agroforestry training system, based on a common framework and core content, and to promote training at European level. The training should involve professionals, agroforesters, and should be as innovative as possible: field based training, usages of ICTs, development of training materials. The specific objectives were:

- Producing of one proposal of European professional referential of farmer agroforester, as support of the training common framework – core content, which one could be adapted to local environment;
- Designing, implementing a knowledge data bank (KDB - BdC), knowledge which will be used as materials, resources for training, including the existing and the transfers from partners;
- Developing new training pathways, then carrying out experimentations targeting student future farmers or advisors and adults, farmers, in the countries of the partnership;
- As much as possible, inserting, developing the training in the framework of the qualification, certification systems for the targeted levels, training based on to the needs and specifications of the country education systems.

Related to the objectives of the AgroFE project the following results can be highlighted:

- A collection of different resources was made based on the synthesis of needs and expectations of partners. This collection was used in developing new and existing training sessions;

- A professional book of references has been developed to support for transfers in training;
- The knowledge database has been developed which will be used for tools and training resources and which will also integrate existing resources in the future;
- Collaborative and dissemination platforms were created such as official web site, videoconference system, facebook, mailing list and Moodle for project document and as LMS.

The Agrof-MM Erasmus+ project

Based on the AgroFE Leonardo project the Agrof-MM project extends the activity to the Mediterranean and mountain areas between 2015 and 2018. Education is essential, not only in order to make this innovation method of production known, but also in order to allow the acquisition of new competencies and knowledge by those working in the agroforestry agricultural profession. This is why Agrof-MM sets up different types of training:

- Courses, group work, conferences;
- Training in the field and online;
- Self-training;
- Thematic workshops;
- Case studies;
- Visits to agroforestry plots;
- Tutored placements on farms.

The Agrof-MM training programmes are directed to pupils, students, farmers and future farmers, foresters, workers, teachers, trainers and agricultural advisors. Agrof-MM analyses existing educational systems and develops new innovative tools:

- A description of existing training procedures and an identification of needs;
- A census and evaluation of existing educational tools;
- The enrichment of the European book of professional reference for agroforestry farmers. Created in the framework of the preceding AgroFE project, the book of professional reference describes the tasks that the farmers and foresters who practice agroforestry must be able to achieve. It also serves to support the transferral of training;
- The design of the book of professional reference as well as the training systems;
- The production of educational material including multimedia tools;
- The practical validation of educational systems;
- The analysis and dissemination of the results obtained.

The knowledge database has been developed which will be used for tools and training resources and will also integrate with existing and future training resources. Collaborative and dissemination platforms were created such as an official web site, video-conference system, Facebook, mailing list and Moodle training portal for project document and as a LMS.

The knowledge databank is a component of the project training system. It aims to gather and share a set of documents, resources that partners can use and which will have been accessed by learners and the public users. The project focuses to the newest innovative ICT solutions and trends. The knowledge databank is to enable the sharing, access and consultation in the use of certain resources for training. These resources are under different forms: Mono document objects (such as a photo, a text, a diagram) and composite materials (for example a html web page with images, a pdf file with pictures and diagrams, a video clip with images and sounds etc.). The prototype of the AgroFE project is based on a software, RUBEDO[1], developed in PHP and RUBEDO is built on different components: a data base management software (DBMS-SGBD), type 'NoSQL', MongoDB, and the user interface uses the ElasticSearch search engine. The paper describes the knowledge databank system prototype and the used ICT tools in the project, such as LMS and the collaborative working environment. These tools have been used in both the AgroFe and the Agrof-MM project.

Practical training – field work (in Hungary at University of Debrecen)

Education in Agro-FE project is contained a field trip, which topic was NATURA2000 habitat mapping of agroforestry and salty grassland to using mobile GIS technology in practice in near Püspökladány, Hajdú-Bihar County, Hungary. During in the field trip, the participants visited three locations:

- In the first location, estimation of tree mass was determined by tree diameter and height. The tree height was measured by Leica DISTOTM D8 laser distance measurement. Finally, the estimation was made by DigiTerra Explorer (the tree volume estimation module), which is used tree volume estimation based on the Sopp-board; and it can be used field as well with GPS. In the first location *Quercus robu*r L., *Ulmus turkestanica* and *Fraxinus excelsior* were measured and the estimation module is required for valuation ten tree/species.
- In the second location were presented groundwater monitoring wells and ecological habitat assessments. The depth of ground water was measured and the precise positioning of monitoring wells were detected with mobile GIS tools. Furthermore the main soil type of the area were shown using soil profiles.

[1] http://www.rubedo-project.org/en/homepage/rubedo-dream-team

- In the third location was Ágota-pusza, which is part of Hortobágy National Park, and it is one of the four sample areas of ChangeHabitats2 project. This area is mainly characterised by salt affected soils, alkali grasslands, micro heterogeneous relief with isolated micro watershed. In this location was shown how can we combine the field measurement with mobile GIS tools. We used EMRC tools to detect the electrical conductivity values of this soils, and we combined it with mobile GIS tools (tablets) to detect the precise positioning of measurement points.

The University of Debrecen (DE) held professional day for AgroF-MM on 19 October 2016 in Tokaj-Tarcal. At the first location the participating farmers and future farmers heard presentations from the colleagues of the Vine and Wine Research Institute about the region, the erosion protection solutions and agroforestry/afforestation role in preventing erosion. Furthermore DE presented the AgroF-MM project. Briefly described its purpose, presented the operating principle and theoretical background of those instruments to students what they tested on terrain in the remainder parts of the practical day. On the second and third locations, colleagues presented their knowledge of terrain erosion protection. They demonstrated the current experiments and described the used erosion protection devices in practicing together with colleagues of DE. The following instruments were presented: Green Seeker, TETRACAM multispectral camera, Hexium type thermocamera. The farmers and future farmers can select the optimal areas of tree planting with the help of these instruments.

Discussion

Related to the objectives of the AgroFE project the following results can be highlighted:

- A collection of different resources was made based on the synthesis of needs and expectations of partners. This collection was used in developing new and existing training sessions;
- A professional book of references has been developed to support for transfers in training;
- The knowledge database has been developed which will be used for tools and training resources and which will also integrate existing resources in the future;
- Collaborative and dissemination platforms were created such as official website, videoconference system, Facebook, mailing list and Moodle for project document and as LMS.

In relation to the AgroFe-MM project objectives, the following results are highlighted:

- A collection of different resources was made based on the synthesis of needs and expectations by the partners. This collection was used in developing new and existing training sessions. A professional book of references was also developed to support the transfer of training curricula across different countries;

- The knowledge database has been developed which will be used for tools and training resources and will also integrate with existing and future training resources. Collaborative and dissemination platforms were created such as an official website, video-conference system, facebook, mailing list and Moodle training portal for project document and as a LMS.

The different ICT tools were integrated into a toolset, but they were used to separately too. The Moodle server was used as virtual collaboration space and e-learning system. The system was implemented on 09/01/2014. We created the initial structure for collaborative work and starting the e-learning courses. Within the AgroFE project (2014–2015) 217 users were registered (enrolled) in the system. From these, there are 155 enrolled students from different countries. The Vidyo videoconference systems was used for project virtual meeting, video conferencing, distance teaching and conference broadcasting. The Videotorium serves as repository for project videos. For supporting the quality assessment more questionnaires have been developed and the LimeSurvey was used for online survey and evaluation.

The proposal of professional referential (book of professional specifications) of the agroforester job in Europe has been developed. A professional referential describes what an agroforester must be able to do in the context of his/her professional activity. This document was produced by iterative and interactive contribution of partners AgroFE project and agroforestry stakeholders. The partners have established this common professional referential whose training declination is a solid and enforceable core, also called ‘core content’, which aims to prepare for the exercise of the profession of agroforester. The training will therefore be declined to operational aims, taking into account the diversity of possible contexts for the necessary adaptations, each project being aparticular case. The result of the work done by AgroFE partners and covers the professional practices of the partner countries, namely, from east to west, Romania, Hungary, Czech Republic, France, Belgium, and the UK. These proposals can be found in the public KDB.

Within the project, more training programmes were implemented assed on the knowledge transfer from the project. Summarising the results, it seems the subject was exciting for the students. Nowadays, in Hungary, agroforestry systems are not so popular, maybe one of the results of this project can be extending this system. The opinion of students on this system would be important. The term of content of this course was good and useful for the students and they evaluated to good and excellent the IT tools used in the course. Under the AgroFe-MM project, we are planning to extend the education to MSc level and transfer this agroforestry knowledge to mountain areas in Hungary, as one of the goals of this new project.

The developed collaborative environment which consisted of more subsystems served the project partners very well. The videoconference systems (desktop and the multimedia central unit) served the virtual meeting of project partners and videoconferences efficiently in high quality. The live broadcasts on the Internet used for delivery the lecture to a wide audience (students, experts, farmers). The virtual meetings had been recorded on video. Because of the efficiency and quality of service, more project partners asked for permission to use these services in other projects. The LMS had been used as virtual collaborative space for project members and organising learning and training courses in different countries. Based on the quality assessment, the content and service also was of high quality. It gave possibilities for very efficient work for more than 200 participants in agroforestry. The knowledge database (knowledge data bank) is very new innovative solution for harvesting, storing and delivering contents in agroforestry. It was used in different training programmes with good feedback. The knowledge database will serve the Agrof-MM partners in the coming years.

This education development project is unique in Europe. The Center for Agroforestry at the University of Missouri is one the centres contributing to the science underlying agroforestry, the science and practice of intensive land-use management combining trees and/or shrubs with crops and/or livestock. They give webinars and organise training, workshops but their training materials relate to their environments. In Europe we need to develop educational tools for European specialities.

Conclusion

Agroforestry will be important for rural areas and farms according to several aspects. Environmental, economic, agricultural production, rural living are very important issues. The project participants are involved in developing training curricula for different levels (L4/L5/L6). The latest version of the Moodle system has been implemented for collaborative space and we carried out more virtual meetings by the new videoconference systems, which have been tested and used many times. All the virtual meetings have been recorded in the Videotorium system. We are convinced that by using innovative technologies and solutions the system will help to achieve the project goals. Analysing the open source tools, we have created the architecture of the knowledge base and service system for harvesting materials, building knowledge base and information service, implement e-learning service in agroforestry. The KDB and service system will be finished this year. Finally, the Hungarian specialties in the projects, such as education, subject about agroforestry, conference and workshops and field trip in Püspökladány and Tokaj-Tarcal region are introduced.

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References

Bunce, R.G.H., Pérez-Soba, M., Smith, M., 2008. *Assessment of the extent of agroforestry systems in Europe and their role within transhumance systems*, in A. Rigueiro-Rodríguez, J. McAdam, M.R. Mosquera-Losada (eds), Agroforestry in Europe, volume 6. Dordrecht: Springer. https://doi.org/10.1007/978-1-4020-8272-6_15

Bustos, E.S., Zazueta, F.S., Howard, H.B., 2007. *Rapid prototyping of learning objects and their implementation using ontology editor*, in Conference on Agricultural Economics, Rural Development and Informatics, Debrecen, Hungary, pp.59-60.

den Herder, M., Burgess, P.J., Mosquera-Losada, M.R., Herzog, F., Hartel, T., Upson, M., Viholainen, I., Rosati, A., 2015. *Preliminary stratification and quantification of agroforestry in Europe*. Report 1.1 for the EU FP7 Research Project AGFORWARD.

EEA, 2005. *The European environment. State and outlook 2005*. Köbnhavn: European Environment Agency.

Evans, J., 1984. *Silviculture of broadleaved woodland*. Forestry Commission Bulletin 62, London.

Finck, P., Riecken, U., Shröder, E., 2002. *Pasture landscapes and nature conservation. New strategies for the preservation of open landscapes in Europe*, in B. Redecker, P. Fink, W. Härdtle, U. Riecken, E. Schröder (eds), Pasture landscape and nature conservation. Berlin: Springer. https://doi.org/10.1007/978-3-642-55953-2_1

Gaspar, P., Mesias, F.J., Escribano, M., Rodriguez de Ledesma, A., Pulido, F., 2007. *Economic and management characterization of dehesa farms: implications for their sustainability*. Agroforestry Systems 71, 151-162. https://doi.org/10.1007/s10457-007-9081-6

Gunn, C., 2010. *Sustainability factors for e-learning initiatives*. Research in Learning Technology 18(2), pp. 89-103. https://doi.org/10.1080/09687769.2010.492848

Helle, T., 1995. Reindeer husbandry and hunting, in M. Hytönen (ed.), Multiple-use forestry in the Nordic countries. Jyväskylä, Finland: Gummerus Printing.

Herdon, M., Lengyel, P., 2013. *Building and using knowledge repositories for agriculture: an innovation case study*, in EFITA WCCA CIGR 2013 Conference: Sustainable Agriculture through ICT Innovation, Torino, Italy, pp. 180-187.

Herdon, M., Rózsa, T., 2012. *Knowledge dissemination on innovative information technologies in agriculture*. Journal of Ecoagritourism 8(1), pp. 301-306.

Jamnadass, R., Langford, K., Anjarwalla, P., Mithöfer, D., 2014. *Public-private partnerships in agroforestry*. International Journal of Educational Development 16(1), 544–564. https://doi.org/10.1016/b978-0-444-52512-3.00026-7

Jongmans, C.T., 1996. *In-Service Teacher Training for Agricultural Education in the Netherlands: From Supply to Demand*. International Journal of Educational Development 16(1), 89-95. https://doi.org/10.1016/0738-0593(94)00059-3

Lawson, G., Dupraz, C., Liagre, F., Moreno, G., Paris, P., Papanastasis, V., 2005. *Deliverable 9.3. Options for Silvoarable Agroforestry Policy in the European Union*. March 2005. Swindon: Natural Environmental Research Council.

Mayer, A.C., 2005. *Management and ecological implications of silvopstoral systems in the Alps*, in M.R. Mosquera-Losada, J. McAdam, A. Rigueiro-Rodríguez (eds), Silvopastoralism and sustainable land management. Wallingford: CABI.

McAdam, J., Thomas, T.H., Willis, R.W., 1999. *The economics of agroforestry systems in the UK and a review of their future prospects*. Scottish Forestry 53(1), 37-41.

McEvoy, P.M., McAdam, J.H., Mosquera-Losada, M.R., Rigueiro-Rodríguez, A., 2006. *Tree regeneration and sapling damage of pedunculate oak Quercus robur in grazed forest in Galicia, NW Spain: a comparison of continuous and rotational grazing systems*. Agroforest Systems 66(2), 85-92. https://doi.org/10.1007/s10457-005-2916-0

Moreno, G., Obrador, J.J., García, E., Cubera, E., Montero, M.J., Pulido, F., Dupraz, C., 2007. *Driving competitive and facilitative interactions in oak dehesas through management practices*. Agroforest Systems 70(1), 25-40. https://doi.org/10.1007/s10457-007-9036-y

Moreno, G., Pulido, F., 2008. *The function, management and persistence of Dehesas*, in A. Rigueiro-Rodríguez, J. McAdam, M.R. Mosquera-Losada (eds), Agroforestry in Europe, volume 6. Dordrecht: Springer.

Mosquera-Losada, M.R., McAdam, J., Romero-Franco, R., Rigueiro-Rodríguez, A., 2008. *Definitions and components of agroforestry practices in Europe*, in A. Rigueiro-Rodríguez, J. McAdam, M.R. Mosquera-Losada (eds), Agroforestry in Europe, volume 6. Dordrecht: Springer. https://doi.org/10.1007/978-1-4020-8272-6_1

Mosquera-Losada, M.R., Pinto-Tobalina, M., Rigueiro-Rodríguez, A., 2005. *The herbaceous component in temperate silvopastoral systems*, in M.R. Mosquera-Losada, J. McAdam, A. Rigueiro-Rodríguez (eds), Silvopastoralism and sustainable land management. CABI, Wallingford, UK. https://doi.org/10.1079/9781845930011.0093

Nair, P.K.R., 1993. *An introduction to agroforestry*. Dordrecht: Kluwer. https://doi.org/10.1007/978-94-011-1608-4

Nair, P.K.R., 2005. *Agroforestry*. Encyclopaedia of Soils in the Environment, 2005, 35-44. https://doi.org/10.1016/b0-12-348530-4/00244-7

Pereira, P.M., Pires da Fonseca, M., 2003. *Nature vs. nurture: the making of the montado ecosystem*. Conservation Ecology 7(3), article 7. https://doi.org/10.5751/ES-00562-070307

Pleininger, T., 2007. *Compatibility of livestock grazing with stand regeneration in Mediterranean holm oak parklands*. Journal for Nature Conservation 15, 1-9. https://doi.org/10.1016/j.jnc.2005.09.002

Porter, S., 2015. *To MOOC or not to MOOC*. Examples of MOOCs, pp. 17-25.

Price, C., 1995. *Economic evaluation of financial and non-financial costs and benefits in agroforestry development and the value of sustainability*. Agroforestry Systems 30, 75-86. https://doi.org/10.1007/BF00708914

Redecker, B., Finck, P., Härdtle, W., Riecken, U., Schroder, E., 2002. *Pasture landscapes and nature conservation*. Berlin: Springer. https://doi.org/10.1007/978-3-642-55953-2

Shakesby, R.A., Coello, C.O.A., Schnabel, S., Keizer, J.J., Clarke, M.A., Lavado-Contador, J.F., Walsh, R.P.D., Ferreira, A.J.D., Doerr, S.H., 2002. *A ranking methodology for assessing relative erosion risk and its application to dehesas and montados in Spain and Portugal*. Land Degradation and Development 13(2), 129–140. https://doi.org/10.1002/ldr.488

Sibbald, A.R., 1999. *Agroforestry principles-sustainable productivity?* Scottish Forestry 53(1), 18-23.

Smit, C., Béguin, D., Butler, A., Müller-Schärer, 2005. *Facilitation of tree regeneration in pasture woodlands*, in M.R. Mosquera-Losada, J. McAdam, A. Rigueiro-Rodríguez (eds), Silvopastoralism and sustainable land management. Wallingford: CABI.

Zingg, A., Kull, P., 2005. *The influence of goat grazing on ground vegetation and trees in forest stand*, in M.R. Mosquera-Losada, J. McAdam, A. Rigueiro-Rodríguez (eds), Silvopastoralism and sustainable land management. Wallingford: CABI. https://doi.org/10.1079/9781845930011.0365

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Competitiveness and innovation in rural Romania

Abstract: *In the recent period, public actions and policies have been increasingly oriented towards the improvement of economic competitiveness on account of numerous studies that signal the problems generated by the loss of performance from this perspective. This study attempts to identify the main factors that make the regional economies in Romania vulnerable in the face of competitors, mainly for the regions with strong and medium rurality features, i.e. the Predominantly rural (PR) counties and the Intermediate counties – classified according to the OECD methodology. The results of the study showed that the factors that largely contribute to widening the regional disparities with regard to rural competitiveness, making the PR counties more vulnerable are the following: (i) access to innovation and (2) the value of exports, in both the non-agricultural and agri-food economy.*

Keywords: *regional competitiveness, rural area, Romania*

Introduction

With the acceleration of economic globalisation, the debates on the competitiveness issue are becoming increasingly relevant, expression of the increasingly fierce competition worldwide. The '*competitiveness*' concept becomes a common topic of the debates from the academic and political circles as far as the globalisation of the economy is getting forward. Most often, the competitiveness concept is considered synonymous with the productivity concept. Thus, Porter (1990) states that "the only significant meaning of competitiveness at national level is that of productivity". WEF (2017) defines competitiveness as a "*set of institutions, policies and factors that determine the level of productivity of an economy and which, in its turn, determines the prosperity level that a given country can reach*". In similar terms, but more broadly, IMD (2015) defines competitiveness as the way in which "*an economy manages all its resources and competences in order to increase population's welfare*".

Recently, the public actions and policies have been increasingly oriented towards the improvement of economic competitiveness on account of numerous studies that identify the problems generated by the loss of performance from this perspective. The way in which competitiveness is defined and understood differs by the level at which competitiveness has been approached. Both in the specialty literature and in the praxeological approaches there are two levels of approaching competitiveness, namely:

1. *at the level of economic operators* – competitiveness of firms. Here, competitiveness is understood as the capacity to produce quality goods and services, at a fair price and at the right time. In other words, the competitiveness of an economic operator defines its ability to respond faster and more efficient to the customers' needs than other firms, all these firms acting as competitors on the same market (Thompson and Ward, 2005).
2. *at the level of geographical areas*. In a territorial perspective, two subsegments are differentiated: (a) competitiveness of countries and (b) regional competitiveness. Here, OECD defines competitiveness as the extent to which, under free and fair market conditions, a geographical area can produce goods and services that are successfully transacted on the international markets, while contributing to the increase of the population's real incomes, on the long term (OECD, 1996). While the firms are competing for market shares, the regions and countries are competing on the markets of mobile factors of production (labour, capital) on the basis of which they can improve their competitive ability.

Having as reference the above-mentioned conceptual delimitations, in the sense of the present analytical approach, regional competitiveness is understood as *the ability of regions to promote, attract and support the economic activity so that their population can achieve and maintain a high living standard*. According to this definition, a region is competitive when its business environment has high accessibility, produces and/or is attractive for the mobile factors of production (highly qualified labour, innovative entrepreneurship etc.), thus generating economic growth. The successful attraction of these factors creates positive externalities, such as the benefits generated by concentration and location, which leads to increased regional economic performance in general and to social welfare in particular.

The objective of this study is to evaluate the regional rural competitiveness, more exactly the comparative analysis between the competitiveness of predominantly rural (PR) regions NUTS 3 (counties) on one hand, and the intermediate (IR) regions, on the other hand, in order to identify the parameters that facilitate/hinder competitiveness growth at the level of each type of region in Romania. Using an evaluation model of regional competitiveness developed in Croatia in 2012, we aim to determine the rural competitiveness level in Romania, nationwide and at the county level. The study had in view to determine the territorial disparities with regard to rural competitiveness between the PR and IR NUTS 3 regions (counties) (according to OECD definition). The main factors are identified that make the regional economies vulnerable in the face of competitors, mainly for the regions with strong and medium rurality levels (i.e. the PR and IR regions).

Two working hypotheses were formulated, which were tested throughout the analysis, as follows: (1) the PR regions are less competitive than the national average; (2) the weak development of the RDI sectors at regional level significantly influences competitiveness.

Theoretical background

The World Economic Forum (WEF) has published an annual report on global competitiveness for more than 35 years. Before 2004, the economies/countries were classified from the macro-economic point of view on the basis of the Growth Development Index developed by Jeffrey Sachs and from the micro-economic point of view on the basis of Michael Porter's Business Competitiveness Index (BCI). Since 2004, the Global Competitiveness has ranked countries according to the Global Competitiveness Index (GCI) developed by Xavier Sala-i-Martin; the index integrates both the macro-economic and micro-economic aspects of competitiveness.

In order to determine the GCI, the methodology developed by the WEF has in view the aggregation of twelve pillars grouped into three categories of sub-indices: *basic requirements index* (including indicators that refer to institutions, infrastructure, macro-economic environment, health and primary education), *efficiency enhances* (higher education and training, goods market efficiency, labour market efficiency, financial market development, technological readiness and market size) and *innovation and sophistication factors* (business sophistication and innovation) considered to influence the national economy capacity in the successful performance in the competition with other economies.

The most recent WEF report analysed the competitiveness of 138 economies. Switzerland, Singapore and the United States ranked in the first three places, while Chad, Mauritania and Yemen were in the last places. Romania ranked 62nd, with the score of GCI of 4.30. Thus, Romania outperformed countries such as Slovakia, Hungary and Croatia, but on the other hand it lagged behind Poland, Bulgaria and Turkey (Figure 1).

	Economy	Score[1]	Prev.[2]	Trend[3]
1	Switzerland	5.81	1	
2	Singapore	5.72	2	
3	United States	5.70	3	
4	Netherlands	5.57	5	
5	Germany	5.57	4	
6	Sweden	5.53	9	
7	United Kingdom	5.49	10	
8	Japan	5.48	6	
9	Hong Kong SAR	5.48	7	
10	Finland	5.44	8	
129	Congo, Democratic Rep.	3.29	n/a	
130	Venezuela	3.27	132	
131	Liberia	3.21	129	
132	Sierra Leone	3.16	137	
133	Mozambique	3.13	133	
134	Malawi	3.08	135	
135	Burundi	3.06	136	
136	Chad	2.95	139	
137	Mauritania	2.94	138	
138	Yemen	2.74	n/a	

Figure 1. Top ten first and last countries, by the Global Competitiveness Index
The score is established from 1-7.
Source: WEF (2017).

The score obtained by Romania in recent years did not change very much, yet Romania's position in the ranking changed each year (Table 1). We consider it relevant for the theme of this study to mention the positions that Romania has in the hierarchy of the 138 countries for each of the twelve pillars, thus providing a picture of the framework in which Romania's economy evolves. Thus, the pillars for which Romania ranks the highest are the Macro-economic environment (28), Market size (402) and Technological training (48) and the lower positions are found for Business complexity (104), Institutions (92), followed by Infrastructure, Good health and primary education, Efficient labour market (for each of these pillars Romania ranked 88th in the global hierarchy). For all the other pillars, Romania's position in the ranking is lower than the position of the general rank, as follows: Developed financial markets (86), Higher education and training (67), Efficient goods markets (80).

Table 1. Romania's position in WEF reports in recent years

Year	Position in the rankings / Number of economies	Global Competitiveness Index total score
2016-2017	62 / 138	4.3
2015-2016	53 / 140	4.3
2014-2015	59 / 144	4.3
2013-2014	76 / 148	4.1
2012-2013	78 / 144	4.1

Sources: WEF Global Competitiveness Reports in the last five years.

According to the same report, the most important five factors that have a negative impact upon the development of business environment in Romania are in the following order: *access to finance, ineffective government, taxation level, labour inadequate to market requirements, corruption*. Romania should intervene to remediate the deficiencies in relation to the market access (through investments in infrastructure), more transparent decision making processes and institutional flexibility as well as for the improvement of the access to innovations and labour market flexibilisation.

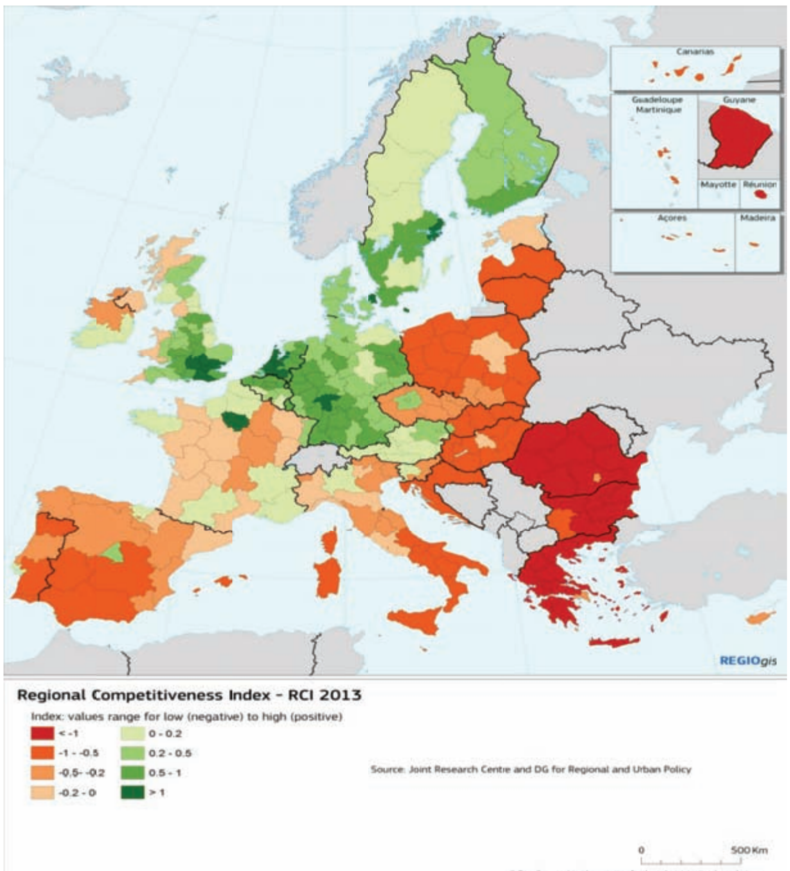
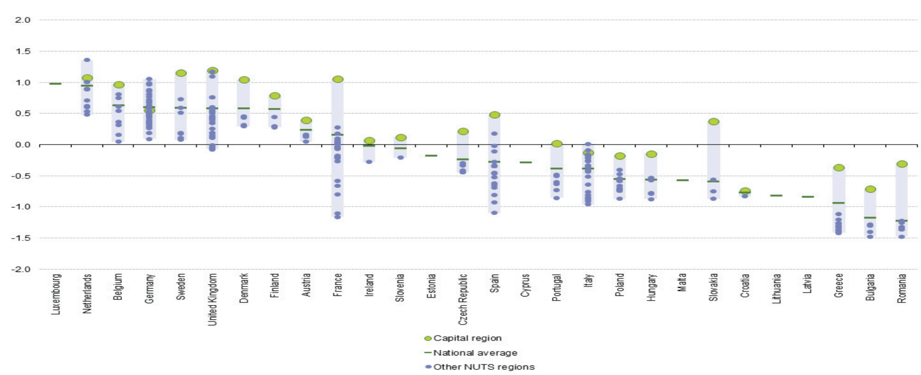


Figure 2. Regional competitiveness index at NUTS 2 level, 2013 (EU-28=0)

Source: Annoni and Dijkstra (2013).

Measuring the regional disparities and the identification of the main factors that contribute to competitiveness improvement across regions are on the research agenda of the European Union (EU), which has included the increase of territorial convergence among its objectives. The first report on the competitiveness of the EU's regions was published in 2010, and was resumed and adjusted with regard to the indicators used in the calculation of Regional Competitiveness Index (RCI) in 2013 (Annoni and Dijkstra, 2013). Like the GCI calculated by the WEF, the Eurostat RCI has three pillars that are relatively similar in terms of explanatory relevance, yet differentiated by the number of component indicators and territorial approach (at national level – in the GCI and at regional level – in the Eurostat RCI). The indicators that describe the regional competitiveness evaluated at the level of EU regions are grouped into three categories, as follows: the *Base sub-indicator* (including indicators referring to institutions, macro-economic stability, infrastructure, health, primary education); *Efficiency sub-indicator* (tertiary education, labour market efficiency, market size); *Innovation sub-indicator* (technological training, business complexity, innovation).

The conclusions of Annoni and Dijkstra (2013) indicate that at EU level, competitiveness has a strong regional dimension, as within each EU Member State there are development regions with different competitiveness levels. France, Italy, Spain are relevant examples in this respect, which confirms that the analyses at national level cannot accurately capture the territorial disparities and realities. An approach based only on the value of indicators at national level may induce errors in the objectives of public policies and would lead to widening territorial disparities. Figure 2 presents the regional competitiveness disparities at EU level. Seven out of the eight NUTS 2 regions of Romania (the Bucharest region is the exception) some one of the lowest RCIs in the EU-28.



([1]) The light purple shaded bar shows the range of the highest to lowest region for each country. The dark green bar shows the national average. The green circle shows the capital city region. The dark purple circles show the other regions. Chemnitz (DED4), Leipzig (DED5), Emilia-Romagna (ITH5), Marche (ITI3), Cheshire (UKD6) and Merseyside (UKD7): estimates based on the NUTS 2006 classification.
Source: European Commission (Joint Research Centre and Directorate-General for Regional and Urban Policy)

Figure 3. Regional disparities of competitiveness index at NUTS 2 level (EU-28=0)
Source: Eurostat (2015).

The regional competitiveness disparities become even more evident when they are illustrated as deviations of the regional indices value from the EU-28 average. The data for Romania reveal that not even the Bucharest region, which the country's best performing region, can reach the average competitiveness value of the EU Member States (Figure 3). According to the data of the same source (Table 2), three regions of Romania are among the ten regions with the lowest competitiveness in the EU: South-West and Centre (RCI 4.2) and South-East (RCI 0.1).

Table 2. The ten most competitive and least competitive NUTS 2 regions of the EU-28 (index = 0 – 100)

Top 10	Region (NUTS code)	RCI 2013	Bottom 10	Region (NUTS code)	RCI 2013
1	Utrecht (NL31)	100.0	**257**	Peloponnisos (EL25)	5.1
2	London area (UKH2, UKH3, UKI1 and UKI2) (2)	94.2	**258**	Sud-Vest Oltenia (RO41)	4.2
3	Berkshire, Buckinghamshire and Oxfordshire (UKJ1)	93.5	**259**	Centru (RO12)	4.2
4	Stockholm (SE11)	92.7	**260**	Anatoliki Makedonia, Thraki (EL11)	3.9
5	Surrey, East and West Sussex (UKJ2)	90.7	**261**	Notio Aigaio (EL42)	3.7
6	Amsterdam area (NL23 and NL32) (3)	90.1	**262**	Dytiki Makedonia (EL13)	2.8
7	Darmstadt (DE71)	89.2	**263**	Yugoiztochen (BG34)	2.7
8	Île de France (FR10)	89.1	**264**	Sterea Ellada (EL24)	2.2
9	Hovedstaden (DK01)	88.8	**265**	Sud-Est (RO22)	0.1
10	Zuid-Holland (NL33)	87.6	**266**	Severozapaden (BG31)	0.0

(1) Chemnitz (DED4), Leipzig (DED5), Emilia-Romagna (ITH5), Marche (ITI3), Cheshire (UKD6) and Merseyside (UKD7): estimates based on the NUTS 2006 classification.
(2) Aggregated data to take account of commuting patterns, comprising: Bedfordshire and Hertfordshire (UKH2), Essex (UKH3), Inner London (UKI1) and Outer London (UKI2).
(3) Aggregated data to take account of commuting patterns, comprising: Flevoland (NL23) and Noord-Holland (NL32).
Source: European Commission (Joint Research Centre and Directorate-General for Regional and Urban Policy)

Source: Eurostat (2015).

So far, the studies on competitiveness referring to Romania have targeted the analysis, from this perspective, of the national economy sectors or focused on the description of territorial disparities with regard to competitiveness across development regions. Research studies on the evaluation of rural competitiveness in Romania and on its determinant factors are relatively modest, and they mainly refer to the competitiveness of the main sector of rural economy – agriculture (Bojnec and Fertő, 1999; Sarris et al, 1999; Fogarasi, 2008).

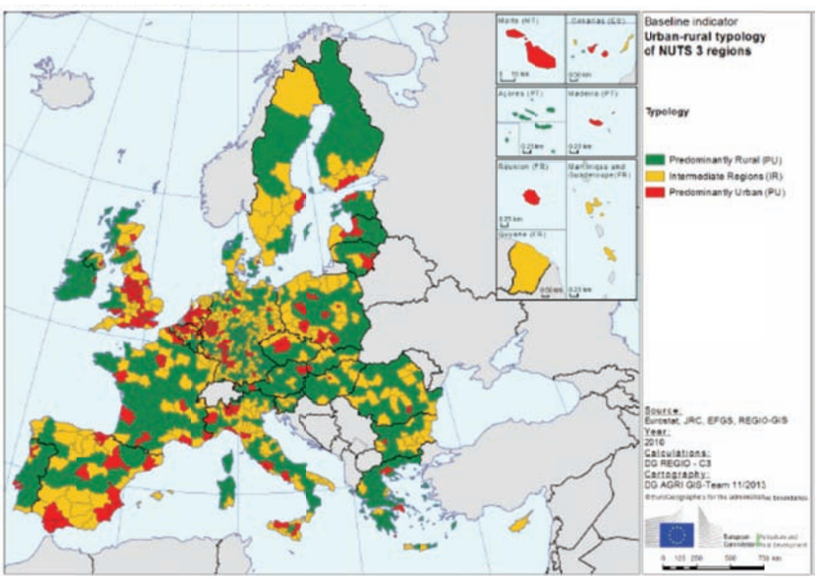


Figure 4. NUTS 3 map of the EU by rurality level
Source: EC (2013).

Table 3. Importance of predominantly rural regions (PR) and of intermediate regions (IR) in Romania and by groups of EU Member States

	% of the territory		% of population		% GVA		% labour employment	
	PR	IR	PR	IR	PR	IR	PR	IR
EU-27	51.6	38.4	22.6	35.1	15.6	30.0	20.6	33.9
EU-15	49.8	39.1	18.1	34.1	14.3	29.5	16.7	33.0
EU-N12	57.2	36.2	39.8	38.8	28.7	35.4	36.0	37.5
Romania	**59.8**	**39.4**	**45.6**	**43.8**	**32.7**	**42.1**	**41.8**	**46.2**

Source: EC (2013).

In view the fact that in Romania the regions with (stronger or more attenuated) rurality characteristics, including here the PR and the IR regions, have a significant socio-economic importance compared to the other EU Member States (Figure 4), we consider that a competitiveness analysis based on a methodology adapted to the particularities of the rural spaces best responds to the national context. The importance of regions with rural characteristics in Romania can be evaluated by a set of relevant geo-economic-social parameters: share of these regions in the national territory, in total population, in labour employment and in value-added formation. According to these parameters, the PR regions of Romania account for 60 per cent of the national territory, being the living space of 45.6 per cent of the country's population, while contributing 32.7 per cent to gross value added (GVA) formation and 41.8 per cent to labour employment (Table 3). The IR regions are added to these regions, which also significantly contribute to the country's descriptive parameters, making Romania the most rural EU Member State.

Methodology

In order to evaluate the RCI of the NUTS 3 (counties) development regions with different rurality characteristics – PR regions on the one hand and IR regions on the other, the statistical model developed by Mikuš et al., 2012 to measure the territorial disparities in the regional competitiveness of Croatia was adapted. While the competitiveness evaluation models implemented by the WEF or Eurostat are constructed on three pillars as described above (*basic needs, efficiency and innovation*), the model developed in the Croatian study includes four sets of indicators namely:

1. human resources;
2. situation of the non-agricultural sector economy;
3. situation of the agricultural sector economy;
4. other income generating activities of the farm households.

After the identification of the available statistical information in the territory, at county level in Romania, we attempted a most comprehensive coverage of the set of indicators included in the Croatian model. Yet certain indicators from the initial model were not available at the disaggregated county level in Romania's official statistical data. In order to increase the compatibility between the Croatian model on the study on rural competitiveness and the reputed models developed by the international forums, we considered the need to adjust this model by introducing the innovative component in it.

Table 4. Adapted model for competitiveness evaluation at county level

Variable – Original Croatian model	**Variable – Adapted model**
Group Human resources	
Population employed in the rural area (pers)	Employed population (thou. pers.)
Population with higher education (pers.)	Population with higher education (pers)
Young population in the rural area (pers.)	Young population (pers)
Population density (pers/km^2)	Population density (pers/km^2)
Group Situation of non-agricultural sector economy	
GVA (EUR)	Turnover (thou. EUR)
Value of exports (EUR)	Value of exports (thou. EUR)
Investments in durable goods (EUR)	Density of local active units (no. of local active units / 1000 inhabitants)
Net average wages (EUR)	Net average wages (EUR)
Group Situation of agricultural (primary) sector	
Average farm size (ha UAA /farm)	Average farm size (ha UAA /farm)
GVA (EUR)	Turnover (thou. EUR)
Value of exports (EUR)	Value of exports (thou. EUR)
Investments in durable goods (EUR)	Density of local active units (no. of local active units / 1000 inhabitants)
Net average wages (EUR)	Net average wages (EUR)
Group Other income generating activities on the farm households	***Group Specialisation and innovation***
Share of tourism households	Share of population employed in non-agricultural sectors
Share of handicraft households	RDI employees in 10000 employed civilians
Share of processing households	Share of crop production value in total agricultural output value
Share of households that gain from other income generating activities	

Source: adaptation from Mikuš et al. (2012).

This determined the research team from the Institute of Agricultural Economics of the Romanian Academy to try to identify other series of statistical data available at NUTS 3 level that are compatible with the unavailable indicators in terms of statistical significance. Thus, the Croatian model was adapted according to the available statistical data from Romania and the need to introduce the innovative parameter in the descriptive framework. The main modifications brought to the initial model (Table 4) consist of:

- the replacement of the indicator *Gross value added by Turnover*, which includes, besides the gross value added, the value of intermediary consumptions used to produce the goods and services traded in a given period;
- the replacement of the indicator *Value of investments in tangible durable goods* by *Density of local active units/1000 inhabitants*, both for the agricultural sector and for the non-agricultural sector, is justified by the fact that a higher density of local active units is synonymous with a higher attractiveness of a given geographical area for investors and investments;
- the group of indicators *Other income generating activities on the farm households* was replaced by a series of three indicators reunited under Specialisation and innovation. This last adjustment to the initial model was justified, on the one hand, by the need to introduce in the study two of the pillars used in the well-known competitiveness evaluation models (WEF and EU), namely: *Innovation and business complexity* revealed by the specialisation level that can induce productivity increase. On the other hand, this methodological decision to change the last set of indicators was motivated by the purpose and coverage area to which the present study has been subsumed. Thus, the present study targets the comparative competitiveness evaluation of a larger region, at NUTS 3 level, which includes both the rural and the urban areas, and including in the model only the information referring to the farmer households would bring incomplete information with regard to the openness to alternative activities in the investigated area. On the other hand, increasing the specialisation level in non-agricultural activities of the regional economies (expressed by higher shares of the population employed in non-agricultural activities) and the development of livestock production generate increasing opportunities for the primary sector of the regional economy to become competitive, as the pressure on the land resources decreases with the non-agricultural employment and the value added in agriculture increases with livestock production development. Furthermore, the chances for an economy to become competitive increase as far as its access to innovation increases. Hence, in the model proposed for this analysis, an indicator was introduced that reflects the innovative capacity at NUTS 3 level, namely: *Employees in RDI in 10000 employed civilians*.

For the model adapted to the county level in Romania, the data were extracted from statistical sources of secondary data at the level of the year for which data were available in the official statistics – 2014. The only indicators for which data were extracted at the level of previous years are the Population with higher education (the source being the Census of Population and Dwellings, 2011 of the Romanian National Institute of Statistics, NIS) and Average farm size (the source being the Structural Farm Survey, 2013).

Table 5. Data source for the indicators included in the adapted model for competitiveness evaluation

Group / Indicators	Source
Group □Human resources	
Employed population (thou. pers.)	NIS, Tempo on-line, TEMPO_FOM103D
Population with higher education (pers.)	NIS, Census of Population and Dwellings 2011
Young population 0-20 years (pers.)	NIS, Tempo on-line, TEMPO_POP106A
Population density (pers./km^2)	NIS, Tempo on-line, TEMPO_POP106A, Statistical yearbook – area in km^2
Group □Situation of non-agricultural sector economy	
Turnover (thou. EUR)	NIS, e_Demos database
Value of exports (thou. EUR)	NIS, Tempo on-line, TEMPO_EXP101J
Density of local active units (no. of local active units /1000 inhabitants)	NIS, Tempo on-line, TEMPO_INT101R, TEMPO_POP106A
Net average wages (EUR)	NIS, Tempo on-line, TEMPO_FOM106E
Group □Situation of primary sector economy □agriculture	
Average farm size (ha UAA /farm)	NIS, Structural Farm Survey, 2013
Turnover (thou. EUR)	NIS, e_Demos database
Value of exports (thou. EUR)	NIS, Tempo on-line, TEMPO_EXP101J
Density of local active units (no. of local active units /1000 inhabitants)	NIS, Tempo on-line, TEMPO_INT101R, TEMPO_POP106A
Net average wages (EUR)	NIS, Tempo on-line, TEMPO_FOM106E
Group □Specialisation and innovation	
Share of employed population in non-agricultural sectors	NIS, Tempo on-line, TEMPO_FOM103D
RDI employees in 10000 employed civilians	NIS, Tempo on-line, TEMPO_CDP102E
Share of crop production value in total agricultural output value	NIS, Tempo on-line, TEMPO_AGR206A

Source: adaptation from Mikuš et al. (2012).

The calculation formula of the competitiveness indicators (components of RCI) was the following:

$X_i = 100(x_i/X)/(p_i/P)$, where:

- the small letters represent the values at the level of NUTS 3 region, and the capital letters the values at national level;
- x_i represents the variable chosen for each category of NUTS 3 region and X for the national level;
- p_i represents the population at the level of NUTS 3 region categories, and P at national level.

Each indicator was assigned a specific weight equal to that of the other indicators from the group, and for each group an intermediate value of index was calculated (SI), using the arithmetic mean. The values thus determined for each group of indicators (SI) were used for the calculation of the value of *RCI at the level of counties and of the categories of NUTS 3 regions (PR regions or IR regions*, according to the OECD classification). The calculation of the RCI for each category of region results from the aggregation of SI values, determined as arithmetic mean in the hypothesis in which the rank of each component in the rural competitiveness explanation is equal.

Results and discussion

The specialty literature highlights the existence of significant disparities in the territory and the lack of homogeneity of the national and/or regional blocks from the competitiveness level perspective. Given this assumption, we propose an analysis of the competitiveness level of the administrative territorial subdivisions of the development regions, i.e. the counties, considering that the higher the spatial disaggregating level of the analyses in territorial profile, the higher is the accuracy of the formulated conclusions.

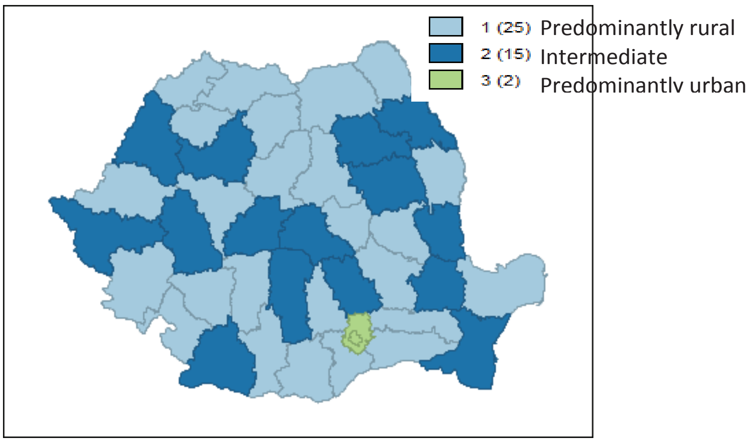


Figure 5. Classification of Romania's counties by the rurality level according to the OECD methodology

Source: EC (2013).

According to the OECD methodology, most of the counties in Romania belong to the categories of regions where the rural characteristics prevail. Of the 42 NUTS 3 administrative-territorial units in Romania, 25 fall into the category PR and other 15 counties belong to the category IR regions.

The results of rural competitiveness evaluation in the (PR and IR) counties in Romania are presented next, at 2014 horizon, having as a methodological basis the model described above. These calculations are an evaluative approach that can be subject to changes proportionally with the availability of data at NUTS 3 level and the progress of socio-economic research in measuring competitiveness.

Rural competitiveness was determined for the two categories of NUTS 3 regions, categories defined by their rurality level, in order to test the previously formulated hypothesis according to which the rurality level influences the regional competitiveness level. The rural competitiveness level of PR and IR counties was determined in relation to the national average using the RCI developed during the study. The results of the application of the Rural competitiveness index computation model are presented in the next table, for the 25 counties considered PR and for the 15 IR counties of Romania.

Table 6. Rural competitiveness index in the predominantly rural and intermediate regions of Romania

Group / Indicators	**Rural competitiveness indicators for:**	
	INT*	**PR****
Group □Human resources		
Employed population (thou. pers.)	97.67	94.67
Population with higher education (pers.)	102.52	68.60
Young population 0-20 years (pers.)	98.93	105.61
Population density (pers./km^2)	110.76	75.06
Average of indicators from Group 1 (SI_1)	*102.47*	*85.98*
Group □Situation of non-agricultural sector economy		
Turnover (thou. euro)	79.81	41.47
Value of exports (thou. EUR)	122.00	62.69
Density of local active units (no. local active units /1000 inhabitants)	99.94	69.21
Net average wages (EUR)	94.47	82.24
Average of indicators from Group 2 (SI_2)	*99.06*	*63.90*
Group □Situation of primary sector economy □agriculture		
Average farm size (ha UAA /farm)	102.73	98.36
Turnover (thou. EUR)	85.57	107.69
Value of exports (thou. EUR)	71.55	42.29
Density of local active units (no. local active units /1000 inhabitants)	97.68	115.47
Net average wages (EUR)	100.71	96.83
Average of indicators from Group 3 (SI_3)	*91.65*	*92.13*
Group □Specialisation and Innovation		
% pop. Employed in non-agricultural sectors	102.11	86.01
No. of RDI employees in 10000 employed persons	102.44	21.69
% crop production value in total agricultural output value	99.25	100.1
Average of indicators from Group 4 (SI_4)	*101.27*	*69.34*
Rural competitiveness index (RCI)	***98.61***	***77.84***

***INT –NUTS 3 regions considered ‘Intermediate’ according to the rurality level.**
**** PR – NUTS 3 regions considered ‘Predominantly rural’ according to the rurality level.**
Source: not stated.

In 2014, overall, the PR counties are 22.1 per cent less competitive than the socio-economic system of Romania in its totality, while the counties that are considered IR from the rurality perspective are 1.4 per cent less competitive than the national average (Table 6). Moreover, there is a strong dependency between population density at county level (used as a proxy for the degree of rurality of the county) and rural competitiveness index calculated at NUTS 3 level (Figure 6); the correlation coefficient is 0.980. As a result, the first hypothesis advanced in our study has been confirmed, as it has been shown that a higher rurality level has a negative influence upon rural competitiveness.

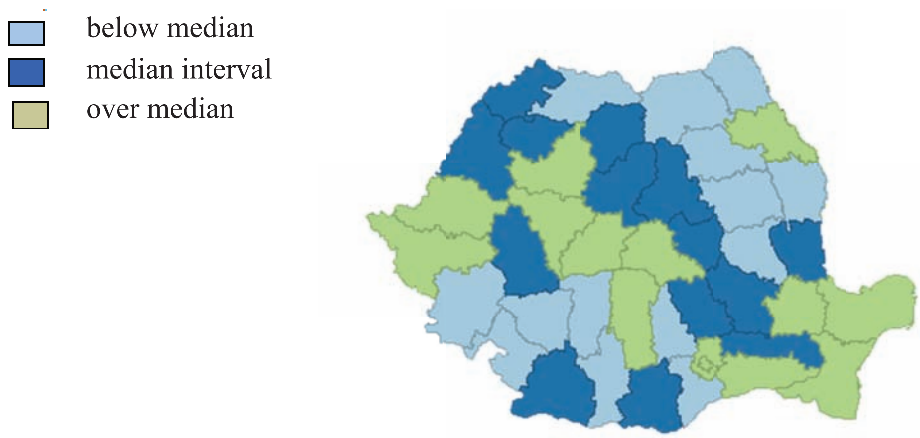


Figure 6. Rural competitiveness index at county (NUTS 3) level in Romania
Source: not stated.

The analysis of the four components (groups) of the Rural competitiveness index, as well as of the component indicators, reveals the strengths that contribute to the competitiveness of the two categories of NUTS 3 regions, as well as the weaknesses that make the PR regions have a lower competitiveness than the national average. Thus:

- comparing the intermediate indices of competitiveness, for each of the four groups of indicators, it results that in the two categories of counties, the NUTS 3 IR regions have positive competitive advantages compared to the PR counties;
- the comparative analysis between all the model parameters reveals that the PR regions have the weakest competitive performance for the group of indicators describing the *non-agricultural economy* for which the capacity of the economy of PR counties to face competition is 36.01 per cent lower than the national average. On the other hand, for the IR counties, the intermediate indicator of competitiveness for the group SI_2 has quite a similar value to that of the national average (the average of the indicators from the group *non-agricultural economy* accounting for 99.06 per cent of the national average);
- significant competitiveness disparities between the categories of regions are found for all the groups of indicators in the model, but, after the *non-agricultural economy*, the greatest differences are quantified in the case of indicators describing the *specialisation and innovation* for which the PR NUTS 3 regions have performances 30.66 per cent lower than the na-

tional average, while for overall IR counties, the intermediate indicator of competitiveness for the group specialisation and innovation (SI_4) has a value higher than the national average (1.27 per cent higher than the national average);

- the only parameters of the model for which the PR and the IR NUTS 3 regions have a relatively similar competitive performance are those from the *primary sector economy*, for which the competitiveness level represents 91.65 per cent and 92.13 per cent respectively of the national average;
- the factor that mostly determines the inter-category competitiveness differences between the economic components of the model (both of the primary economy sector and of the non-agricultural economy) is the value of exports. Thus, while the intermediate indicators of competitiveness (X_i) for the *value of exports* of the non-agricultural economy represents only 62.69 per cent for PR regions, in the case of IR counties the same indices reach 122 per cent of the national average. Moreover, there is a statistically significant correlation between rural competitiveness index calculated at NUTS 3 level and the export value both of the primary sector and economy of the non-agricultural economy (the values of the correlation indicators being 0962 and respectively 0733[1]). Figure 7 shows the regional disparities between the values of exports of non-agricultural sectors, on the one hand and agriculture on the other hand.
- by comparing all the indicators included in the model, the largest disparities between the PR and the IR regions are found between the intermediate indicators of rural competitiveness for Innovation, more exactly, in the case of the *number of RDI employees per 10,000 employed civilians*. Thus, while for the PR NUTS 3 regions, the intermediate indicator of competitiveness accounts for only 21.69 per cent of the national average, for the other category of counties, the competitiveness level in innovation is 102.44 per cent (Figure 8). Moreover, the degree of rurality (approximately by the population density at county level) is positively correlated with the density of the employees in RDI sector.

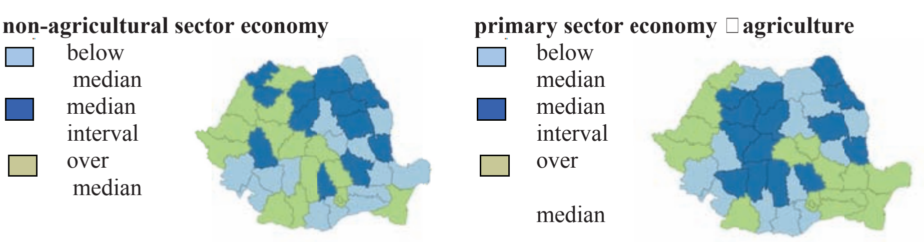


Figure 7. Value of exports at county level (thousand EUR)
Source: not stated.

[1] Correlation is significant at the 0.01 level (2-tailed).

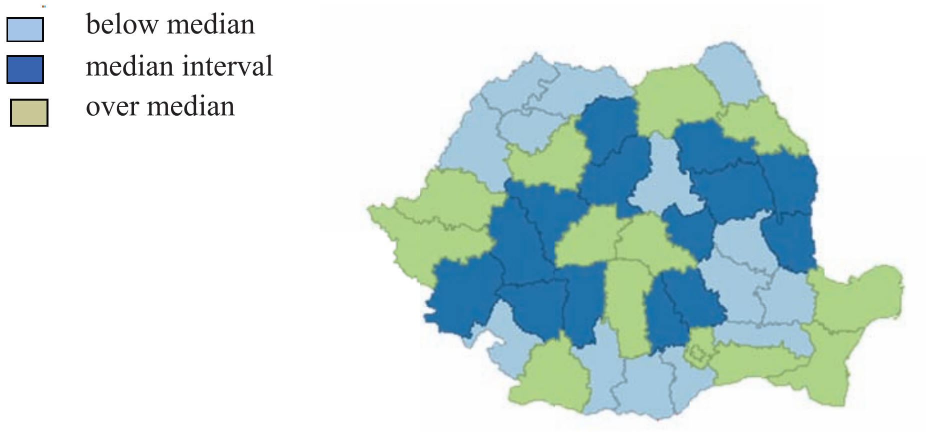


Figure 8. Territorial disparities between no. of RDI employees per 10000 employed persons
Source: not stated.

Consequently, innovative capacity is the factor for which the competitiveness disparities between the categories of regions are the most significant and this can be considered the main comparative advantage that leads to competitiveness increase in the investigated regions, making the difference between the PR and the IR regions. Thus, the second hypothesis of this study, namely that *the poor development of the RDI sectors at regional level significantly impacts the competitiveness level*, has been positively validated, also at national level.

Conclusions

Following the application of the competitiveness evaluation model, it results that the economies of the PR NUTS 3 level regions are less competitive than the economies of the IR regions. The application of the rural competitiveness evaluation model at the level of all counties in Romania in 2014 reveals that the factors that mostly contribute to the amplification of rural competitiveness territorial disparities between the two categories of NUTS 3 regions are the following:(1) the number of staff employed in RDI activities that ensures the comparative advantage of access to innovation and (2) the value of exports, in both the non-agricultural and agricultural economy, which certifies the competitive advantage of regional economies on the international markets. Our final conclusion is that, in order to increase rural competitiveness, measures are needed to improve the performance of the PR counties in the first place, with a priority focus on RDI sector development and innovation transfer in all the economic sectors.

References

Annoni, P., Dijkstra, L., 2013. *EU Regional Competitiveness Index RCI 2013*. Luxembourg: European Union.

Bojnec, Š., Fertő, I., 2009. *Agro-food trade competitiveness of Central European and Balkan countries*. Food Policy 34(5), 417-425.

EC, 2013. *Rural Development in the European Union – Statistical and economic information – 2013*. Brussels: European Commission

Eurostat, 2015. *Regional competitiveness statistics* [www document]. http://ec.europa.eu/eurostat/statistics-explained/index.php/Regional_competitiveness_statistics (accessed 1 December 2016).

Fogarasi, J., 2008. *Hungarian and Romanian agri-food trade in the European Union*. Management 3(1), 3-13.

IMD, 2015. *World Competitiveness Yearbook 2012*. Lausanne: International Institute for Management Development.

Mikuš, O., Franić, R., Grgić, I., 2012. *The evaluation of rural competitiveness in creating a policy of rural development in Croatia*. Journal of Food, Agriculture & Environment 10(2), 962-969.

OECD, 1996. *Industrial Competitiveness*. Paris: OECD.

Porter, M.E., 1990. *The Competitive Advantage of Nations*. Harvard Business Review, March-April 1990.

Sarris, A.H., Doucha, T., Mathijs, E., 1999. *Agricultural restructuring in central and eastern Europe: implications for competitiveness and rural development.* European Review of Agricultural Economics, 26(3), 305-329.

Thompson, N., Ward, N., 2005. *Rural Areas and Regional Competitiveness*. Newcastle upon Tyne: Centre for Rural Economy.

WEF, 2017. *The Global Competitiveness Report 2016-2017*. Genève: World Economic Forum.

*** NIS (2014) – *Farm Structure Survey*, 2013.

*** NIS, e-Demos database, http://edemos.insse.ro/portal/

*** NIS, TEMPO on-line database, http://statistici.insse.ro/shop/

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Economic and social changes in rural areas in Poland

Abstract: *Poland's accession to the European Union has had a significant effect on the socio-economic situation of rural dwellers. The quality of life in rural areas is worse than in the cities, which is primarily due to lower income of rural residents. Also, the level of expenditure is lower, mainly with respect to higher needs. The equipment of households with basic technical installations and durable goods, especially modern, is also worse in rural areas than in the urban areas. The rural population evaluates subjectively their quality of life as worse than the urban population and they also believe that the ability to satisfy their needs is worse than in the cities. Rural development policy should continue pursuing actions contributing to the development of entrepreneurship, renewal and development of villages, in order to ensure sustainable development of rural areas, also with regard to technical infrastructure, which contributes to improvement in the living conditions and the conditions of business operations of the inhabitants of rural areas. This will contribute to bridging a gap of economic and social disparities between urban and rural population.*

Keywords: *Poland, rural areas, economic and social situation*

Introduction

Rural areas in Poland occupy 90.3 per cent of the country. Over 15 million people (nearly 40 per cent of the population of Poland) live in villages. Poland's accession to the European Union (EU) in 2004 has had a significant effect on the socio-economic situation of rural dwellers. The level of schooling and educational activity changed significantly, and life expectancy has increased. In the past two decades the changes in lifestyles were accompanied by the development of information and communications technologies. The contribution of the agricultural sector, which employs only a certain number of people, to the rural economy has declined. These factors are important for social change in the Polish countryside. Besides these problems, the paper analyses the social activity of the rural population.

Over time, rural areas and their inhabitants underwent significant and multidirectional transformations. The Polish rural areas have always been characterised by the economic, social and intellectual diversity of their inhabitants. They were shaped by two basic directions of changes: on the one hand – 'the countryside was catching up with cities', and on the other hand – 'cities were moving to the countryside'. Improvement in the area structure of agricultural holdings and their adoption of new functions, as well as the progressing urbanisation processes and the accompanying phenomenon of dissemination to rural areas of the so-called urban lifestyle, changed rural areas and their inhabitants. However, despite the significant improvement, there are still disproportions between the countryside and the city, mainly in terms of the development of technical infrastructure (water and sewerage, gas, road and institutional infrastructures), as well as the standard of living of their inhabitants (Terziev et al., 2016).

Also, many farming families have more than one source of livelihood. Both employment opportunities and the amount of salary for non-agricultural work are important in the process of the shaping and distribution of the general budget of each family. In addition to agricultural income, they gain income from paid employment, pensions and annuities and self-employment. This trend is permanent. Income of rural and agricultural holdings is more and more dependent on a possibility of getting employment in the non-agricultural labour market and on the level of salaries in the national economy.

Methodology

The purpose of the study is to assess the economic and social situation of the rural population in the period 2005-2014. The study was conducted on the basis of the results of the European Survey on Income and Living Conditions (EU-SILC) and household budgets GUS[1]. Another source of information is the survey conducted by the Institute of Economics of Agriculture and Food –

[1] Budżety gospodarstw domowych w 2006 r. (2007), Budżety gospodarstw domowych w 2014 r. (2015), GUS, Warszawa.

National Research Institute in 2011 among nearly 8.5 thousand rural families, of which 3.3 thousand families had agricultural holdings with an area of more than 1 ha of agricultural land. Each time, the surveyed entities accounted for about one five hundredth of the actual number of individual agricultural holdings. Virtually, all surveyed farms (99.7 per cent) pursued agricultural activity. The assessment of the quality of life of the rural population was based on indicators characterising the objective living conditions (income, expenses, infrastructure, environment, housing and furnishings, educational activity) and subjective assessment. Basic indicators relate to individuals or households. As a basic working instrument, the descriptive analysis was applied using the quantitative and comparative methods, including the structure and intensity ratios of the analysed phenomena and growth rates.

Results

Income

Income is an economic guarantee to meet human needs. The average rural resident has an income below the average income per capita in the city. In the post-accession period, the ratio of rural income to urban income improved. In 2006, nominal available income of the rural population (average annual per capita) was PLN 659.3, which accounted for 69.8 per cent of income of urban residents; in 2014, it was at the level of PLN 1,067.4, and the share was 70.4 per cent (Household budgets in 2006, 2007, pp. 50 and 57; Household budgets in 2014, 2015, pp. 100 and 113).

In the post-accession period, the improvement in rural income in relation to urban income was primarily a result of a growth in available income in the countryside of 61.9 per cent, while in the city, on average, that growth was lower –60.6 per cent. An increase in income of rural families resulted mainly from the more than double growth of income from paid employment (from PLN 259 to PLN 527 monthly average per capita). Also, agricultural income rose but mostly in families with agricultural holdings, which resulted, inter alia, from financial support for agricultural holdings under the Common Agricultural Policy.

The primary source of income in rural areas is paid employment. In the structure of available income of the average rural household, the share of income from paid employment is the highest and in the analysed population it amounted to 39.4 per cent in 2006 and 49.4 per cent in 2014. In the compared years, in the shaping of the rural family budget, more important as a source of income was also self-employment (in the structure of income: 6.1 and 7.7 per cent respectively); of lower importance were work in agriculture and social benefits. The share of income from the individual holding in the structure of available income in 2006 was 14.1 per cent and in 2014 only 9.7 per cent; however, the share of income from social benefits was: 35.9 and 29.6 per cent respectively (Figure 1).

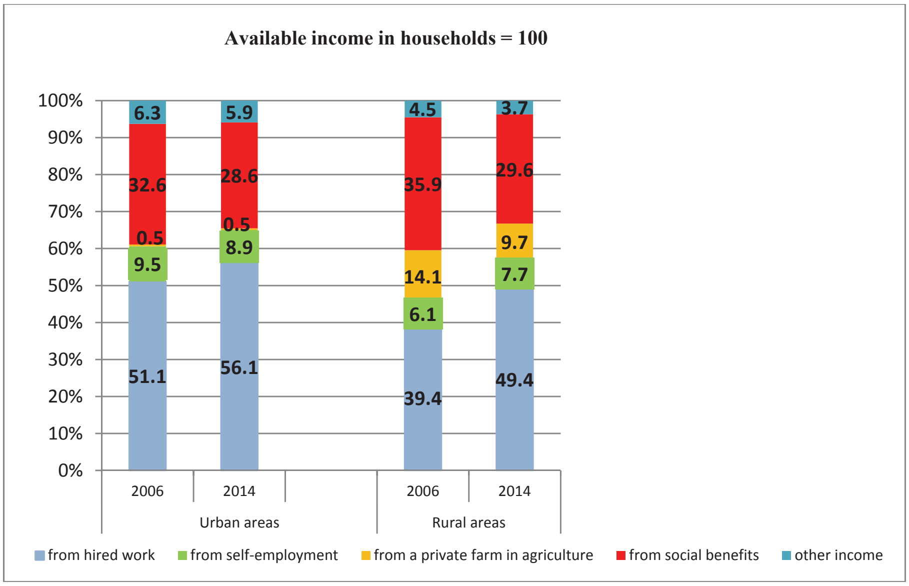

Figure 1. Structure of available income in Polish households by sources of acquisition in 2006 and 2014, in percentage terms

Data source: GUS.

After Poland's accession to the EU, incomes from agriculture increased relatively the most. In the structure of incomes of the rural population, incomes from employment constitutes a high share. The income growth was higher in rural than urban households. This growth was due to the improvement of farmers' income (EU subsidies). Currently, the rural migrants are not only old-age pensioners but also more often freelancers and managers (Zegar, 2015). The village becomes a place of residence for people employed in cities and towns, often with high incomes. This group contributes mainly to the growth in rural incomes, as well as to the prevalence of incomes from off-farm work over that from agriculture.

Expenditures

Another important indicator of quality of life is the expenditures to meet the basic needs. In the post-EU accession period (2006-2014), the overall level of expenditures (in current terms) increased (in rural areas by 45.2 per cent and in urban areas by 45.1 per cent). The expenditures of rural households accounted for 72 per cent of urban households. Since the accession to the EU these relationships have remained stable. In 2006-2014, the urban-rural disparities in spending on clothing, housing (equipment and maintenance), transport and communication, recreation and culture and restaurants and hotels decreased (Figures 2 and 3).

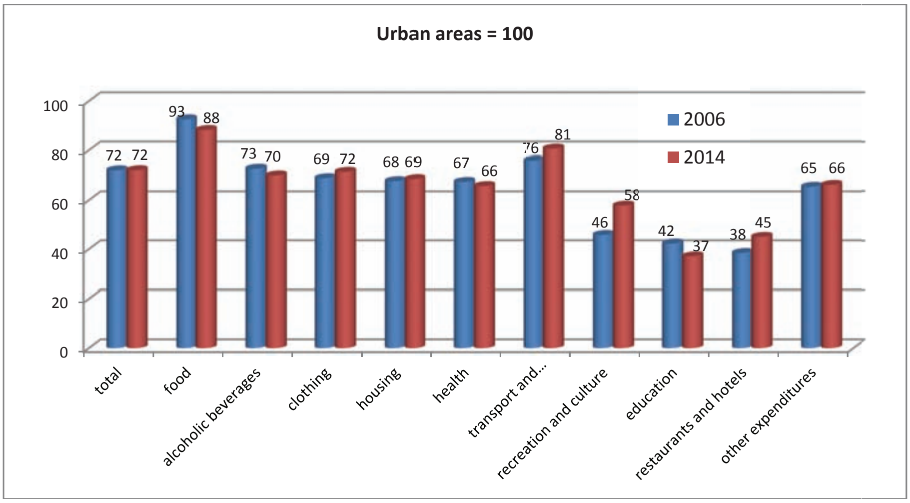

Figure 2. Structure of expenditures in Polish rural and urban households
Data source: GUS.

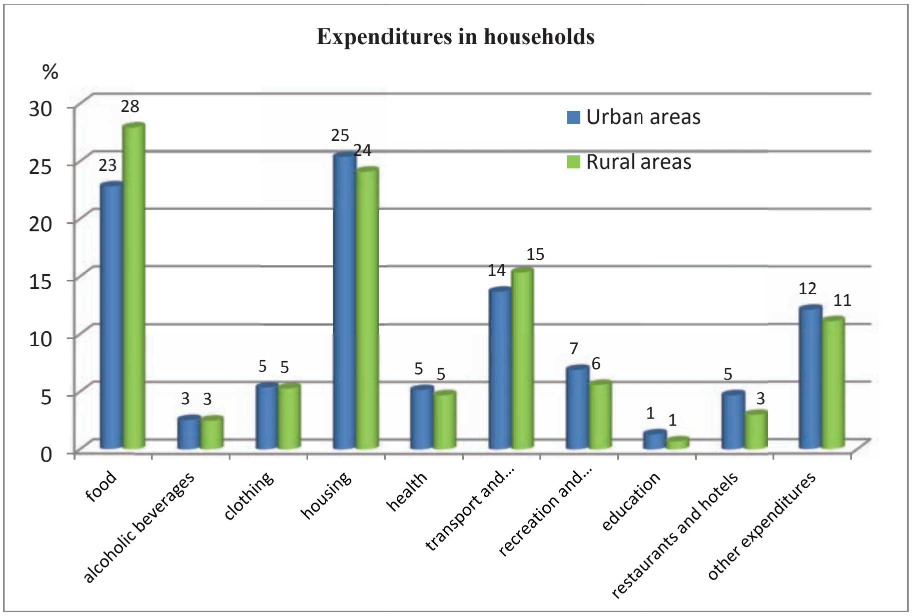

Figure 3. The structure of expenditure in Polish households, 2014
Data source: GUS.

Housing and equipment

From the surveys it results that, when compared to 2005, rural houses were better furnished with technical and sanitary installations in 2011. In the survey (in 2011), it was recorded that 87 per cent of the rural families had running water from the water supply, and 45 per cent of the families were connected to the sewage system. 93.4 per cent of the houses had bathrooms and WC and 7.4 per cent of the families had even their own backyard water treatment plant (Table 1). The farming families (i.e. those having agricultural holdings of more than 1 ha of Utilised Agricultural Area) were relatively better furnished with sanitary and technical installations than the landless households (Figure 4).

Table 1. Percentage of households (dwellings) of the rural population by furnishing with sanitary and technical installations in 2005 and 2011

Specification	2005	2011
Sewage system	22.5	45.0
Running water		
water supply	80.0	87.0
hydrophore	21.6	20.8
Boiler/domestic hot water	74.4	89.4
Bathroom	84.8	93.4
WC	82.3	
Central heating	73.7	85.7
Backyard water treatment plant	1.9	7.4

Data sources: IAFE-NRI Surveys, 2005, 2011.

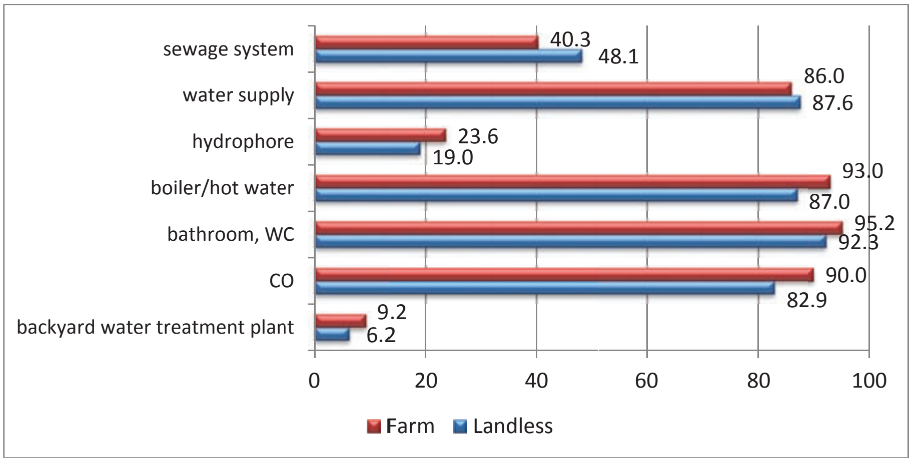

Figure 4. Furnishing of rural farming and landless households in Poland with technical and sanitary installations in 2011

Data source: IAFE-NRI Survey, 2011.

In Poland, more than 80 per cent of rural families live in single-family houses. They are equipped with running water (hot and cold), bathroom with bath or shower, flushable toilet and gas installation (often from a bottle rather than from the network). About 5 per cent of the rural population live in single-family homes in terraced houses, the remaining 12-13 per cent live in buildings with multiple dwellings (Table 2). In the countryside the life quality level in terms of infrastructural facilities has increased. Still, the percentage of apartments with access to water, sewage and gas systems is lower in rural areas than in the urban areas.

Table 2. Housing situation in Polish rural areas (% of households)

Item	2006	2014
Single Family Detached	81.2	82.4
Single Family Row	4.8	5.4
Faucet with cold running water	93.1	97.3
Bathroom with bath or shower	81.8	91.6
Gas cylinder	72.6	73.7

Data source: GUS.

Furnishing of rural households with durable goods is, in addition to the level of income they obtain, an important factor that informs about the level and quality of life of the surveyed population. These goods are consumption goods with a long period of use, and the duration of their use depends on the type of needs that satisfy and the speed of their consumption, and often also on their quality and workmanship. Rural families possess the most modern and prestigious durable goods (home cinema sets, DVD player) less frequently than urban families. Rural families possess the more traditional equipment (landline telephone, refrigerator) or very useful on the farm, like a car, which in rural areas is the primary means of transportation (Table 3). From the point of view of the spatial dispersion of villages and specific transport difficulties, it is also very important to have vehicles. In rural areas, having a car was relatively common. Also, with regard to furnishing with the vehicles, the situation has improved when compared to 2005. In general, in 2011, almost one-third of the families had vehicles, and almost every tenth had even two cars. The farming families were slightly better furnished with cars than the landless families (Table 4). However, those vehicles were generally more than ten years old. The average age of a car in 2011 was 11.6 years, regardless of the status of the rural family.

Table 3. Furnishing of Polish rural households with the selected appliances and devices (% of households)

Item	2006	2014
Mobile phone	66.5	89.9
Home theater system	10.0	20.6
Satellite TV or Cable TV	29.1	66.1
Computer	34.3	68.9
Internet Connection	15.1	66.2
Car	57.4	74.0

Data source: GUS.

The ability to use information has become a prerequisite for economic and cultural development. In addition, access to modern information media eliminates many difficulties and limitations related to the distance and spatial dispersion (Kowalski, 1998). Currently, a factor which to the greatest extent differentiates rural equipment in relation to urban equipment is to have a computer and Internet access, although the changing reality and a number of conditions in a specific way enforce the use of a computer and the Internet to an increasing extent. It should be stressed, however, that in rural areas this situation has clearly improved in recent years.

Table 4. Cars in Polish rural families in 2005 and 2011

Rural families	Percentage of the families having	
	car	two cars
2011		
TOTAL	63.5	9.7
Farming	77.9	12.2
Landless	54.1	8.1
2005		
TOTAL	54.0	6.4
Farming	69.5	9.5
Landless	42.3	5.3

Data source: GUS.

The presence of a computer has been recorded in 59.9 per cent of the rural families. Almost all of these families also had access to the Internet. Relatively better access to those media and devices was held by the farming families rather than by the landless families. In 2011, more than two-thirds of the farming families had a computer while in the landless families – more than half. The surveys also show that the farming population, more often than the landless population, uses computers and the Internet for professional activities. In every third farming family, a computer and access to the Internet were used to pursue the economics of agricultural activity and among the landless families that figure was lower (Figure 5). In this case, just every eleventh family used a computer and the Internet for economic activity, mainly to contact customers. The farming families relatively often logged onto the websites of the MARD and ARMA, in addition, half of the families logged onto the websites of the AMA, slightly less often onto the websites of the APA, ASIF and agricultural portals, and only almost every tenth landless family visited those websites. Farmers treat these devices in a more professional way. The use of the Internet in the professional activities of farmers translates into the benefits and effects of their production activities.

54.4 per cent of the total population of the surveyed villages rated positively the furnishing of their houses, a little over a third considered it average and only less than one fifteenth considered it bad. This rating was relatively better in case of the farming families (Figure 6).

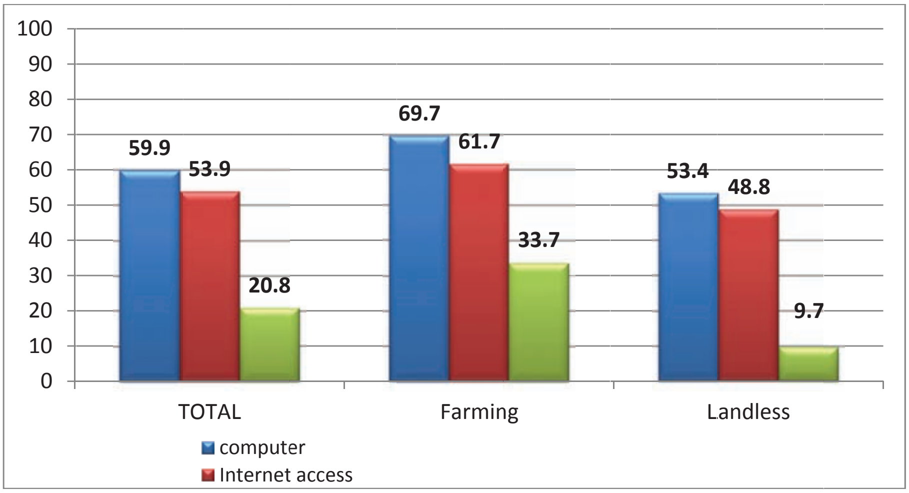

Figure 5. Computers, Internet access and use of computers in the Polish countryside in 2011

Data source: IAFE-NRI Survey, 2011.

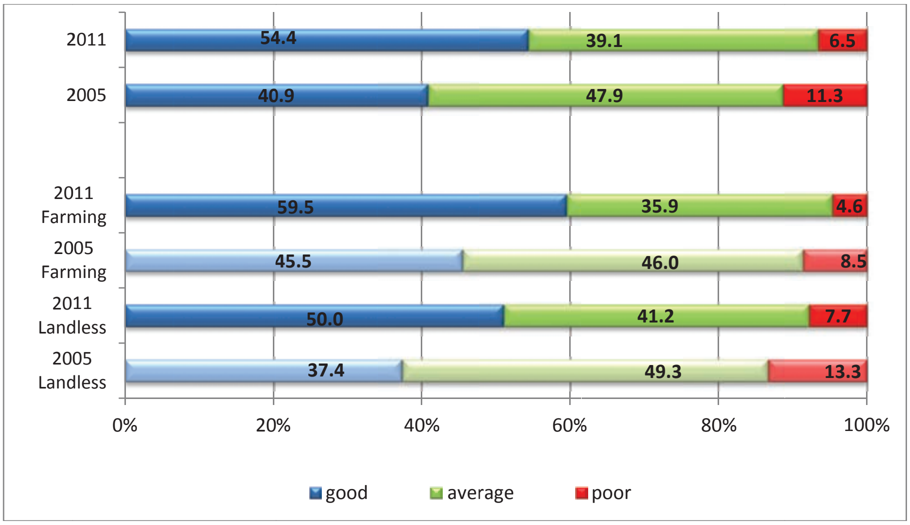

Figure 6. Furnishing of Polish households with durable goods – as rated by the rural residents

Data sources: IAFE-NRI Surveys, 2005, 2011.

In total, when compared to 2005, there was an increase in the percentage of the families which rated positively their furnishing with durable goods. The farming families rated their furnishings better than the landless population. In the past, it was the landless population which adopted the urban patterns in the countryside, now the situation is changing.

The major deficiencies in households and a specific difficulty in the work related to the household were indicated in 48.5 per cent of the surveyed families. Those deficiencies related mainly to technical infrastructure – no sewage system in the case of 11.6 per cent of the families, the absence of central heating and bathrooms was reported less often (less than every twentieth family reported such difficulty). In the household, the work was made most difficult by the lack of a dishwasher (11.6 per cent of the responses). In nearly every twentieth family, the lack of a washing machine made its functioning difficult.

Health condition[2]

Factors affecting the health of society can be grouped into those that result from the conditions of the surrounding environment, i.e. those associated with both the environmental situation, working conditions and with healthcare infrastructure. At the same time, health is directly affected by health behaviour and lifestyle of society. In defining the determinants of the health condition of the rural population, account must also be taken of the very nature of work of those engaged in agriculture, which is characterised by a variety of activities performed during the day, various working conditions, irregular working hours – often 10-12 hours per day, resulting in different meal times. Negative factors also include unfavourable climatic conditions, such as continuous temperature changes, sunlight, air humidity variations or winds.

In rural areas, there are many fewer healthcare institutions and consequently the number of people per such facility is almost twice that in urban areas (Table 5). Also the number of medical visits per 100 inhabitants in rural areas is much lower than in urban areas (Table 6). However, it should be emphasised that, although slowly, the situation has improved in the last decade. Although the number of dental visits per capita is still much lower in rural areas, it should be noted that this value is relatively low also among the urban population.

Table 5. Number of people (in thousand) per healthcare facility in Polish rural and urban areas in 2006-2014

Item	2006	2014
Rural areas		
Per healthcare facility	4.6	3.4
Per doctor's office	9.6	9.8
Urban areas		
Per healthcare facility	2.6	1.6
Per doctor's office	3.9	5.2

Data source: GUS.

[2] In the Constitution of 1948, the World Health Organisation (WHO) defines health as: "a state of complete physical, social and mental well-being, and not merely the absence of disease or infirmity". In recent years, this definition has been extended by: "leading a productive social and economic life".

Table 6. Number of visits in healthcare facilities and doctor’s offices per one hundred persons Polish in rural and urban areas in 2006-2014

Item	2006	2014
Rural areas		
In total, in healthcare facilities	252.1	310.2
Medical facilities	237.9	274.7
Dental facilities	14.3	35.6
As part of private medical practice	34.3	22.5
Urban areas		
In total, in healthcare facilities	859.4	1118.3
Medical facilities	793.3	997.9
Dental facilities	66.1	120.4
As part of private medical practice	75.7	50.7

Data source: GUS.

From the point of view of the rural population, not only the number of healthcare facilities is most important, but above all, their spatial distance, i.e. their proximity to a place of residence and how long it takes, if need be, to get to them. The IAFE-NRI surveys show that in 2011, only 12 per cent of villages provided access to pharmacies, 14.5 per cent to doctors’ surgeries, and 13.2 per cent to clinics (health centres). However, the inhabitants of nearly half of the villages surveyed had to travel at least 5 km to reach a specific facility (Table 7). According to the IAFE-NRI surveys almost half of the respondents declared that their needs concerning the health care were met (Figure 7).

Table 7. Spatial accessibility of healthcare facilities in Polish villages surveyed in 2000-2011 (%)

Year	In rural areas	1-2 km	3-4 km	5 km and more
Pharmacies				
2005	16.3	8.0	32.0	44.0
2011	12.0	9.3	28.0	50.7
Doctors’ surgeries				
2005	13.1	9.2	30.3	47.4
2011	14.5	6.5	30.3	48.7
Dentists’ surgeries				
2011	13.2	7.9	29.0	49.9
Clinics				
2005	13.1	7.9	31.6	47.4
2011	13.2	9.2	30.3	47.4

Data source: IAFE-NRI, Survey 2011.

All the aforesaid positive changes related to healthcare in rural areas and environmental values (own food, fresh air, recreation opportunities), as well as physical effort constantly required in the course of work make, as already stated, the rural population live long compared to the urban population (Stoeva and Valcheva, 2016). Moreover, life expectancy increased significantly during the survey period. In 2014, rural areas were inhabited by over 1.5 million people aged 70+, including 556 thousand people aged 80+. In recent years, the size of this group has increased (by 120 thousand people compared to 2005). Providing care to those people, including actions not only at the family level, but above all, at the level of local authorities, is clearly a problem.

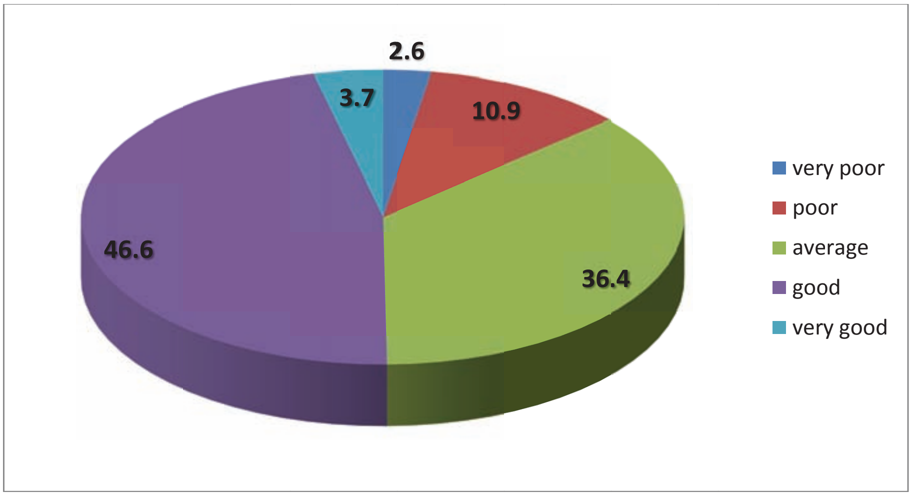

Figure 7. Assessment of the needs of the Polish rural population concerning medical care

Data source: IAFE-NRI Survey, 2011.

It should also be emphasised that, at the same time, the infant mortality rate significantly decreased in rural areas and its level in 2014 was comparable to that of urban areas (4.8 in rural areas compared to 4.5 in urban areas). In 2005, their values in rural and urban areas reached 6.5 and 6.3 respectively.

The causes of death in both urban and rural communities are also similar. Thus, its structure is dominated by cardiovascular diseases (nearly half of deaths) and cancers (nearly one quarter of deaths). In recent years, numerous factors were observed in the rural environment, which adversely affect the level of stress among this population group[3]. These factors include not only the changing economic situation in Poland and worldwide, but also unpredictable weather, time pressure, unpredictable events (natural disasters), government decisions (regulatory developments), the price volatility of products, difficulties in selling products, as well as the geographical isolation of farmers. Agricultural holding managers are a group of farmers that are subject to intense stress, as they are mainly the ones responsible for the state of their agricultural holdings. In consequence, all of these factors causing long-term stress lead to behaviour which significantly reduces the level of work safety[4] and may contribute to other health problems.

[3] In accordance with the U.S. National Institute for Occupational Safety and Health (NIOSH), the agricultural profession is among the top ten of (130 surveyed) most stressful professions.

[4] In accordance with GUS statistics, in 2014, mental or physical stress caused 9.8 per cent of recorded workplace accidents in agricultural holdings, Rocznik Statystyczny, GUS 2015, Dział VI. Rynek pracy.

Conclusions and summary

Economic and social situation (quality of life) in rural areas is worse than in the urban areas. This is mainly due to the lower incomes of the rural population. In the post-EU accession period (2006-2014) income relationships between the rural and urban population improved in favour of the former. In rural areas agriculture is increasingly less important as a source of income. The tendency of increasing share of income from employment in the structure of income of rural population is permanent.

Rural population and farming families spend more of their income to meet basic needs (food, clothing and footwear, transport and communications) than urban households; and less on other needs (education, recreation and culture). In 2006-2014 the disparities in the level of spending between rural and urban areas decreased in favour of the former.

The level of equipment of households with basic technical systems (mainly sewerage and gas) and durable goods, especially modern (Internet, satellite and cable TV) was higher in urban areas than in rural areas. In rural areas the quality of road infrastructure and transportation was relatively lower. Therefore, the rural residents have more difficult access to basic services and new technologies.

In rural areas, there are many fewer healthcare institutions and consequently the number of people per such facility is almost double that in urban areas. Also the number of medical visits per 100 inhabitants in rural areas is much lower than in urban areas. However, it should be emphasised that the situation has improved in the last decade, albeit slowly. All the aforesaid positive changes related to healthcare in rural areas and environmental values (own food, fresh air, recreation opportunities), as well as physical effort constantly required in the course of work make, as already stated, the rural population live long compared to the urban population. Moreover, life expectancy increased significantly during the survey period. The health condition and health predispositions of society are also supported by other processes conditioning progress and opportunities for the socio-economic development of the country. Good health condition is directly reflected in commitment and performance of an individual, his/her educational achievements, all of which translate into achieving social well-being.

Taking into account the basic indicators of life quality of household, the level and changes in income, expenditures, housing condition, health condition and technical infrastructure in rural areas, the research results indicate that after Poland's accession to the EU the general situation of the rural population has improved much more than in urban areas. But still in the case of rural areas significant disparities remain. The biggest gap is compared to the urban centres and cities. The rural population evaluates their quality of life lower than the urban population (as well as the possibility of meeting the needs).

Lowering the gap between the rural and urban quality of life requires, above all, the income situation improvement of the former, as well as the widely-understood sustainable rural development. In rural areas it is necessary to improve the road infrastructure and access to water, sewage and gas systems, which will not only facilitate the everyday life of people, but also will contribute to the creation of new jobs, mainly in services, trade and small and medium-sized enterprises.

References

Kowalski A., 1998. *Społeczne uwarunkowania rozwoju wsi i rolnictwa* [Social conditions of rural development and agriculture]. Studia i Monografie, nr 85. Warszawa: IERiGŻ-PIB.

Stoeva T., Valcheva E., 2016. *Regional characteristics and tendencies related to the agricultural development of the South central region*. Prospects for development of education and science, Plovdiv, Bulgaria, 2016, 6-9.

Terziev, V., Bencheva, N., Stoeva, T., Tepavicharova, M., Arabska, K., 2016. *Instytucjonalna podkrepa na socjalnoto predprijemachestvo* [Institutional emphasis on socjalnoto predprijemachestvo]. MGI 'Sv. Ivan Rilski', Sofia Godisznik 59(IV), 64-70.

Zegar J.St., 2015. *Przesłanki i uwarunkowania zrównoważonego rozwoju rolnictwa i obszarów wiejskich* [Rationale and determinants of sustainable development of agriculture and rural areas]. In: J.St. Zegar (ed.), Z badań nad rolnictwem społecznie zrównoważonym (31)., Monografie Programu Wieloletniego 2015-2019, Nr 6, Warszawa: IERiGŻ-PIB.

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The economic context of climate change impacts and an evaluation of the impacts of the proposed adaptation measures in the South Moravian region of the Czech Republic

Abstract: *The problem of climate change was the subject of the project EEA-CZ02-OV-1-039-2015, which was carried out by partners from the Czech Republic and Norway. Cost-benefit analysis was applied for 36 cadastral units where co-investigators suggested adaptation measures on the impacts of drought, erosion, retention and torrential rains. Costs were investments for the creation measures, and loss of production from the area where the action was on the arable land. Benefits were based on reducing the negative impacts of climate change and ecosystem services. The results of the analysis clearly showed that the implementation of adaptation measures could bring societal benefits beyond the cost of the measures. Net social benefits at current value are estimated at nearly CZK 55 million for the 2017-2040 timeframe while maintaining the current situation and implementing measures. Finally, the project develops a comprehensive strategy to harmonise and link the partial conclusions into the linkages and ensuring the synergy effect of different types of instruments (e.g. economic, legislative, planning approach).*

Keywords: *cost-benefit analysis, cadastral units, societal benefits*

Introduction

The objective of the ÚZEI research team in the project EHP-CZ02-OV-1-039-2015 "Complex planning, monitoring, information and educational tools for adaptation of territory to the climate change impacts with the main emphasis on agriculture and forestry management in the landscape" (abbreviated AdapdaN) was to evaluate the economic impacts of proposed adaptation measures through cost-benefit analysis (CBA). The evaluated adaptation measures were focused on the mitigation of impacts of climate change in 36 cadastral units within the South Moravian region of the Czech Republic. The economic analysis builds on the data processed by other researchers in the AdaptaN project, including Brno University of Technology, EKOTOXA, s.r.o. and the T.G. Masaryk Water Research Institute. The proposed adaptation measures are from the group of close measures which eliminate mainly negative impacts of torrential rain, soil erosion and thereby topsoil runoff from lands and surroundings, and loss of nutrients in the soil. Other possible influences and impacts of the measures were considered which, however, were not addressed due to lack of time.

Methods

CBA works with a set of assumptions and limitations; in an ideal data environment the effort is made to express all costs and benefits in the monetary value. CBA in this case included the overall costs and benefits[1] for farmers, land owners, administrators as well as for other users of land and soil ecosystems. CBA works with indicators, where one of the key indicators is the "Net Present Value" (NPV). The indicator calculates only with the future cash flow. It says how much money will a given project actually bring or take within a selected lifetime. Thus, it is not focused on accounting items, such as revenue or costs or some future value of a company, but it solves only the cash flow which a given investment or generally any project/measure will bring. The NPV is more suitable for a short-term and medium-term period for the evaluation of tactic activities of a company.

In the case of the introduction of a new technology, which will be in operation for x years, the NPV will help to evaluate whether to opt for it or, if there are more variants, it advises which one to choose. In individual variants there is the expression of the NPV of social benefits until the year 2040[2]. In order to evaluate results, the method of net benefit of measures and the cost benefits ratio is most often used. The net benefit of measures is usually expressed in the absolute value by the NPV:

$$NPV = \sum_{t=1}^{n} \frac{(B_t - C_t)}{(1+r)^t} \qquad (1)$$

[1] Which were possible to be found out and transferred to financial flows = monetarised.

[2] In the case of this project it was 25 years.

where the NPV is the net present value, Bt are benefits in the year t, and r is the interest rate. To accept a measure, the NPV must be higher than zero. If more variants meet this condition, the one with the highest NPV is chosen.

Besides costs and benefits, which are quantified and expressed in the monetary value, there are also specific categories stated for every variant which are not expressed in the monetary value. Given that financial resources lose their value with time, costs as well as benefits are burdened by a discount coefficient, which adjusts financial values to a current value during the whole time of monitoring of costs and benefits. Thus, the results partially depend on a used discount rate.

Within the project AdaptaN, which included evaluation of very similar examples of impacts of climate change and adaptation measures in 36 cadastral units, sensitivity analysis (Macháč, 2016) was carried out and the discount rates of 1, 4 and 8 per cent were tested. It was shown here that the most suitable discount rate for this period of evaluation (24 years) was 4 per cent.

A discount factor is calculated per a formula:

$$\text{Discount factor} = \frac{1}{(1+r)^t} \qquad (2)$$

where r is the discount rate and t is the project duration (maturity).

In this analysis, four basic variants were chosen, which were based on the realisation of measures and the state of climate change, and they are explained below. The process of work was as follows:

- The first task in this economic evaluation is dedicated to the identification and qualification of costs and benefits;
- Next, there follows a phase of quantification of costs and benefits from the measure in natural units from more resources;
- Discounting of costs and benefits was carried out according to a work document (or process) compiled by Slavíková (2016);
- The prepared materials subsequently enter into individual variants, for which there are evaluated costs and benefits shown below;

The economic evaluation by the CBA then leads to the conclusion, completion of qualitative costs and benefits;

- The basic criterion for the creation of variants is an optional condition, when a farmer considers an option, if he/she implements a measure or not. The second criterion is not dependent on the decision of the farmer; it works with the assumption whether a climate change will occur or not. The chosen variant of climate change is based on a median of contemplated variants of climate models (Trnka et al., 2015).

The four variants used were as follows:

- Variant 1: *without measures; without change of climate*. It does not consider the realisation of any measures, it counts with maintaining of the current situation, i.e. it ignores potential impacts of climate change, it includes only current risks;
- Variant 2: *without measures; with change of climat*e. It does not consider the realisation of any measures, it counts with impacts of climate change;
- Variant 3: *with measures; without change of climate*. Considers the realisation of measures proposed in 36 cadastral units and it counts on maintaining of the current situation, i.e. it ignores potential impact of climate change, it includes only current risks;
- Variant 4: *with measures; with change of climate*. It considers the realisation of adaptation measures proposed in 36 cadastral units and it counts with impacts of climate change.

Within the requirements of the project a comparison of overall costs and benefits expressed in the present value to 1 July 2016 was carried out with the time horizon until the year 2040. The condition of climate change could work only with selection of impacts in the calculation. More precisely, it meant that impacts were measured as changes in soil compaction, increase of proposed rainfall in the calculation of erosion and decrease of water retention in soil. The calculation of CBA used did not use directly model processing of climate change during the whole period, but it used data in the actual situation (2016) and after 25 years with or without the realisation of measures (2040). Subsequently, there was a decomposition of impacts of climate change linearly through individual years in order to avoid the necessity to determine the year when there will occur a step change from the current state to a state corresponding with impacts of climate change subjectively.

Results

The overview of impacts of erosion of agricultural land for chosen terriers provided data about erosion losses for variants of the current state (2016) and climate change (2040). In Table 1, differences of values are stated in tonnes per hectare per year which it retains due to the adaptation measures per the used model for the calculation of erosion – USLE. Impacts of measures were expressed in overall amounts per terrier and per pilot area. The overall pilot area was 34,434 ha of fertile ground, vineyards and orchards.

For the calculation of costs, it was necessary to quantify the proposed realisations of individual measures in individual cadastral units. In the monitored area, ten types of measures were evaluated within the economic analysis:

- Exclusion of erosion dangerous crops including maize, other crops without limitation (VENP);

- Exclusion of erosion dangerous crops, in the crop rotation there will be no maize, but other crops will be grown in contour lines and without ploughing until there is mulch after harvesting (VENP2);
- Maize grown to cover crops, other crops without limitation (AGT);
- Maize grown to cover crops, other crops will be grown in contour lines and without ploughing until there is mulch after harvesting (AGT2);
- Grassing;
- Afforestation;
- Stabilisation of pathway of concentrated runoff (PCR);
- Dam;
- Furrow;
- Retention area.

Data about areas of individual measures within the researched area are shown in Table 2. Based on these measures, three categories of relevant costs were identified. Besides the initial investment costs, operational costs as well as opportunity costs were included in the evaluation. This division of costs is commonly applied in the processing of CBA. The data resources were the realised measures with similar parameters, professional studies, catalogues of building works and market research in the form of non-binding inquiry. Opportunity costs of the concerned area caused by the realisation of measures on arable land (e.g. building of furrow or grassing) were calculated based on the contribution to cover fixed costs and profit from the concerned cultivation.

Within the AdaptaN project, there was the monetarisation of five types of benefits which occur in the case of the realisation of measures and they de facto decrease the negative impact caused by water erosion and low retention of water in soil. It included the additional benefits from:

- Cost savings from recovering of washed down topsoil back on land blocks;
- Cost saving from removal of topsoil washed down from water streams and reservoirs;
- Cost savings from lost soil;
- Replacement of nutrients;
- Savings from irrigation thanks to higher retention of water in the landscape.

The process of discounting included costs for solving erosion, benefits stemming from the realisation of measures in the form of reduced erosion activity and decrease of quantity of soil which is washed down, and thus to lower costs for solving erosion. In the case of water retention, it was cost of irrigation in the scope of water volume which will be retained by the realised adaptation measure. The amount of partial benefits per one effect in prices of the year 2015 is based on the ÚZEI methodology within the AdaptaN project (Table 3).

Table 1. Statistics of erosion in 36 cadastral units of the pilot area (quantity of soil runoff in tonnes per hectare per year)

Name of cadastral unit	variant 1	variant 2	variant 3	variant 4	difference 1 and 3	difference 2 and 4
		Climate change		*Climate change*		*Climate change*
Archlebov	22.3	47.2	2.8	5.7	19.5	41.5
Bohumilice	28.9	63.0	3.8	8.1	25.1	54.9
Boleradice	29.8	63.0	2.0	4.0	27.8	59.0
Bořetice u Hustopečí	15.4	31.1	2.6	4.9	12.8	26.2
Brumovice	16.5	34.6	2.6	5.2	13.9	29.4
Čejkovice	21.3	45.7	2.4	5.2	18.9	40.5
Dambořice	21.2	45.7	4.3	9.0	16.9	36.7
Dolní Bojanovice	6.9	13.2	2.4	4.2	4.5	9.0
Dubňany	1.7	2.8	1.0	1.7	0.7	1.1
Hodonín	1.0	1.6	0.6	1.0	0.4	0.6
Horní Bojanovice	35.2	76.2	1.9	4.2	33.3	72.0
Hrušky	1.4	2.3	1.0	1.7	0.4	0.6
Josefov u Hodonína	8.1	15.6	1.9	3.4	6.2	12.2
Kašnice	19.7	42	3	6.4	16.7	35.6
Klobouky u Brna	28.6	61.4	2.7	5.5	25.9	55.9
Křepice u Hustopečí	14.3	31.6	5.1	11.4	9.2	20.2
Ladná	1.3	2.3	0.7	1.2	0.6	1.1
Lovčice u Kyjova	24.4	51.3	3.0	6.2	21.4	45.1
Lužice u Hodonína	1.5	2.5	0.7	1.1	0.8	1.4
Mikulčice	1.5	2.6	0.9	1.6	0.6	1.0
Moravská Nová Ves	2.7	5.2	0.9	1.6	1.8	3.6
Moravský Žižkov	2.7	4.7	1.5	2.5	1.2	2.2
Morkůvky	26.0	54.2	3.6	7.2	22.4	47.0
Mutěnice	13.3	26.2	2.6	4.8	10.7	21.4
Nikolčice	10.9	23.4	2.8	5.8	8.1	17.6
Nový Poddvorov	12.6	22.8	3.2	5.5	9.4	17.3
Prušánky	6.3	10.5	1.6	2.7	4.7	7.8
Ratíškovice	1.9	3.1	0.5	0.9	1.4	2.2
Rohatec	1.1	1.8	0.7	1.2	0.4	0.6
Starý Poddvorov	17.3	31.5	3.2	5.8	14.1	25.7
Terezín u Čejče	11.8	23.4	1.9	3.7	9.9	19.7
Tvrdonice	2.5	5.0	0.8	1.4	1.7	3.6
Uhřice u Kyjova	24.2	50.7	4.2	8.6	20.0	42.1
Velké Hostěrádky	31.7	70.3	3.1	6.8	28.6	63.5
Vrbice u Vel. Pavlovic	23.0	44.6	3.5	6.9	19.5	37.7
Ždánice	22.1	47.1	2.2	4.4	19.9	42.7

Source: own data.

Table 2. Areas that are considered for partial measures in individual cadastral units (in ha)

Name of cadastral unit	VENP	VENP2	AGT	AGT2	Grassing	Afforestation	PCR	Dam	Furrow	Retention area
Archlebov	35.3	5.3	177.6	99.3	31.6	0.0	1.5	3.9	0.7	7.1
Bohumilice	8.9	69.4	38.8	44.8	38.0	0.0	1.1	0.5	0.0	9.9
Boleradice	0.0	0.0	29.8	112.0	76.3	0.0	6.8	0.5	0.0	2.7
Bořetice u Hust.	107.1	17.5	82.1	0.0	13.5	0.0	3.0	0.0	0.0	0.0
Brumovice	0.0	17.7	150.4	81.7	33.6	0.0	4.0	1.9	0.0	1.1
Čejkovice	114.8	127.0	151.4	630.4	13.9	0.0	16.8	2.6	1.2	48.1
Dambořice	0.0	0.0	49.8	434.8	37.4	0.0	7.8	6.1	1.0	11.8
Dolní Bojanovice	71.4	14.5	52.0	0.0	0.0	0.0	0.0	0.0	1.1	32.0
Dubňany	163.5	0.0	92.0	0.0	0.0	0.0	3.8	0.0	1.4	12.4
Hodonín	23.1	0.0	103.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0
Horní Bojanovice	0.0	0.0	26.1	27.9	3.6	0.0	0.0	0.0	0.0	23.1
Hrušky	34.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	10.9
Josefov u Hod.	29.7	0.0	101.3	0.0	0.0	0.0	0.0	0.4	1.2	19.2
Kašnice	0.0	0.0	15.5	47.6	0.0	0.0	0.6	1.0	0.2	7.6
Klobouky u Brna	3.1	50.3	225.7	336.8	98.9	0.0	8.9	12.3	0.5	12.5
Křepice u Hust.	0.0	20.9	113.4	47.9	4.2	0.0	6.9	1.6	0.2	3.1
Ladná	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lovčice u Kyjova	0.0	0.0	115.0	234.0	22.6	0.0	3.6	2.2	0.1	4.1
Lužice u Hod.	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0
Mikulčice	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Moravská N. Ves	0.0	0.0	184.5	0.0	0.0	0.0	0.0	0.0	0.0	7.4
Moravský Žižkov	10.2	0.0	105.9	0.0	0.0	0.0	0.0	0.0	0.0	2.6
Morkůvky	0.0	75.5	28.6	167.6	6.1	0.0	3.6	0.5	1.1	1.8
Mutěnice	11.9	0.0	471.9	304.9	15.0	0.0	8.4	4.1	0.0	24.2
Nikolčice	9.7	14.6	226.9	73.4	22.3	0.0	6.6	2.6	0.1	2.8
Nový Poddvorov	38.0	20.6	111.5	14.3	0.0	0.0	1.6	0.0	0.0	1.0
Prušánky	197.8	44.8	16.7	23.8	0.0	0.0	3.4	0.0	0.0	9.2
Ratíškovice	76.2	0.0	6.0	0.0	0.0	0.0	0.9	0.3	2.0	5.6
Rohatec	11.7	0.0	86.5	0.0	0.0	0.0	0.0	0.0	0.0	2.3
Starý Poddvorov	5.1	78.5	67.0	28.9	0.0	0.0	3.2	0.3	0.0	3.3
Terezín u Čejče	12.7	0.0	152.0	7.0	26.7	0.0	2.4	0.0	0.0	11.3
Tvrdonice	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uhřice u Kyjova	0.0	0.0	91.7	274.0	3.6	0.0	5.5	7.3	0.7	2.3
V. Hostěrádky	0.0	18.5	19.9	70.9	25.2	0.0	1.0	1.1	0.3	13.1
Vrbice u Velkých Pavlovic	2.1	8.6	97.4	186.8	0.0	0.0	10.9	3.0	0.3	13.5
Ždánice	0.0	0.0	84.9	188.6	165.8	0.0	4.1	1.4	1.3	13.9
Total	967.0	583.7	3,275.2	3,437.3	638.3	10.0	116.1	53.3	14.4	319.8

For abbreviations see text.
Source: own data.

Table 3. Amount of partial benefits (costs) in prices of the year 2015

Benefit/costs connected with:	**Amount**
Restoration of washed down topsoil back on land blocks	CZK 204 per tonne
Removal of washed down topsoil from water streams and reservoirs	CZK 650 per tonne
Purchase of lost soil	CZK 205 per tonne
Replacement of nutrients	CZK 5,188 per tonne
Water retention in the landscape	CZK 7 per m^3

Source: Slavíková (2016).

The total current costs for the realisation of the ten measures in the researched area were CZK 4.45 billion (variants 3 and 4). Costs of the realisation of measures were significantly different between individual cadastral units depending on types of measures, area on which they were realised, the total size of a cadastral unit. Costs connected with erosion were in all cases included in costs within the CBA, in benefits there were saved costs, which occur thanks to the realisation of adaptation measures. Thus, benefits include the difference between costs for removal of erosion impacts in case of not implementing measures and in case of implementing measures. The calculation of present costs and benefits is summarised in Table 4, where values are expressed as the current value at 1 July 2016.

Table 4. Current value of benefits and costs of individual variants (million CZK)

	Variant 1		**Variant 2**		**Variant 3**		**Variant 4**	
B/C connected with:	C	B	C	B	C	B	C	B
Realisation of measures					4,447		4,447	
Restoration of washed down topsoil back on land blocks	1,066		1,542		177	889	248	1,294
Removal of washed down topsoil from water streams and reservoirs	1,011		1,464		163	848	229	1,235
Purchase of lost soil	319		462		51	267	72	390
Nutrient replacement	4,075		5,892		676	3,399	947	4,945
Water retention in the landscape	166		166			166		166

Source: Macháč (2016).

Based on the calculations of costs and benefits for individual variants, it was possible to express the net social benefit of individual variants as the difference between benefits and costs expressed in the present value. In case of variants 1 and 2, there were costs for measures and benefits from them equal to zero and it was so in case of maintaining the current state of erosion as well as in case of increase of the erosion activity due to climate change, where climate change deepened the social loss even more. On the contrary, variants 3 and 4 were socially beneficial measures, where benefits exceeded costs for the realisation of measures and costs of the remaining impacts of erosion, which has an impact on the area despite the realisation of measures (Table 5).

Table 5. Net social benefit of individual variants (thousand CZK)

Variant	Costs	Benefits	Net social benefit	Ratio B/C
1	6,636,870	0	-6,636,870	0
2	9,525,420	0	-9,525,420	0
3	5,514,434	5,569,200	54,766	1.01
4	5,941,924	8,030,260	2,088,335	1.35

Source: Macháč (2016).

Per the net economic benefit, it was shown that the most socially beneficial was the realisation of adaptation measures, which will have a net social benefit of CZK 2.09 billion even when climate change will be CZK 55 billion or it will not happen at all. Not realising the measures will, on the contrary, cause a loss of CZK 9.53 billion in case of climate change and with the assumption of maintaining the current erosion activity, a net social loss of CZK 6.64 billion was calculated.

The indicator of the ratio of benefits and costs in individual scenarios expresses the social benefit per unit of costs. A measure is usually accepted if this ratio is higher than one, and it also means that for CZK 1 of costs there should be a benefit of more than CZK 1. In case there will be no significant manifestations and impacts of climate change on erosion and therefore on the agricultural activity, the narrow B/C ratio was found, however, in the case of climate change over 25 years, the ratio increased to CZK 1.35 of benefits per CZK 1 of costs. Thus, this led to the social valorisation of costs by 35 per cent.

Besides the above stated monetarised benefits, there may be also considered other benefits which, however, were not monetarily evaluated due to financial and time requirements. In order to state other benefits, it is possible to start from the concept of ecosystem services, which determines anthropocentric benefits provided by ecosystems, or more precisely by services that these ecosystems create. Ecosystem services are most often divided into production, support, regulatory, ecological and cultural.

Conclusions

The study of economic impacts in the AdaptaN project compared costs and benefits of impacts of erosion activity and realisation of adaptation measures in four variants. These variants were different in two conditions, the first was related to the realisation or non-realisation of adaptation measures and the second was related to the application or non-application of impacts of climate change. In costs, the potential realisation was calculated of measures according to the models, more specifically ten types of measures, with costs for removal of erosion activity and costs for irrigation. Benefits were expressed as cost savings from removal of erosion impacts and cost savings from irrigation. However, due to time limitations, it was not possible to quantify other possible benefits. Annually, the pilot area (34,434 ha) currently loses 436,783 tonnes of quality topsoil due to erosion. If climate change occurred and no measures were in place, the impacts without measures would be around double and thus representing a threat of 905,608 tonnes of topsoil. In case of implementation of measures, there would be significant decrease in washed down topsoil in the pilot area, currently it would be 72,015 tonnes a year and after climate change 141,386 tonnes.

Based on the comparison of net social benefit in the basic variant, it was shown that it is socially beneficial to realise the adaptation measures. This was valid for maintaining the current state of erosion activity as well as in the occurrence of negative impacts due to climate change. A significant role in quantification of costs and benefits was played by the discount rate and the rate of return of nutrients. However, this had no impact on the order of scenarios. In the case of maintaining of the current situation of climate and realization of measures (variant 3), the net social benefit in the present value would be almost CZK 55 million in the time horizon of 2016 to 2040. In the case of the modelled impacts of climate change and realisation of adaptation measures, the net social capital would be CZK 2.1 billion.

The analysis of costs and benefits implies that it is recommended to realise adaptation measures regardless of whether there will or will not be negative impacts of climate change. If social benefits are not achieved, there will at least be a minimisation of social losses.

References

Macháč, J., 2016. *Cost-benefit analýza opatření pro adaptaci území na dopady klimatické změny v Jihomoravském kraji, Výsledky a propočty CBA v rámci projektu AdaptaN* [Cost-benefit analysis of the adaptation area on the impacts of climate change in the Southern Region, and the results of calculations in the CBA project AdaptaN]. ÚZEI – Výstup z projektu AdaptaN.

Slavíková, L., 2016. *Podklady pro cost-benefit analýzu z výstupů projektu AdaptaN. Příprava „technické stránky" - systém propočtů, postavených na příslušných teoriích a návodech z literatury* [Data for cost-benefit analysis of the project outputs AdaptaN. Preparation of the "technical aspects" - a system of calculations, built on relevant theories and guidelines from the literature]. ÚZEI – Výstup z projektu AdaptaN.

Trnka., M. and others, 2015. *Matematické modelování klimatických, hydrologických a pedohydrologických dat pro účely řešení projektu číslo EHP-CZ02-OV-1-039-2015 s názvem „Komplexní plánovací, monitorovací, informační a vzdělávací nástroje pro adaptaci území na dopady klimatické změny s hlavním zřetelem na zemědělské a lesnické hospodaření v krajině", souhrnná výzkumná zpráva* [Mathematical modelling of climate, hydrological and pedohydrologických data for the project number of the EEA-CZ02 1-039-2015-OV-called "comprehensive planning, monitoring, information and educational tools to adapt to the impact area climate change, with the main emphasis on agriculture and forestry management in the country", the summary research report]. Centrum výzkumu globální změny AV ČR v.v.i. 2015.

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The role of Agroforestry Innovation Networks in rural development of the Eastern-European Region

Abstract: *Agroforestry systems can increase resource efficiency, enhance productivity and improve the overall resilience of agro-ecosystems. The potential of agroforestry to contribute to sustainable rural development has been recognised in research and political circles, but still there are several obstacles for the implementation of these systems. National innovation networks have an important role in promoting land use best practices. In recent years, eastern European countries have gained the possibility to contribute to the research and development activities of the European agroforestry community. As a result, the first national agroforestry innovation networks have been established in the region. The paper introduces good examples of such initiatives in Eastern Europe.*

Keywords: *agroforestry, innovation, rural development, network*

Introduction

Agroforestry is the land use practice of integrating woody vegetation with crops and/or livestock systems to optimise the benefits from their ecological and economic interactions. As a multi-purpose mixed and integrated system, agroforestry has thousands of types with different combinations of woody, herbaceous and animal components, adapted to local conditions. Furthermore, agroforestry practices may both spatially and temporally (Mosquera-Losada et al., 2016).

Tzilivakis et al. (2015) compared the ecological benefits of eighteen of the Ecological Focus Area (EFA) elements[1] and found agroforestry highest in almost all countries surveyed. In total, 22 mitigation actions were assessed in a meta-review of mainstreaming climate action in the Common Agricultural Policy (CAP) by Martineau et al. (2016), who concluded that agroforestry is among the mitigation actions having the greatest potential. Also new results from the SOLMACC[2] project (Guttinger, 2016) show that it is possible to reduce greenhouse gas emissions (GHG) from agricultural practices such as agroforestry, improved on farm nutrient recycling, or improved crop rotation and among these agroforestry had the highest record in GHG savings.

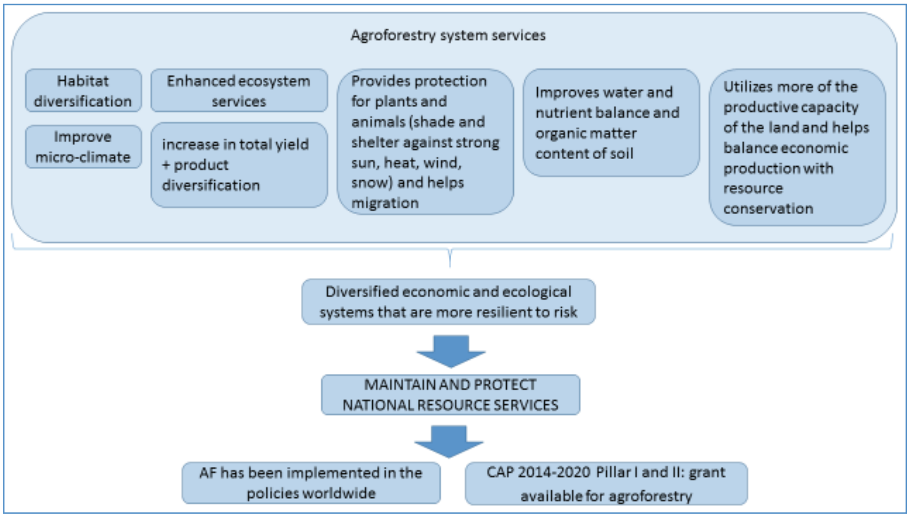

Figure 1. Agroforestry system services support the development and climate adaptation of rural areas

Source: not stated.

[1] An Ecological Focus Area (EFA) is an area of land upon which agricultural practices that are beneficial for the climate and the environment are carried out by using six EFA options on their own or in combination: fallow land, buffer strips, field margins, catch crops, green cover, nitrogen-fixing crops.

[2] SOLMACC (Strategies for organic and low-input farming to mitigate and adapt to climate change; http://solmacc.eu/) is a LIFE-co-funded project that runs from 2013 to 2018.

The European Union (EU) Framework 5 research project Silvoarable Agroforestry for Europe (SAFE) used field experiments and modelling to show that agroforestry could increase land resource use efficiency by up to 40 per cent relative to 'standard' monoculture arable or monoculture woodland systems (Dupraz et al., 2005). The introduction of agroforestry practices can greatly contribute to increasing the sustainability of farming and diversifying production (e.g. fruits, woody biomass, fibres), making farms more resilient to market changes and more profitable.

All these aspects are key to recognising the important role that agroforestry has to play as a technique for mitigation and adaptation of rural areas to climate change (Figure 1). To reach the goals of maintaining and protecting national resource services may be possible through agroforestry programmes carried out in cooperation with rural populations (Szedlák, 1993). Stakeholder networks have an important role as catalysers in this process.

State of agroforestry in Eastern Europe

Agroforestry is a traditional land use practice across Europe, but still there is limited information available on the extent of agroforestry in the Central-Eastern region, especially as regards the modern practices. Recent studies (Hartel and Plieninger, 2014; den Herder et al., 2016) imply that agroforestry – both in traditional and modern forms – might be present to a notable extent in the landscape of this region.

According to the study of Kachova and Mosquera-Losada (2015) on the state of agroforestry in Bulgaria, particular focus has been placed on the creation of agroforestry systems, in relation to the energy crisis, the recent increase of prices of conventional fuels as well as with regard to climate change. Successful forms of implementation of agricultural use in plantations, protective forest belts, forest-grassland complexes and specialised plantations of fast growing tree species are known. Also, high value fruit bearing trees such as ordinary walnut, hazel, almond and wild cherry, among others, are cultivated in plantations. The development of the forest farming is particularly suitable and promising in Bulgaria.

In Romania, large areas of wood pasture can be found in Southern Transylvania. These were created by the grazing of closed oak woodlands and they are considered to have high cultural and natural value due to the presence of the ancient oak trees. These dynamic systems derived from previously closed woodlands during the past two centuries due to the increasing demand for timber and agricultural products. (Hartel, 2014).

Agroforestry practices have also been traditionally used in the Czech Republic. Concerning the situation of agroforestry in this country, the literature is inconsistent. Krcmarova et al. (2016) state that agroforestry in the Czech

Republic has vanished both from the landscape and public conscience, while according to Zelba et al. (2016) a significant area of traditional farming systems combining trees (mainly traditional fruits) and agricultural crops is still remaining with small-holders in the Czech Republic.

In Poland, experts have recognised and evaluated diverse services and products offered by woody patches and belts in agricultural areas, particularly soil protection, water balance improvement and biodiversity enhancement functions or amenity values. The extensive studies on these aspects are supportive of the environmental policy in terms of protecting trees in the agricultural landscape, however current legislation considers merely natural protection of individual trees, thereby blocks development of agroforestry systems within farms. Despite this, agroforestry systems have come to be incorporated in farms, especially on pastures and hilly areas, some farmers introduce also hedges in their fields. Recently, therefore a strong national cooperation of foresters and agronomists has started to promote agroforestry nationwide (Borek, 2015).

Table 1. Resources allocated to measure 222 in the 2007-2013 EU rural development programming period and actual expenditure

Country	Region	Resources (EUR)	Realised expenditure (EUR)	Expenditure/planned %
Belgium	Flanders	500,000	11,752	2.4
	Total	500,000	11,752	2.4
UK	Northern Ireland	96,610	0	
	Total	96,610	0	0.0
France	Hexagon	2,852,202	101,138	
	Guadeloupe	326,000	0	
	Guyane	50,000	0	
	Total	3,228,202	101,138	3.1
Hungary	Total	2,813,540	720,574	25.6
Italy	Marche	1,270,000	0	
	Veneto	30,000	9,797	
	Total	1,300,000	9,797	0.8
Portugal	Mainland	6,644,519	102,827	
	Azores	160,000	0	
	Total	6,804,519	102,827	1.5
Total EU-27		14,742,871	946,088	6.4

Source: not stated.

In Hungary, agroforestry was a widespread technology of land use but has been declined and disappeared from large areas of the Hungarian countryside in recent decades. Nowadays, with the exception of forest belts (16,000 ha) and traditional silvopastoral systems (5,500 ha), agroforestry technologies are not widely used in Hungary (Takács and Frank, 2008; Vityi et al., 2015). Other arable agroforestry systems such as alley cropping and forest garden – considered as new (atypical) land use practices in Hungary –exist mostly on small farms or newly-established pilot systems for educational and/or experimental purposes (Vityi, 2014). In Hungary the high share of agricultural territories (57 per cent) (KSH, 2016) and of the agro-environmentally sensitive and/or 'triple-risky' areas (floods, droughts, inland waters) demonstrates the strong need for development in climate-adaptive agro-technologies. The use of arable agroforestry systems or re-adaptation of traditional ones could become a new pathway for realising more resilient and sustainable agricultural production (Vityi and Marosvölgyi, 2013). In the 2007-2013 rural development programming period, Hungary was the only country in Central Europe to implement the EU Measure 222 (First Establishment of Agroforestry on Agricultural Land) with the aim of maintaining a sustainable land management and facilitate protection of soils against erosion (Szedlák, 2006) (Table 1).

Still in Central and Eastern Europe, particularly in Romania, Bulgaria and Poland, a significant share of agroforestry areas is related to diversified land cover use on agricultural holdings with highly fragmented structures, within arable as well grassland areas. This implies that a significant share of rural areas in these countries can be considered as traditional agroforestry at the landscape scale.

Examples to follow: Agroforestry Innovation Networks

During 2014, an European participative research and development network was established to focus on different types of European agroforestry systems within the frame of the AGFORWARD project[3]. This international network comprises 12 national arable agroforestry stakeholder groups, 8 stakeholder groups dealing with agroforestry systems for livestock and 10 stakeholder groups of agroforestry systems that are recognised for their high natural and cultural value. The stakeholder groups include farmers, breeders, foresters, landowners, representatives of regional and national associations, agricultural service companies, extension services, nature-related NGOs, local action groups, policy makers and scientists. The facilitators of these groups synthesised their results to identify key areas on which to focus research and development in the coming years (Mirck et al., 2014; Hermansen et al., 2015; Moreno et al., 2015).

In cooperation with the national associations, the network of agroforestry stakeholders is continuously growing throughout Europe[4]. Development of successful agroforestry systems and knowledge share are common attributes of these groups which are framed by the AGFORWARD project and the European

[3] AGFORWARD (AGroFORestry that Will Advance Rural Development; http://agforward.eu/index.php/en/) is a four-year research project funded by the European Union's Seventh Framework Programme for Research and Technological Development. The project involves two international institutions and over 23 universities, research and farming organisations from across Europe.

[4] European Map of National Agroforestry Associations. AGFORWARD project. https://www.agforward.eu/index.php/hu/associations.html

Agroforestry Federation (EURagroforestry). In recent years, more and more Central-Eastern-European countries (e.g. Czech Republic, Romania, Poland, Bulgaria and Hungary) have gained the possibility to contribute to the activities of this community. As a result, agroforestry innovation networks in Hungary and Poland have been established in the Eastern European region in 2014.

The Hungarian Agroforestry Network was established with more than 70 stakeholders. The Cooperational Research Centre of the University of Sopron has a leading role within the network. The members are farmers, extension services, related NGOs, Local Action Groups, policy makers and scientists. The scope of activity ranges from organising national and international forums to share knowledge and experiences to representation of interests and catalysing common innovations (Vityi, 2014). Regular meetings, conference attendance, consultations and participatory work with farmers ensure the fastest way of knowledge exchange, instant feedbacks for policy development and opportunities for farmers to realise common ideas together with other stakeholders. As result of the network's activity the number and total area of agroforestry systems has increased, the Hungarian Agroforestry Civil Association has been created and joined the organisation of EURagroforestry, and agroforestry has been more integrated into the research and educational programme of the University of West Hungary Faculty of Forestry.

The Polish Agroforestry Innovation Network is based mainly on cooperation between foresters, agronomists and ecologists, initiated by present members of Polish Agroforestry Association (OSA). The group has the ambition to develop agroforestry systems in Poland, cooperating with farmers and advisors and participating in consultative meetings at governmental level, particularly the Ministry of Agriculture and Rural Development. Presently, the main Polish research unit engaged in agroforestry activities is the Institute of Soil Science and Plant Cultivation – State Research Institute in Puławy, a unit conducting numerous interdisciplinary studies in the framework of policies on sustainable agriculture, involving farmers and advisors from across the country. An important role in dissemination of innovative agricultural ideas is played by the public network of agricultural advisors, managed by Agricultural Advisory Centre at Brwinów, responsible for dissemination and knowledge exchange through a network of Agricultural Provincial Advisory Centres. The unit is the core of the National Network of Innovations in Agriculture as a part of EIP-Agri. Agricultural universities and other agricultural state research institutes are relevant stakeholders.

Bulgaria and Romania are among the agroforestry 'hot-spots' in Europe (Burgess, 2016). Romania has a significant area of wood-pasture systems in southern Transylvania. In this country, ADEPT[5] has a significant role in hel-

[5] Fundatia ADEPT Transilvania is a landscape stewardship NGO, aims at protecting the nature-rich, farmed landscapes of Transylvania, and supporting the traditional farming communities who have created them over centuries and who maintain them today.

ping farmers to work together and organising the national agroforestry stakeholder network. As a result of their activity, the importance of protecting wood pastures with high natural and cultural values and assuring their sustainability is gaining recognition and starting to receive support from political, institutional and NGO levels (Hartel, 2014).

In Bulgaria, traditional sylvopastoral systems, shelterbelts and alley cropping are the most common types of agroforestry. Though the current conditions are favourable for the development of agroforestry due to the socio-economic incentives and environmental necessities, it is not very familiar to stakeholders as a scientific theory or as practice, therefore Stancheva et al., (2007) highlight the importance of wide-scale popularisation of agroforestry, a comprehensive research and educational programme, and supportive governmental policy. The role of catalyst has been taken by the Agroforestry Centre which is aiming at the development of a national structure for agroforestry research and education, as well as to build the network of agroforestry practitioners. Kachova et al. (2016) explain that although the successful implementation of agroforestry systems in forestry and agriculture is known both for science and practice and there are also “legal basis and political understanding for promoting these types of systems” based on their ecological and social benefits, the entire concept and strategy of supporting the development of agroforestry in Bulgaria is still missing.

In the Czech Republic the availability of new studies on the extension of agroforestry practices in the country shows that the ecological, cultural, socio-economic and historical value of agroforestry and its important role in rural development is starting to be recognised.

The existing national networks and initiatives serve as potential bases for LEADER Local Action Groups, National Operational Groups and other participatory research co-operations as well as providing professional and practical support for decision making, thus playing a significant role in rural development in this region.

Recent options for agroforestry in the Rural Development Programmes

In the 2014-2020 EU programming period, grants are available for agroforestry within Pillar 1 and Pillar 2. In Pillar 2, grants are available for establishment of new agroforestry systems on either agricultural or forest land. Private land holders, municipalities and their associations may be beneficiaries of this support The main instrument for new agroforestry systems on agricultural land is submeasure 8.2. If the RDPs are fully implemented, the total area of newly established agroforestry in Europe will reach 74,000 ha. Submeasure 8.2. has been activated only by Hungary out of the surveyed Eastern-European countries (Lawson et al., 2016). At the moment, financial support for establishment and maintenance of sylvopastoral and shelterbelt systems is available in Hungary[6]. In addition to submeasure 8.2, funding to assist agroforestry is available under other measures and submeasures related to, among others, Operational Groups, advisory services or climate adaptive land use practices of lower production risk and higher environmental benefits. Pillar 1 grants are also available for agroforestry, but in practice the uptake is limited. It is derived from the uncertainty over whether the area remains eligible for Pillar I direct payments[7]. For newly-established EFAs, grants for agroforestry are only eligible if the EFA is established on arable land and within a Pillar 2 scheme (Lawson et al., 2016).

The potential of agroforestry to contribute to sustainable development has been recognised in international policy meetings, including the United Nations Framework Convention on Climate Change (and the Convention on Biological Diversity, justifying increased investment in its development (Buttoud, 2013). Therefore, it is regrettable that most of the surveyed countries in the region did not activate measure 8.2. and the agroforestry EFA. However, this is not an obstacle for funding agroforestry system establishment from other relevant measures and submeasures and even more underlines the important role of agroforestry networks in formulating stakeholder groups to promote innovative land use practices in rural areas.

Conclusion

The results of recent studies and achievements of the European agroforestry networks show that agroforestry has high potential in the ecological, economic and social improvement of rural areas. Agroforestry is one of the most recognised practices to fight against climate change and an effective tool for climate adaptation of agriculture. Thus, networks promoting agroforestry strongly contribute to the sustainable and climate adaptive development of rural areas. Despite the fact that agroforestry has a tradition in all European countries, agroforestry networks are less developed in the Eastern European region. Also CAP instruments for new agroforestry systems are more poorly implemented compared to the rest of Europe.

The discussion on the post-2020 CAP reform should take into consideration the necessity of evaluation of all the benefits of land use practices and systems. Current and future implementation of Rural Development Plans should better encourage the use of beneficial agricultural practices such as agroforestry. National stakeholder networks have a key role in promoting innovative land use practices in rural areas, therefore following already operating examples would accelerate rural development in the Eastern European region.

[6] According to the National Rural Development Plan of Hungary.

[7] Also called in Member States as Basic Payment Scheme – BPS, or Single Area Payment Scheme – SAPS.

References

Burgess, P.J., 2016. Agroforestry: *Complexity underpinning multiple benefits from the farm to the landscape*. Presentation at 'Designing the path: a strategic approach to EU agricultural research & innovation', Brussels, 28 January 2016.

Buttoud, G., 2013. *Advancing Agroforestry on the Policy Agenda. A guide for decision-makers*. Agroforestry Working Paper no.1. Rome: FAO.

Borek, R., 2015 *Agroforestry in Poland – the current state and policy perspectives*. In book of abstracts of the 3rd European Agroforestry Conference: Celebrating 20 years of Agroforestry research in Europe, Montpellier, 2016, 439-441.

den Herder, M., Moreno, G., Mosquera-Losada, M.R., Palma, J.H.N. and others, 2016. *Current extent and trends of agroforestry in the EU27*. Deliverable Report 1.2 for EU FP7 Research Project AGFORWARD.

Dupraz, C., Burgess, P.J., Gavaland, A., and others, 2005. *SAFE (Silvoarable Agroforestry for Europe) Synthesis Report*. SAFE Project (August 2001-January 2005).

Guttinger, A., 2016. *How can (organic) farming practices reduce greenhouse gas emissions? Seminar on CAP and Climate Change – How can the CAP drive climate change mitigation and adaptation in the agriculture sector?* PowerPoint presentation, Brussels, 9 November 2016. http://solmacc.eu/wp-content/uploads/2016/11/SOLMACC-presentation_Andreas-Gattinger.pdf

Hartel, T., 2014. *Wood pastures in Southern Transylvania, Romania*. Initial Stakeholder Report for the EU FP7 Research Project: AGFORWARD.

Hartel, T., Plieninger, T. (eds), 2014. *European Wood-pastures in Transition*. A Social-ecological Approach. Routledge.

Hermansen, J.E., Kongsted, A.G., Bestman, M. and others, 2015. *Agroforestry Innovations to be evaluated for Livestock Farmers*. Milestone 5.2 (MS 21) for the EU FP7 Research Project: AGFORWARD.

Kachova, V., Mosquera-Losada, M.R., 2015. *Agroforestry in Bulgaria and opportunities for development as a method of land use*. International Conference 'Soil and Agrotechnology in a changing world' dedicated to the international year of soils and the 140th anniversary of the birth of Nikola Pushkarov, Sofia, Bulgaria, 11-15 May 2015.

Kachova, V., Hinkov, G., Popov, E., Trichkov, L., Mosquera-Losada, R.M. 2016. *Agroforestry in Bulgaria: history, presence status and prospects.* Agroforestry Systems. https://doi.org/10.1007/s10457-016-0029-6

KSH, 2016. *A mezőgazdaság főbb adatai c. STADAT-Tábla* [Main data on agriculture]. Budapest: Központi Statisztikai Hivatal

Krcmarova, J., Jelecek, L., 2016. *Czech traditional agroforestry: historic accounts and current status*. Agroforestry Systems.

Lawson, GJ, Balaguer, F, Palma, JHN, Papanastasis, V., 2016. *Options for agroforestry in the CAP 2014-2020*. In book of abstracts of the 3rd European Agroforestry Conference: Celebrating 20 years of Agroforestry research in Europe, Montpellier, 2016, 424-427.

Martineau, H., Wiltshire, J., Webb, J. and others, 2016. *Effective performance of tools for climate action policy -meta-review of Common Agricultural Policy (CAP) mainstreaming*. Report for European Commission -DG Climate Action. Ricardo -AEA/R/ED 60006/Mitigation Potential/Issue Number V1.1

Mirck, J., Cirou, E., Camilli, F. and others, 2014. *Agroforestry Innovations to be evaluated for Arable Farmers*. Milestone 4.2 (MS15) for the EU FP7 Research Project AGFORWARD.

Moreno, G., Berg, S., Burgess, P.J. and others, 2015. *Innovations to be examined for High Nature and Cultural Value Agroforestry*. Milestone 2.2 (MS 3) for the EU FP7 Research Project AGFORWARD.

Mosquera-Losada, M.R., Santiago-Freijanes, J.J., Rois, M. and others, 2015. *CAP and agroforestry practices in Europe*. In book of abstracts of the 3rd European Agroforestry Conference: Celebrating 20 years of Agroforestry research in Europe, Montpellier, 2016, 428-430.

Stancheva, J., Bencheva, S., Petkova, K., Piralkov, V. 2007. *Possibilities for agroforestry development in Bulgaria: Outlooks and limitations*. Ecological Engineering 29, 382-387. https://doi.org/10.1016/j.ecoleng.2006.09.013

Szedlak, T., 1993. *Plantation and Climate Change*. Tropical Forest Update 3(5), 9.

Szedlák, T., 2006. *EU Rural Development Regulation No 1698/2005 and its forestry relevant measures*. PowerPoint presentation, 21-22 September 2006, Budapest.

Takács, V., Frank, N., 2008. *The traditions, resources and potential of forest growing and multipurpose shelterbelts in Hungary*. In Agroforestry in Europe. Netherlands: Springer, 415-433. https://doi.org/10.1007/978-1-4020-8272-6_21

Tzilivakis, J., Warner, D.J., Green, A., Lewis, K.A., 2015. *Guidance and tool to support famers in taking aware decisions on Ecological Focus Areas*. Hatfield: University of Hertfordshire.

Vityi, A., 2014. *Initial Stakeholder Meeting Report – Alley Cropping Systems in Hungary*. Milestone 4.2 (MS15) for the EU FP7 Research Project AGFORWARD.

Vityi, A., Marosvölgyi, B., 2013. *Role of agroforestry in the development of the Hungarian rural areas*. In eProceedings of the XXVth Congress of the European Society for Rural Sociology 'Rural resilience and vulnerability: The rural as locus of solidarity and conflict in times of crisis', Pisa, Italy, 29 July – 1 August 2013, 281-282.

Vityi, A., Marosvölgyi, B., Kiss, A., Schettrer, P., 2015. *Research and Development Protocol for Arable Agroforestry in Hungary Group*. Milestone MS16 Part of Experimental Protocol for Arable Farmers for the EU FP7 Research Project AGFORWARD.

Zelba, O., Lojka, B., Houska., J, Kotrba, R., Martiník, A., Weger, J, 2015. *Inventory of Agroforestry in Czech Republic*. In book of abstracts of the 3rd European Agroforestry Conference: Celebrating 20 years of Agroforestry research in Europe, Montpellier, 2016, 439-441.

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Green infrastructure and EU agricultural policy

Abstract: *We explored the trends and scales of landscape changes in two pilot rural regions of different landscape characters in Hungary (micro-region Csorna, micro-region Gönc). The result of the continuous intensification is the loss of biodiversity and shrinking of the natural, semi natural vegetation, habitats. To halt the loss of biodiversity the European Union has introduced the 'greening' measures in the Common Agricultural Policy (CAP). These measures contribute to realising the objectives of green infrastructure (GI) planning. Green infrastructure represents a crucial approach in maintenance and development of ecosystems and ecosystem services. In our study we explored the relationships between the greening of the CAP and GI planning. We formulated the most important GI development objectives in our pilot regions. We elaborated three different scenarios based on the present trends and the realisation of GI development objectives in these regions. The scenarios show that the present incentives for GI development are not enough to halt the loss of biodiversity and enhance life quality of rural regions.*

Keywords: *greening of CAP, micro-region Csorna, micro-region Gönc, landscape changes*

Introduction

People have changed their surrounding for thousands of years, especially because of agricultural production. In early history these changes were of local scale but mostly since the 18th century great scale landscape changes have occurred. In Hungary, the major landscape changing activities in the 19th century were drainage, river regulation, meadow-plough land conversion and deforestation. Production was shifted from extensive to intensive methods which resulted in the growth of plough lands. In the 20th century, during the socialist regime, the organisation of agricultural associations and further intensification of agricultural production brought further changes in landscape structure. Analysing the former trends, we explore the most effective ways for the development of the Common Agricultural Policy (CAP) 'greening' measures and green infrastructure (GI) in two pilot regions.

Since 2004 the CAP has had the most significant effect on Hungarian agriculture, and thus on agricultural landscapes. It has direct or indirect effects on the farm size, the type of the crops, the ratio of the crop and livestock production, the land cover structure, and the size of the ecologically valuable areas in the agricultural regions. In terms of the landscape structure, some of the most important regulations and subsidies were the following: encourage afforestation, 'set-aside' payments to withdraw land from production, payment to limit stocking levels, 'decoupling'[1].

The reformed CAP came into force in 2014[2]. From the view of our research, in the 2014-2020 period the most important CAP innovation is the 'greening'. To make the direct payments more environmentally-friendly, to strengthen the environmental sustainability of agriculture and enhance the efforts of farmers, the European Commission (EC) is proposing to spend 30 per cent of direct payments on the improved use of natural resources. Farmers receiving an area-based payment must make use of various straightforward, non-contractual practices that benefit the environment and the climate. These require action each year. They include:

- diversifying crops;
- maintaining permanent grassland;
- dedicating 5 per cent of arable land to 'ecologically beneficial elements' ('ecological focus areas')[3].

The CAP greening measures fit entirely into the framework of GI. GI planning is becoming a widely used tool in Hungary as well but so far mostly in relation to cities (e.g. the term 'green city'). In our study we highlight a different approach. GI planning is a complex, multifunctional tool which can deal at the

[1] COM (2003) 23 final

[2] COM (2010) 672 final

[3] SWD (2016) 218 final

same time with protection and development issues so it is appropriate to realise objectives related to nature conservation, rural development and sustainable agriculture. While grey infrastructure is designed to perform only single functions, GI networks serve multiple functions as 'ecosystem services' (Ely and Pitman, 2014). GI can be an important tool in rural development because of its multifunctional approach. Different terms and definitions exist in the professional literature in relation to GI. According to Benedict and McMahon (1996): "a strategically planned and managed network of wilderness, parks, greenways, conservation easements, and working lands with conservation value that supports native species, maintains natural eco-logical processes, sustains air and water resources, and contributes to the health and quality of life".

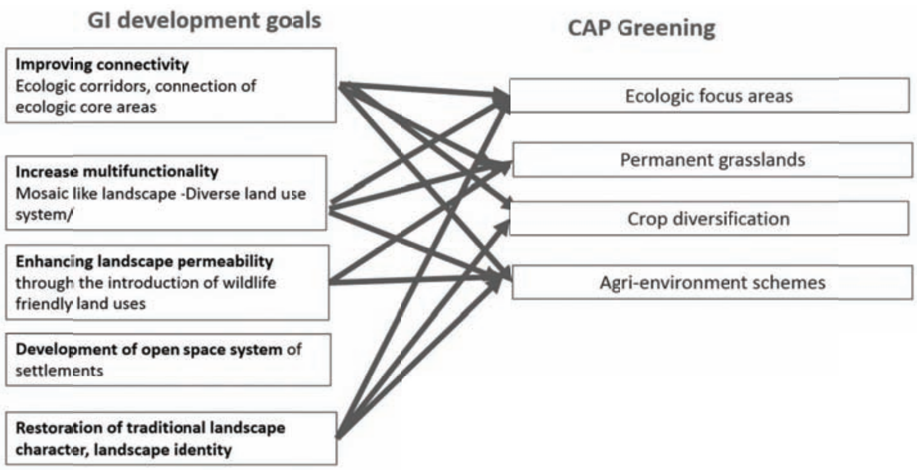

Figure 1. Potential connections between green infrastructure and CAP greening
Source: not stated.

There are several ways to distinguish GI elements; however, the most frequently used typology of GI is as follows (Dancsokné Fóris, 2015; Civic and Siuta, 2014):

- Natural and semi-natural ecosystems, such as pastures, woodland, forest (no intensive plantations), ponds, bogs, rivers and floodplains, coastal wetlands, lagoons, beaches, marine habitats;
- Extensive agricultural and forest landscapes, large marsh and bog areas, rivers and floodplains;
- Restored ecosystem types;
- High nature value farmland and multi-use forests (such as watershed forests); protection forests;
- Greenways, green belts, metropolitan park systems.

The EU intends to integrate GI into different policies such as the Biodiversity Strategy to 2020[4], the roadmap to a Resource Efficient Europe[5], the EC's proposals for the Cohesion Fund and the European Regional Development Fund[6], the new CAP[7], the new Forest Strategy[8] (especially relevant since many GI elements might be forest-based), or the forthcoming communication on 'land as a resource'. The European Union (EU) accepted in 2011 the Biodiversity Strategy that sets the following objectives: by 2020, ecosystems and their services are maintained and enhanced by establishing GI and restoring at least 15 per cent of degraded ecosystems.

The main objectives of GI development are: improving connectivity, enhancing landscape permeability identifying multifunctional zones. The improvement of connectivity is possible by safeguarding hedgerows, wildlife strips along field margins etc. The way of enhancing landscape permeability means, for example, wildlife-friendly land uses or agri/forest environment schemes for existing farming practices. The multifunctional zones can be areas where farming, forestry, recreation and ecosystem conservation operate together. These multifunctional zones can provide valuable ecosystem services also to the society (e.g. water purification or soil improvement) (EC, 2010).

The provision of ecosystem services and the whole multifunctional idea of the GI fit into the CAP multifunctional agriculture endeavour. It means the GI development through providing valuable ecosystem services also can help to fulfil the objectives of multifunctional agriculture (e.g. quality of life in rural regions).

Based on the literature review (historic overview of the transforming of the Hungarian countryside/agriculture areas and analysis of CAP greening measures and GI), the objectives of our research are the following:

- to identify the historical changes in the agricultural landscapes in two study areas;
- to identify the regularities of these historical policies, general trends in the context of the landscape structure;
- to explore the current situation and landscape structures in the study areas;
- to find common enforcement options of 'greening' and GI initiative in the study areas;
- to identify potential areas for 'greening' in the study areas (similarities and differences between the study areas);
- to develop different scenarios in the pilot regions based on the intensity of the enforcement of 'greening' principles.

[4] COM (2011) 244 final

[5] COM (2011) 571 final

[6] COM (2011) 612 final/2

[7] COM (2010) 672 final

[8] COM (2013) 659 final

Methodology

The research material can be divided into three groups: written sources, map databases and statistical data. We used the data of the Hungarian Statistic Office, and other types of databases (Spatial planning and development Information System – TEIR, landscape values – TÉKA, nature and environmental protection databases – TIR, CORINE Land Cover database) for the evaluation of the historical and the present structure of the landscape.

We used various methods in the different parts of the work. GIS analysis was used during the identification of the historical changes in the agricultural landscapes (based on historical maps) and during the scenario development/modelling. We also employed GIS techniques to identify the potential areas for 'greening'. The statistical information was analysed using Microsoft Excel.

Pilot regions

We have chosen two rural regions lying along the western and north-eastern borders of Hungary (Figure 2). Both pilot regions contain backward settlements, suffer from severe depopulation processes and are peripheries or have peripheral parts. Agricultural land use forms are significant in both landscapes.

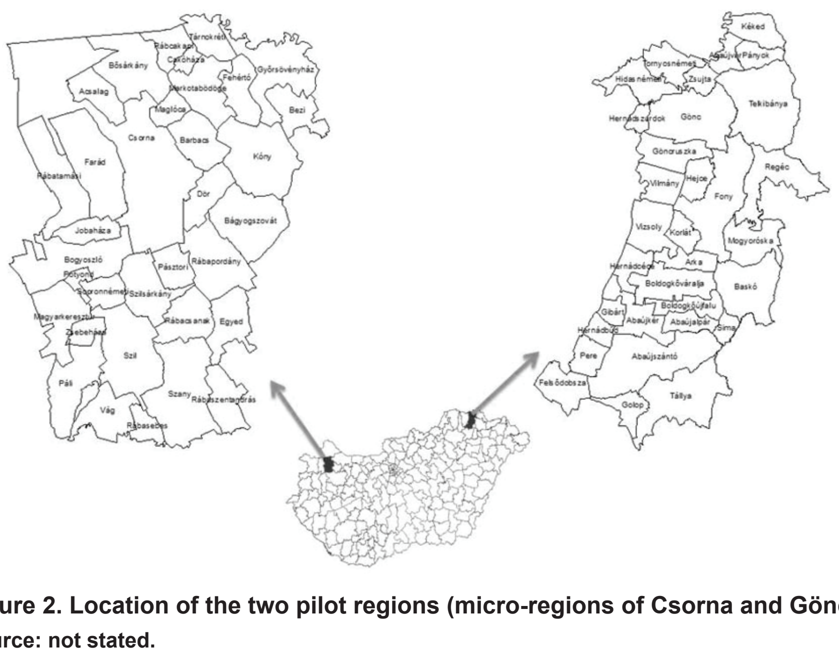

Figure 2. Location of the two pilot regions (micro-regions of Csorna and Gönc)
Source: not stated.

The micro-region of Csorna is situated in the Small Hungarian Plain between the great centres of Győr-Moson-Sopron County. It consists of two major landscape units: Hanság and Tóköz with wetlands, swamps and forests, extensive agriculture, and the intensive agricultural landscape of Rábaköz. The ratio of plough fields is extremely high in the micro-region (national average 48 per cent, locally 66 per cent with great local differences).

In the micro-region of Gönc, the settlements belong to the most disadvantaged areas of the country. The sample area can be divided into two main parts with different landscape characteristics, the upper valley of the Hernád River and the mountains of Zemplén. In the Valley of Hernád the ratio of arable land is very high. This region historically was called the 'pantry of Kosice', so the agriculture has a great tradition. The southern settlements of the micro-region belong to the 'Tokaj Wine Region Historic Cultural Landscape' World Heritage Site. The other interesting area is Gönc and the settlements in its surroundings, which are traditionally fruit product areas ('pálinka of Gönc').

Results

The pilot regions can be characterised by different landscape conditions but the scale and trends of landscape changes are similar. We can distinguish five periods of local landscape changes in the pilot regions (Tables 1 and 2). For centuries people were just capable to change their direct environment for survival or achieving a better quality of life. At first it just meant the adaptation to nature, hunting, fishing, limited agricultural use. Since the 1st century we can more talk about local changes. In Hanság it meant local drainage, but the vast marshland of Hanság has not changed much. Deforestation and grazing were also typical, and a slowly increasing rate of arable land can be witnessed in both pilot regions, and a growing importance of vine growing and fruit production in Gönc.

Table 1. The first two periods of local landscape changes in the pilot regions

Period	Time period	Characteristics of land use, landscape changes		Drivers of land use changes
		R□bak□z	G□nc	
I. Survival, adaptation	-1st century	The region was settled since the Neolithic ages, adaptation to nature, hunting, fishing, agricultural use mostly in Rábaköz. Limited agricultural use on the elevated surfaces.	The region was settled since the Upper Paleolithic ages, grazing on higher sand-islands of Hernád valley, and on foothills of Zemplén-mountains, small scale deforestation in Hernád valley.	Adaptation for better life quality
II. Adaptation, local landscape changes	1-18th century	Local drainage, the marshland of Hanság has not changed much. Deforestation. Grazing, slowly increasing rate of arable land. Specific pond management system in Tóköz.	Local drainage, the marshland of Hanság have not changed much. Deforestation in Hernád valley. Optimal extension of arable land. Vineyards and fruit gardens on foothills of Zemplén-mountains.	Adaptation, local changes for better life quality.

Source: own construction.

Table 2. The latest three periods of local landscape changes in the Micro-region of Gönc

Period	Characteristics of land use, landscape changes	Drivers of land use changes
III. Large scale landscape changes End of 18th century □WW1	Grasslands and forest were turned to arable land even in the floodplain of Hern□d B□rsonyos was regulated in 1860s; 1865: 44.7 per cent arable land, 29.8 per cent grassland; 1913: 69.1 per cent arable land, 17.8 per cent grassland; In 1880s phylloxera destroyed the vineyards, partial revival of the vine region, mostly fruit gardens and arable land In 1895 2 million fruit trees were registered in the region,	High yields by changes of the landscape in large estates. Instead of adaptation great scale land use changes.
IV. Intensive land use 20th century□ 1980s	Continuing river regulation, Regulation of Hern□d in 191□s; Stady land use system, Effects of Trianon: the region become a peripheral region Intensive crop production and stock-raising. Fruit production, Extending vine yards in Southern region.	The values of the society are formed by the socialist regime, intensive urbanisation process. Land use is led by rationalisation industrial agriculture. Decreasing value of rural life.
V. Nature protection, wetland restoration, growing intensification of agriculture Since the end of 1980s	Growing importance of nature protection, wetland restoration, Natura 2000 network. Increasing crop production shrinking stock-raising. decrease of grassland. 2011: 68 per cent arable land, 16 per cent grassland.	Continuous conflicts between economy and nature protection. Strong constraints of nature protection. Growing land concentration.

Source: own construction.

Especially for the 19th century the organisational level of the society and the technological development made landscape change on a greater scale possible. There is a characteristic period of great scale landscape changes which lasted until WW1. It meant intensive drainage, river control and retreating wetlands of Hanság. It brought almost 30 per cent growth of arable land and the area of grassland halved. More or less the same trends occurred the micro-region of Gönc, the regulation of Hernad river changed the cultivation patterns of the valley and in the 1880s phylloxera destroyed the vineyards. Afterwards the vine region only just partially revived, mostly fruit gardens and arable land replaced the former vineyards.

A fourth characteristic period of landscape history was when the intensive land use became common, drainage continued, even in the inner parts of Hanság. Intensive crop production and stock-raising characterises the land use systems. Such major land use changes have not occurred. Land use is led by rationalisation of industrial agriculture, efficiency of agricultural production. In the micro-region of Gönc river regulation continued. Fruit production became a major economic base of the region; vineyards were extended in the southern part of Gönc.

In the fifth period of landscape history we see the appearance of nature protection in both pilot regions; firstly, landscape protection areas and later national park were created and the Natura 2000 network was set up. The Landscape Protection Area of Hanság was set up in 1976 and in 1994 became part of the Fertő-Hanság National Park. In the micro-region of Gönc the Landscape Protection Area of Zemplén was set up in 1984. There were continuous conflicts between economy, agriculture and nature protection. Agricultural production is characterised by increasing crop production and shrinking stock-raising. There were also strong constraints of nature protection and growing land concentration. Similar trends in landscape change can be witnessed in the other pilot region, as a detailed example we just highlight the periods of micro-region of Gönc (Tables 1 and 2).

Present trends of landscape changes

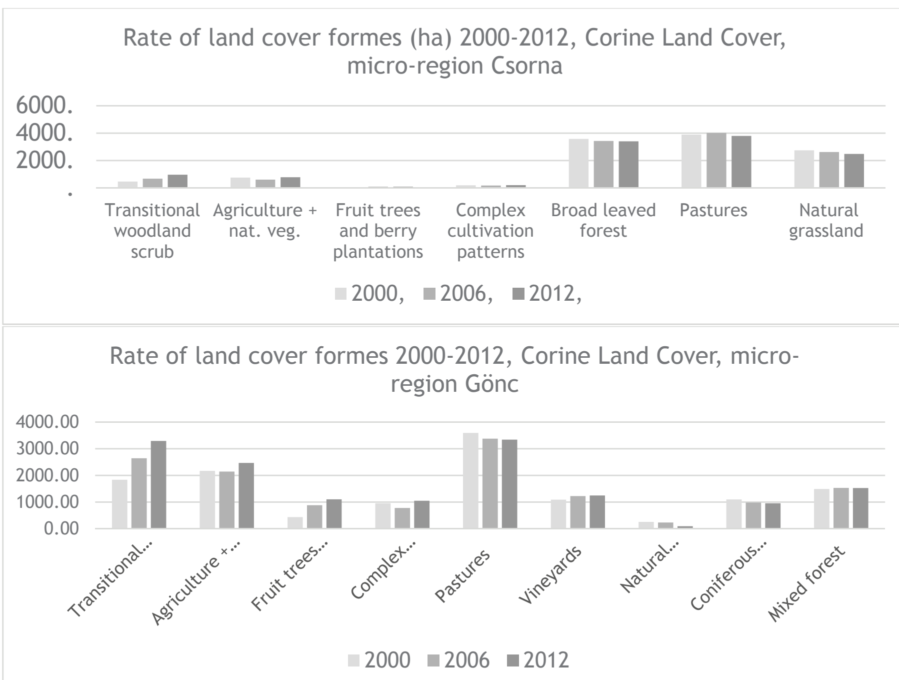

Figure 3. Land use forms in Csorna and Gönc micro-regions

Source: Corine Land Cover 2000, 2006, 2012.

The Corine land cover maps and data (2000, 2006 and 2012) made it possible for us to explore the present trends. In the pilot areas the set of land use forms are influenced by different landscape conditions. Gönc micro-region is mostly a hilly landscape with high incidences of forests, woodland, and pastures and plain landscape of Hernád valley, while Hanság-Rábaköz is a typical plain landscape where arable land dominates (72 per cent) and the ecologically-valuable pastures and natural grasslands make up around 10 per cent of the micro-region's territory. In both areas the share of arable land has been quite stable in the last fifteen years, but there has been a steady decrease in pastures and natural grassland, and a growth of transitional woodland, especially a drastic growth of transitional shrub areas in Gönc micro-region. In Csorna micro-region pastures dropped by 3 per cent, natural grassland by10 per cent; while in Gönc pastures dropped by 2 per cent and natural grassland by 63 per cent (Figure 3).

Present state of green infrastructure in the pilot regions

In the Northern and Eastern part of the micro-region of Csorna, Hanság-Tóköz dispose of high ecological value of the remnants of the former marshland, mosaic-like landscape in the remnants and in the drained marshland. Here the GI network is dense and mostly intact. Rábaköz is plain mainly monotonous agricultural landscape with missing or low value sections, elements of GI. From East and South the Rábaköz is bordered by river Rába, the riparian forests and meadows are of high ecological value. Forests just make up approximately 6 per cent of the micro-region and the majority of these are plantations of *Robinia pseudoacacia* L.

In micro-region of Gönc the mountains of Zemplén can be characterised by high ecological value of the extensive forests. The Hernád-valley is mostly plain, monotonous agricultural landscape, the only elements of the GI networks are the valleys of the creeks between the Mountains and the River Hernád. There are extensive orchards on the foothills of Zemplén of moderate ecological value. Along the river Hernád the forests and backwaters are of high ecological value.

The continuous intensification of agricultural production has led to a series of land use conflicts in both pilot regions. In Hanság-Rábaköz maybe the most serious one is the high rate of excess waters. In general, 12 per cent of the territory of the micro-region has frequent occurrences of excess waters, but there are settlements especially in Hanság where this proportion is above 30 per cent. Owing to the continuous intensification of agricultural production, arable land covers such areas also where the conditions are not the best for this cultivation form. For example, there are huge areas of Csorna with a high potential of excess waters which in the middle of the 19^{th} century were cultivated as pastures, but by the end of the century had mostly become arable land (Figure 4). Crop production is more profitable fore farmers than grazing and animal husbandry, which leads to the continuous loss of grassland.

Figure 4. Land use in the middle of 19th century in the micro region of Csorna (II. Military survey, 1845-1846); at the end of the 19th century (III. Military survey 1872-1884); present state with frequent occurrence of excess waters

Source: www. mepar.hu.

In Gönc micro-region the cultivation of hillsides is problematic; much of the arable land is situated on steep slopes where the potential of erosion is quite high. Also in Hernád valley in the past there were swampy areas which are now arable land with high risk of excess waters.

Green infrastructure development

In the field of GI development there are wide range of development possibilities which help to enhance the multifunctionality of the landscape (Figure 5). In spite of the different characteristics of GI in the pilot regions, the development goals are more or less similar (Table 3). To maintain and stop the declining trends of ecosystem services it is essential to improve the GI system in the pilot regions, especially on intensive agricultural land. Both pilot regions have great monotonous agricultural landscapes where the diversification of the production structure, higher rate of horticulture and growing importance of animal husbandry would improve the ecological value of the region and enhance employment potential of agriculture. In arable land the protection and development of semi-natural ecosystems such as forest belts, hedges etc. are crucial for landscape connectivity and permeability. The creeks, channels, and the green buffer zones along them could be the potential backbone of any regional green and blue network so it is essential to maintain 5-10 m wide buffer zones along watercourses (especially along the creeks of the Hernád valley and in Rábaköz).

The old, traditional orchards are important elements of landscape character and identity in micro-region of Gönc. The maintenance and development of these orchards and the development of the food processing sectors based on fruit production are important issues of rural development programmes.

In terms of the future trends of land use changes there is the question of whether the steady loss of biodiversity and intensification will continue or the growing importance of the GI approach, development and greening measures of agricultural production could change the trends. According to the possible future trends we elaborated three scenarios visualising the development of rural areas.

The realisation of the objectives of GI planning which are also important from the rural development point of view require great efforts from the local society and authorities but in the long term these improve the life quality and population retention capacity of rural regions (Figure 5). In scenario C with the full realisation of rural development programmes and environmentally-friendly methods and diversification of local economy we can visualise flourishing rural regions with diverse agricultural production structures, and significant shares of sectors with higher added value (Table 4) in the future. Tourism, multifunctional agriculture and food processing can absorb the local human resources so the strong ageing and depopulation process will be slowed down or reversed.

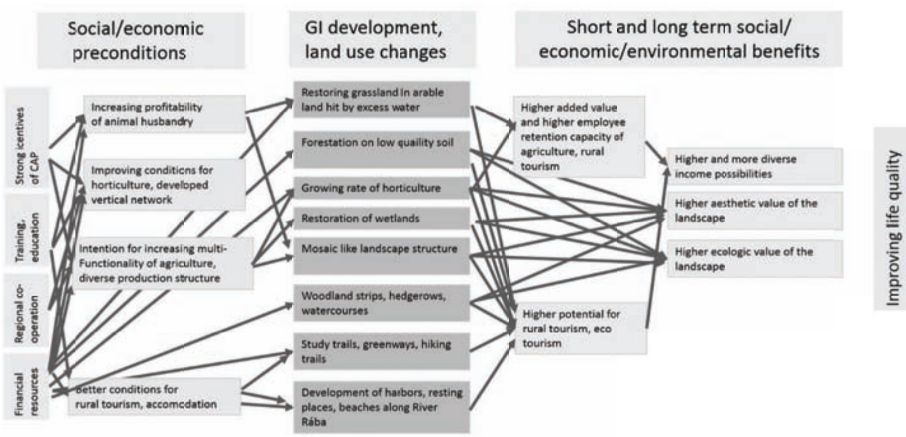

Figure 5. Preconditions and long-term effects of green infrastructure development
Source: not stated.

Table 3. Green infrastructure objectives in the pilot regions

Micro-region of Csorna	Micro-region of G□nc
Diversify agriculture, enhancing multifunctional production structure (more horticulture, animal husbandry, grassland). Protection and development of semi-natural ecosystems in the agricultural land (maintenance and development of forest belts, hedges etc.) Increase the share of grassland, especially in areas of frequent excess water. 5-10 m wide buffer strips along watercourses. Increase the share of forest by at least 3 per cent at settlement level and 10 per cent at regional level. Enhance eco-tourism potential by GI development (Hans□g, R□bak□z, along river R□ba).	Decrease the intensity of agriculture in the Hern□d-valley, diversification. Protection and development of semi-natural ecosystems in the agricultural land especially in the valley. Development of the green connection between the Mountains of Zempl□n and the river Hern□d. Increase the width of the riparian forests. Maintenance of the old, traditional orchards on the foothills of Zempl□n. 5-10 m wide buffer zone along watercourses (especially along the creeks of the Hern□d-valley). Enhance eco-tourism potential by GI development.

Source: own construction.

Table 4. Possible scenarios in rural regions on the basis of the scale of realisation of green infrastructure development and CAP greening

	Scenario A Trend scenario	**Scenario B Greening (basic)**	**Scenario C High level of GI development, growing significance of rural development**
Driving forces	Maximum profit from agricultural land, decreasing employee absorption capacity of agriculture.	Protection of permanent grasslands, partial protection of non-production areas otherwise continuing trends in agricultural production.	Strong incentives in rural development and agricultural policy for changing, diversifying production structure, nature protection.
Major land use changes	Decreasing share of grassland, increasing share of arable land and transitional woodland-scrub, increasing land use concentration	Lower, but steady decrease of grasslands, continuous growth of arable land.	Growing share of grassland, forests, growing share of horticulture, mosaic-like landscape.
Structure of agriculture	Decreasing multifunctionality, growing significance of arable land.	Decreasing multifunctionality, growing significance of arable land.	Diverse production structure, high share of sectors with higher added value, increasing employee retention capacity of agriculture.
Effect on biodiversity	Decreasing biodiversity.	Positive effects are questionable, probably in a lower rate, but steady decrease of biodiversity.	Decrease is stopped.
Demographic trends	Continuing strong depopulation and aging process in the region.	Continuing strong depopulation and aging process in the region.	Lower rate of depopulation and aging process in the region.

Source: own construction.

As stated above, the greening measures of the CAP contribute to the realisation of GI development. The question is how effective will be the greening in halting the loss of biodiversity. The greening has been just recently introduced and spatial data are not available about the practical realisation in Hungary but we can estimate the effects on the basis of the guidelines, interviews with experts. Several studies (van Zeijts et al., 2011, Máté and Kollányi, 2016) highlighted the fact that greening will have just limited effects, it will increase biodiversity especially in North-Western-European regions with high shares of intensive farms, and will have less impact in extensively-managed regions. Our pilot regions because of their varied landscape characters have intensive but also extensively-managed areas as well. The greening measures were softened in such a way through the negotiations that the farmers do not really have to realise considerable changes in their farming practice to fulfil the requirements. So unfortunately the possibility of realisation of A and B scenarios are higher. This means that the present trends of landscape changes will be continued in the future with further intensification and biodiversity loss. The labour need of intensively-cultivated arable land is low; the decreasing biodiversity and heterogeneity of the landscape will result in lower levels of ecosystem services. These processes result in continuing strong depopulation and aging processes of rural regions (Table 4).

Discussion

In spite of the fact that greening has been just recently introduced, the majority of scientific literature highlights its failure to stop the loss of biodiversity. What are the reasons for the limited positive effects? Significant core elements of greening are the so called Ecological Focus Areas which are important backbones of GI as well. These EFA elements such as landscape features, buffer strips and hedges may also be protected under cross-compliance. Also such crops qualify for EFA which are not beneficial to biodiversity (nitrogen-fixing crops, catch crops etc.), so the really valuable EFA elements cover usually maximum 1-2 per cent of the farm area. Originally conservation scientists and professionals recommended that 10 per cent of arable land within each farm should be allocated for ecological purposes, and permanent grassland cannot be considered (Máté and Kollányi, 2016).

In agricultural landscapes, grassland and pastures are important core areas of GI, which is why among greening measures the maintenance of grassland is crucial. Unfortunately, the present trends show a steady decrease in grasslands. In the micro-region of Csorna pastures dropped by 3 per cent and natural grassland by 10 per cent in the last fifteen years. In the micro-region of Gönc there are more drastic decreases: natural grassland dropped by 63 per cent in this hilly landscape, which meant land abandonment and the acceleration of natural forestation processes. A core element of greening is the protection of permanent grassland. But this measure allows a further loss of 5 per cent of their extent by 2020 at the regional level. This 5 per cent threshold is quite high: in some cases, it can just slow down the loss of grasslands.

Crop diversification requires at least 2-3 crops in large farms (above 10-30 ha) which does not really mean heterogeneity especially in cases when diversification is fulfilled by using spring and winter plantings of the same crop. So the crop diversification measures do not really mean any ecological, heterogeneity not even at the farm level, but especially not at the landscape level.

GI planning has become a popular approach in nature and landscape protection. But there are no effective financial and legal incentives to encourage the restoration of degraded ecosystems, or development of areas of low ecological value. Not even in rural development is GI development a priority. All these facts and processes highlight the possible realisation of Scenarios A or B.

The objectives of nature protection and agricultural production often contradict each other. These contradictions can be eliminated by the complex approach of GI development and considering the most effective ways of greening measures. In our study we have drawn attention to the overlapping functions of agricultural greening and GI. The improper agricultural management cause severe negative effects, which in the long term hinder effective and profitable production and contribute to the loss of biodiversity, low level of ecosystem services and finally to the depopulation of rural regions. Harmonisation of GI development with greening of agricultural production would improve the ecological network and the efficiency and diversity of production and the local economy. We have identified the most effective locations of greening and GI development in the pilot regions. With the scenario building we tried to give guidance for future planning in landscape management and development. Our scenarios highlighted the fact that the present incentives for greening of agricultural production and GI development are not enough. Much more effort is needed to stop the negative trends of rural regions.

References

Benedict, M.A., McMahon, E.T., 2001. *Green Infrastructure: Smart Conservation for the 21st Century*. Sprawl, Watch, Clearinghouse Monograph Series.

Civic, K., Siuta, M., 2014. *Green Infrastructure – Training manual for trainers*. Tilburg, the Netherlands: ECNC and Budapest, Hungary: CEEweb for Biodiversity.

Dancsokné Fóris E., 2015. *Zöldinfrastruktúra és vidékfejlesztés* [Green infrastructure and rural development]. In: Gazdálkodás és Menedzsment Tudományos Konferencia I. Kecskeméti Főiskola.

EC, 2010. *Green infrastructure*. Brussel: European Commission. Available at http://ec.europa.eu/environment/nature/info/pubs/docs/greeninfrastructure.pdf

Ely, M., Pitman, S., 2014. *Green Infrastructure; Life support for human habitats*. Adelade: Botanic Gardens of Adelaide, Department of Environment, Water and Natural Resources.

Máté K., Kollányi L., 2016. *The potential impact of greening as a directed land use on the landscape structure*. In: I. Valánszki, S. Jombach, K. Filep-Kovács, J.Gy. Fábos, R.L. Ryan, M.S. Lindhult, L. Kollányi (eds), 2016. Greenways and Landscapes in Change – Proceedings of 5th Fábos Conference on Landscape and Greenway Planning, Budapest, Hungary, 30 June 2016, 79-85.

Van Zeijts, H., Koen Overmars, K., Van der Bilt, W., Schulp, N., Notenboom, J., Westhoek H., Helming, J., Terluin, I., Janssen, S., 2011. *Greening the Common Agricultural Policy: impacts on farmland biodiversity on an EU scale*. Den Haag: Planbureau voor de Leefomgeving.

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Innovation in farming and rural areas in Hungary and Romania: its current state and determining factors

Abstract: *Increasing attention is being given to the role of innovation in promoting rural development and sustainable intensification of agriculture. By means of quantitative data and semi-structured interviews with representatives of the main actors in the rural and agricultural innovation chains, this paper compares and contrasts the status and role of innovation among rural actors and farmers in Hungary and Romania. In both countries, many NUTS3 regions are predominantly rural (PR), showing the importance of promoting innovation in agriculture and rural areas. In Hungary the percentage of households in PR regions having subscribed to broadband Internet connection was almost double that of Romania and the selected education and training indicators (both among the general population and among farmers) were also higher. The state of innovation in farming in the two countries is assessed by the interviewees to be weak and it was confirmed that many farmers are either simply followers of innovation, or do not attach importance to innovation. In Romania, foreign/multinational firms/companies are believed to be the major producers of innovation. Although in both countries the state is perceived to have a major role in the mediation of innovation, governmental organisations could do more to improve innovation. It remains to be seen whether the current policy interventions will stimulate an increase in innovation in the two countries.*

Keywords: *sustainable intensification, socio-economic indicators, innovative capabilities, policy interventions*

Introduction

In 2011 the Food and Agriculture Organization of the United Nations (FAO) proposed a new paradigm of intensive crop production, one that is both highly productive and environmentally sustainable (FAO, 2011). This idea of 'sustainable intensification' of agricultural production is now widely accepted, with 'sustainable' including the economic (e.g. profitability of farming), environmental (e.g. minimising unfavourable environmental impacts such as pollution) and social (e.g. maintaining sustainable farming communities) dimensions. In line with this, increasing importance is being attached to the role of innovation in promoting rural development and sustainable intensification in agriculture.

Numerous definitions of innovation appear in policy documents. WB (2006) states that "[i]nnovation is the process by which individuals or organizations master and implement the design and production of goods and services that are new to them, irrespective of whether they are new to their competitors, their country, or the world". Similarly, OECD (1999) defines it as "anything new introduced into an economic or social process" and as "the ability to manage knowledge creatively in response to market-articulated demands and other social needs". It does not matter whether this is new to producers, competitors or the economy. According to OECD (2005), innovation can be a technologically new or remarkably improved product, service, process, a new marketing or management method in the business practice, organisation or external relationship. Based on this definition, product innovation, process innovation, marketing innovation and organisational innovation can be differentiated. Reflecting the view of the European Union (EU), SCAR (2012) uses the OECD's definition of innovation.

Farmers can innovate in different ways. Change can involve farm products, production processes and/or farm organisation and management[1]. In addition to facilitating sustainable intensification, innovation help farmers to expand, change or diversify their marketable output, thereby increasing the profitability of their farms, to free up resources for use in other economic activities, or enhance the provision of important ecosystem services (FAO, 2014). It can be argued that there is a difference between an entirely new, breakthrough innovation and the adoption and/or adaptation of a massively-spread innovation. Farmers can justifiably point out that, when dealing with plants, animals and the weather, they have been innovating and adapting their practices since agriculture began. However, innovations created out of immediate and urgent needs, for example of smallholders or family farmers, frequently from their existing knowledge and without the appropriate resources to grow, have usu-

[1] Innovation is often used as a synonym of a new technology or product, however a new plant variety can be considered as innovative only after its economic, environmental or social benefit for the farmer has been proven in practice.

ally very limited potential to upscale and generate a development change, or lead to transforming the agricultural sector.

Over fifteen years ago, OECD (1999) could state (p.9) "[e]nterprises are the main source of innovation". More recently, the innovation systems approach has recognised that innovation is also a social process between different actors. This is linked to the concept of social innovation. Bock (2012) observes (p.57) that "[e]verybody seems to agree that social innovation is important but what exactly is meant by the term often remains unclear". She identifies three main interpretations of social innovation that underline (a) the social mechanisms of innovations (they take place within specific social and cultural contexts and networks of social relations); (b) the social responsibility of innovations (they should take into account 'people and planet' and not only 'profit'); and (c) the innovation of society (where the focus is on changes in social relations, people's behaviour, and norms and values).

Individuals and institutions (and the linkages between them) and the 'enabling environment' (which includes factors such as political commitment and vision; policy, legal and economic frameworks; budget allocations and processes; governance and power structures; incentives and social norms) make it possible to bring new products, processes and forms of organisation into use to achieve food security, economic development and sustainable natural resource management (FAO, 2012). Thus, as Rivera et al. (2006) concluded, "effective knowledge systems for enabling agricultural development generally require (a) a core capacity in public sector technology institutions that (b) promote pluralistic (i.e. sector-wide) research systems and extension services that are (c) strategically aligned in knowledge and information systems that increase coordination [their emphasis] and respond to client demands (d) to advance innovation fostered by a facilitating policy and institutional environment" (p.588). Effective policy interventions for encouraging agricultural and rural innovation are therefore necessary.

In Hungary, the National Rural Development Strategy 2012-2020 (VM, undated) aims for 'viable agricultural and food production' together with the 'protection of natural resources and the environment, and the sustainable use of natural resources'. Romania does not have an equivalent national strategy but the National Rural Development Programme (NRDP) 2014-2020 (MARD, 2014) is addressing the following strategic objectives: 'increase the competitiveness of agriculture', 'sustainable management of natural resources and climate change' and 'balanced rural development, reducing economic and social disparities between different areas of the country'. Both approaches are consistent with the idea of sustainable intensification. The specific objectives are listed in Table 1.

Table 1: Specific objectives of the Hungarian National Rural Development Strategy 2012-2020 and the Romanian National Rural Development Programme 2014-2020

Hungary	Romania
• Encouraging employment growth; • Balanced and diverse agricultural and forestry production structures; • Local food production and food markets; • Restoration of local power generation; • Strengthening of local rural communities including improvement of demographic indicators; • Conservation of biological diversity.	• Employment growth in agricultural sector; • Workforce rejuvenating in rural environment; • Restructuring of small and medium farms; • Improving the economic performance of farms and processing sector; • Adaptation of agricultural infrastructure to mitigate climatic change effects; • Strengthening local development through the LEADER approach.

Sources: VM (undated) and MARD (2014).

The EU has implemented several rural and agricultural innovation-related programmes and initiatives. The LEADER approach that was designed to mobilise and deliver rural development in local rural communities (EC, 2006) depends heavily on the above-mentioned social process between different actors for its effectiveness. More recently, in order to foster competitive and sustainable farming and forestry through innovation, the European Innovation Partnership ‘Agricultural Productivity and Sustainability’ (EIP-Agri) has been established to bring together farmers, scientists, advisors, enterprises and others in farmer-driven multi-actor project-based partnerships or ‘Operational Groups’ (OGs). Topics for OGs can include environmental and social, as well as economic innovation (EC, 2012). In the current programming period, Hungary plans to establish 70 OGs (ENRD, 2015a) and Romania expects to set up 24 (ENRD, 2015b).

In view of the increasing importance attached to agricultural and rural innovation in the national and European policy agendas, this paper compares and contrasts the current state and role of innovation among rural actors and farmers in Hungary and Romania. It attempts to identify the determining factors of the introduction, acceptance and diffusion of innovation in the two countries and, from this information, advance some ideas on how the efficiency and effectiveness of innovation in agriculture and rural areas can be improved.

Methodology

Key indicators

To provide a socio-economic and socio-technical context of innovation in the two countries, identifying similarities and differences between them, the main features of agriculture and rural areas in Hungary and Romania were compared via an analysis of key indicators for the period 2005-2010. Two sets of indicators were selected:

- *The main socio-economic characteristics of rural areas*[2], so as to give a general overview of the rural areas that are addressed by AKIS;
- *Innovative capabilities*[3], i.e. the subset of the competences/capabilities which allow the rural actors to access and benefit from innovation sharing.

The rationale behind the choice of the first set of indicators is reasonably self-evident. Measuring innovation capability per se is not easy as there is no consensus on its definition (Zawislak et al., 2012) so, as proxies, the second set of indicators was selected to encompass (a) information channels, (b) educational levels and (c) age profiles:

- *The percentage of homes having subscribed to broadband Internet* is a measure of access to an important information channel (Bótáné Horváth et al., 2015);
- *The educational structure of the rural labour force* shows whether this indicator represents an opportunity or a threat to the development of non-agricultural entrepreneurial initiatives. The implementation of economic activities that require a higher level of training can be facilitated by a higher educational level in the rural labour force; on the contrary, a low educational level is associated with a reluctance to innovate (Bougrain and Haudeville, 2002; Gray, 2006);
- *The structure by age of farm managers* reflects the *potential innovating capacity* in a given area. A younger age structure is associated with greater willingness to accept innovation, to internalise new ideas of business management, new technical and technological procedures and to generate innovative ideas due to greater openness towards risk assumption (Jung and Ejermo, 2014). Openness to innovation also stems from the fact that young people usually have higher educational capital compared to older people and their social independence permits them a much higher mobility;
- *Structure of farm managers by their agricultural training level* reflects their ability to access and use innovations with a high-tech level, new farm management tools, etc.

Interviews

Semi-structured interviews were conducted face-to-face or by telephone (and in one case by email). This method allowed us to study the assumptions, values and experiences of the project team members, project participants or external

[2] Percentage of population resident in predominantly rural (PR) NUTS3 regions; percentage of land area accounted for by PR NUTS3 regions; average population density of PR NUTS3 regions; average GDP per inhabitant in PR NUTS3 regions cf. other regions; employment by sector in PR NUTS3 regions cf. other regions; unemployment rate in PR NUTS3 regions cf. other regions; average utilised agricultural area (UAA) per farm; average standard output per farm; number of farms and their economic size profile in terms of number of farms and share of UAA occupied.

[3] Percentage of homes having subscribed to broadband Internet in PR NUTS3 regions cf. other regions; Educational level and participation in adult education and training in thinly-populated NUTS2 regions; age profile of farm managers; agricultural training level of farm managers.

parties; and at the same time to encourage reflection. The interviewer stimulated the interviewee to examine issues (such as the barriers in the existing system or the interrelationships) in greater depth. The main topics covered during the interviews were derived from Biró et al. (2014) and are listed in Table 2.

Table 2: Main topics covered during the interviews

Topic
• A brief description of the interviewee's organisation or farm; • Interpretation of innovation and knowledge sharing, assessment of innovation performance; • Determining factors of the introduction, acceptance and diffusion of innovation; • Innovation activities of the interviewee's own organisation, business or farm; • Tools to encourage innovation; • Comments on any other topics considered to be important.

Source: own composition.

The interviewees were selected to represent the main actors in the rural and agricultural innovation chains (see Fieldsend et al., 2015 for details) although, in line with our previous experience that most farmers in Hungary and Romania behave as followers in innovation, no individual farmers were interviewed. The interviewees were already known to the researchers to be experts in the topic and, in several cases, to have knowledge of the environmental and social sustainability of agricultural innovation as well as its economic sustainability. The interviews were carried out in June, July and August 2014. Each interview took approximately 1.5-2 hours and was recorded with the permission of the interviewee.

The Romanian interview results were processed via the following steps: categorisation, contextualisation, metaphorical substitution, formal analysis and structural analysis. The 'framework' method described by Brunt (1997) was used by the Hungarian researchers. This involves five stages: familiarisation, identifying a thematic framework, indexing, charting, and mapping and interpretation. It was agreed between the two research teams that the two methodologies were essentially compatible.

Results

Comparative analysis of key indicators

Comparisons between the status of rural areas in Hungary and Romania are hampered by the fact that national data sets are not always compatible. EU level data are often available only at NUTS3[4] (or even NUTS2) level, and many such regions are composed of both rural areas and urban centres. However, we could make the following comparisons.

[4] Unless otherwise stated, 'region' is used in a sense of a NUTS3 level region.

The importance of predominantly rural[5] regions in the two countries in 2012 (the most recent comparable data at the time of writing) was similar. In Hungary, 46.6 per cent of the population was resident in such regions, which occupied 66.3 per cent of the land area. The equivalent figures for Romania were 45.5 and 59.8 per cent. The population densities (75.4 and 71.3 inhabitants per km^2 in Hungary and Romania respectively) of predominantly rural regions in the two countries was also similar (Table 12 in EC, 2013).

National data from 2011 (again, the most recent comparable data) show that in Hungary the average GDP per inhabitant in predominantly rural regions was EUR 7,206 (cf. EUR 7,535 in intermediate regions and EUR 21,873 in Budapest). A much larger gap in economic performance existed between predominantly rural (EUR 4,331) and intermediate regions (EUR 5,793) in Romania, while the value for București was EUR 15,516.

In 2011, the breakdown in employment by sector (NACE Rev. 2) in predominantly rural regions of Hungary was as follows (intermediate region data are shown in parentheses): primary sector: 11.5 (8.9) per cent; secondary sector: 37.4 (33.2) per cent; and tertiary sector: 51.0 (57.9) per cent. The equivalent data for Romania were as follows: primary sector: 38.9 (29.7) per cent; secondary sector: 28.0 (31.1) per cent; and tertiary sector: 33.1 (39.3) per cent (EC, 2014). In contrast to Hungary, where the primary sector accounts for only around 10 per cent of employment outside Budapest, it continues to account for around 40 per cent of jobs in the predominantly rural regions of Romania although it should be noted that most jobs are not represented by employees (with full or part time working contract). The majority of the Romanian population working in agriculture are family members working or self-employed on their own farm.

According to Eurostat data, in 2012, 10.8 per cent of the population aged between 20 and 64 in predominantly rural regions of Hungary was unemployed, compared to unemployment rates of 11.6 and 9.3 per cent in intermediate and predominantly urban regions respectively[6]. Unemployment rates in Romania were notably lower but were higher in predominantly rural regions (7.3 per cent) than in intermediate regions where the figure was 6.9 per cent.

In 2010 the average utilised agricultural area (UAA) per farm in Hungary was 8.6 ha, an increase from 6.4 ha in 2005. Similarly, the average standard output (SO) had increased from EUR 6,866 to EUR 9,086. By contrast, the average

[5] In 2010, the European Commission adopted a new NUTS3 level typology of predominantly rural, intermediate and predominantly urban regions, based on a variation of the previously used OECD methodology. This is described at http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Urban-rural_typology and is used by EC (2013).

[6] Since 2011, public workers in Hungary have been accounted for as regular employees.

UAA per farm in Romania in 2010 was almost unchanged from 2005 (3.4 ha cf. 3.3 ha) while average SO had increased only from EUR 2,471 to EUR 2,700. These data are also taken from the Eurostat database.

Also in 2010 there were 534,020 farms in Hungary, of which 65 per cent had an economic size of less than EUR 2,000 SO while more than 30 per cent of the UAA was occupied by farms that were EUR 500,000 SO or more in size (Figure 1). Farms of an economic size of less than EUR 2,000 SO accounted for 73 per cent of the 2,816,460 Romanian farms, but these occupied over 20 per cent of the UAA. Farms of EUR 250,000 SO or more accounted for approximately 20 per cent of Romanian UAA, cf. 40 per cent in Hungary.

In conclusion, predominantly rural regions are prominent in both countries, but in Hungary the level of GDP is almost double. Employment in intermediate and predominantly rural regions is different: in Hungary, the tertiary sector is predominant while in Romania the primary sector recorded the highest values. However, unemployment is lower in Romania. Also, the farm structure is notably different between the two countries: the average size of farms in Hungary is approximately 2.5 times higher. Romania is characterised by a more pronounced polarisation between large and small farms than is Hungary.

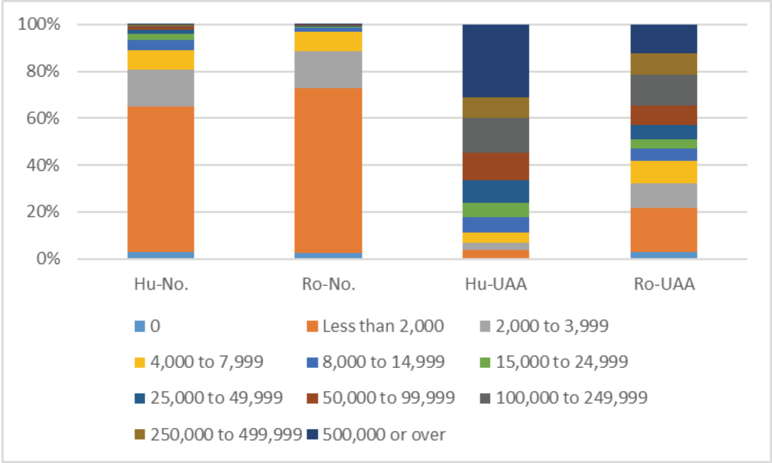

Figure 1. Farm structure by economic size (Standard Output) categories in Hungary (Hu) and Romania (Ro), 2010 (% total no. of farms and % total UAA)

Data source: Eurostat.

Innovative capabilities

In Hungary in 2012 the percentages of households having subscribed to broadband Internet connection were 60, 69 and 76 in predominantly rural, intermediate and predominantly urban regions respectively, while the equivalent percentages for Romania were 36, 70 and 70 (Table 88 in EC, 2013). Take-up increased tremendously in both countries between 2008 and 2010; for predominantly rural regions the increase was 25.1 and 30.3 percentage points in Hungary and Romania respectively. However, predominantly rural regions still lag behind intermediate regions and predominantly urban regions, especially in Romania.

In the same year, 72.1 per cent (Table 92 in EC, 2013) of the population aged between 25 and 64 from thinly-populated NUTS2 areas in Hungary had at least an upper-secondary level of education (ISCED level 3) and the share of adults participating in education and training in the same year was 1.9 per cent (Table 93 in EC, 2013). In Romania, the levels of both indicators were lower: 58.5 and 0.5 per cent respectively. Over the period 2007-2012 the evolution of these indicators was contradictory between the two countries. While the share of people with an upper-secondary diploma in thinly populated areas increased by 2.8 percentage points in Hungary, in Romania it decreased by 0.7 percentage points (Table 92 in EC, 2013). Throughout the five-year period the level of participation in life-long learning activities decreased in thinly populated areas of Hungary (-0.5) and slowly increased in Romania (0.1) (Table 93 in EC, 2013).

According to Eurostat data, over the period 2005-2010 there were contrasting trends in the age profile of farm managers in Hungary and Romania (Figure 2). Especially noticeable in Hungary was that the percentage of farm managers aged 45-54 dropped from 38 to 30, while that of farm managers aged 55-64 increased from 27 to 32. In Romania the percentage of farm managers aged 35-44 increased from 13 to 21 per cent, while a big fall, from 35 to 26 per cent, was evident in the number of farm managers aged 65 and above.

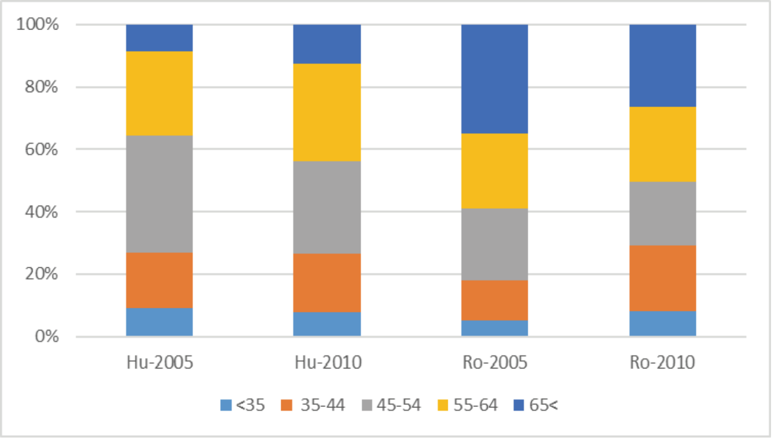

Figure 2. Age profile of farm managers in Hungary (Hu) and Romania (Ro) in 2005 and 2010 as a percentage of total farm Standard Output

Data source: Eurostat.

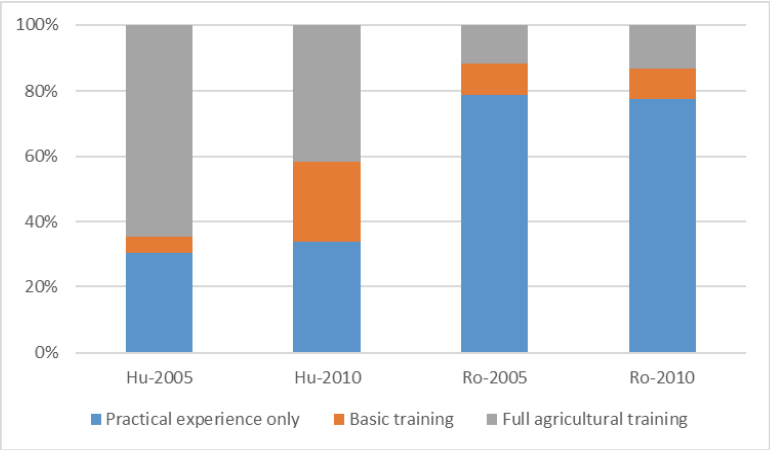

Figure 3. Agricultural training level of farm managers in Hungary (Hu) and Romania (Ro) in 2005 and 2010 as a percentage of total farm Standard Output

Data source: Eurostat.

Contrasting trends over time between the two countries were also evident in the agricultural training level of farm managers (Figure 3). In Hungary the percentage of farmers with full agricultural training fell from 65 in 2005 to 42 in 2010. In Romania over the same period the percentage of farmers with full agricultural training increased slightly from 12 to 13.

In conclusion, fewer households in predominantly rural regions are connected to broadband Internet, but the numbers are increasing in both countries. The shares of people with higher education and training are higher in Hungary. In terms of structure by age of farm managers, in Romania, there is an increase in the share of young farmers; in Hungary the older farmer group is increasing.

Interview results

Most interviewed actors in Romania and Hungary define ‘innovation’ as a novelty that helps to solve an existing problem, to improve a product or a service, to increase the economic performance of a product or process etc. Among governmental actors in Romania there is an overlap between the meaning of the ‘innovation’ concept and the ‘transfer of knowledge’. This particular problem was not noted in Hungary, although the importance of knowledge transfer in promoting (disseminating already existing) innovation is widely acknowledged.

The interpretations of the ‘innovation’ concept are generally of secondary importance to the evaluations of the benefits that the respective organisations might have if they implement the innovation process. ‘Generating money’ and ‘high value added’ are examples. The interpretations of the investigated actors represent instrumentalisations of the innovative process, resulting from their institutional attributes.

In Romania, the potential direct beneficiaries of innovation (farming company, farmers' cooperation cluster) and the innovation diffusers generally consider that it is the foreign/multinational firms/companies (agricultural input manufacturers and suppliers) that produce innovation, while also ensuring the efficient transfer of necessary knowledge for its implementation The same actors also valorised the role of the market in the process of innovation creation. Similarly, the interviewees also believe that innovation and its implementation can be put into practice only by foreign companies, and that the large and medium-sized farms in Romania are the beneficiaries (territorial government entity, farmers' cooperation cluster, farming company).

Most Hungarian interviewees assessed the state of innovation in the country's farming and food industries to be very poor. Many farmers are focusing on immediate issues such as the weather during harvest, blue tongue and markets (e.g. the Russian embargo on fruit imports) and do not see innovation as a solution to these problems. Other farmers, however, are able to focus on innovation because their businesses are secure. Unlike in Romania, multinational companies are not seen as being such clear leaders in innovation, but their important role is tacitly recognised by many of the interviewees.

In Romania the role of the state in generating innovation is positively valorised by actors from the public sector (research organisations and regional governmental organisations). They consider that the state has the role of mediating innovation at territorial level by facilitating the meeting between the innovation suppliers and the final beneficiaries, through fairs, exhibitions, information caravans, etc. In Hungary the state is also expected to provide an appropriate (enabling) environment for innovation and to part-finance innovation.

In Romania, the hierarchy of organisations/institutions that mediate innovation is headed by the *multinational companies that manufacture and supply inputs*. They are followed by the *universities and research institutes, research stations* and different institutions that represent the Ministry of Agriculture and Rural Development: territorial entities with administrative functions (county agricultural directorates, town halls), and entities with agricultural and rural development support functions (*development agencies, agricultural payments agencies, advisory agencies*).

In Hungary. the *Chamber of Agriculture* is now responsible for all farm advisory services in Hungary so has a major role in mediating innovation. The important role of *producer organisations* is also recognised. Many other organisations similar to those listed above for Romania are active in Hungary but it is difficult to rank them in order of importance.

The main disturbing factors of innovation dissemination in Romania differ according to the perception of interviewed actors, namely:

- The *innovation offices/agencies* consider that there are several different factors that hinder innovation transfer, namely lack of finance, fear of novelty, lack of information, legislation, state;
- The *farming companies* believe that the disturbing elements lie in the state institutions, financial scarcity and the non-functional relationships existing between the farmers and the state in particular;
- The *research organisations, governmental entities and cooperation clusters* consider that the farm and farmer characteristics (absence of agricultural education and of vocational training, economic farm size) generate significant obstacles in the process of innovation diffusion and acceptance.

Hungarian interviewees identified numerous factors that they believe disturb the transfer of innovation. For example:

- The *innovation offices/agencies* (*bridging organisations*) believe that Hungarian entrepreneurs are waiting for others to do something for them, awareness and cooperation are low, and that there is no demand for development;
- *Businesses and farmers' organisations* point to a lack of resources (technology and capital), lack of information, competence and knowledge, an unskilled workforce, and the 'black' economy. Interestingly, one interviewee suggested that financial support is used by businesses to keep up with competitors but it holds back innovation;
- *Research organisations* and *public institutions* believe that multinational companies innovate but there is no demand on small farms. The gap between research topics and practical problems is too big to encourage innovation transfer.

Hungarian interviewees mainly feel that *governmental institutions* could do more to improve innovation. The grants system (together with related measures such as tax relief, employment support, innovation vouchers and venture capital) is considered to be potentially a key driver, but not presently very effective. One interviewee suggested that LEADER Local Action Groups should operate as [rural] development agencies.

Discussion

Our quantitative data illustrate the political, economic and social importance in both countries of the need to increase innovation activity in agriculture and rural areas. Almost 50 per cent of the population of each country lives in predominantly rural NUTS3 regions and the economic performance of these regions, in terms of GDP per inhabitant, is relatively low. The primary sector is an important source of rural employment in both Hungary and Romania.

Indicators for farm size, age and educational levels of farmers and the rural population, and broadband Internet penetration show that the potential for innovation in rural areas should not be underestimated. Although in terms of numbers, small farms predominate in both countries, farms with Standard Output of EUR 15,000 or more account for over 80 per cent of UAA in Hungary and over 50 per cent of UAA in Romania (Figure 1). These are real, commercial farms that produce for the market. In Hungary in terms of SO, around 70 per cent of farmers have at least basic training (better educated farmers should be more amenable to absorbing new information), although the figure for Romania is little more than 20 per cent (Figure 3). By the same measure, around 60 per cent of Hungarian farmers are aged under 55, cf. around 40-50 per cent in Romania (Figure 2). Thus, there are not negligible percentages of younger, educated farmers in both countries. In the wider population, over 70 per cent of the working age population from thinly-populated NUTS2 areas in Hungary have at least an upper-secondary level of education, although in Romania the figure is a little under 60 per cent. The percentages of households in predominantly rural NUTS3 regions subscribing to broadband Internet connection is lagging in both countries, but take-up is increasing rapidly.

The state of innovation in farming merits a less positive assessment in both countries. The opinion of the interviewees is that many farmers in both countries behave as followers in innovation, as already demonstrated in Hungary by Biró et al. (2014). Although the concept of innovation is widely understood, the confusion among government actors in Romania between 'innovation' and 'transfer of knowledge' implies that transferring knowledge between actors (such as from a machinery supplier to a farmer) is sometimes mistaken for genuine innovation in agriculture. This is probably linked to the view that multinational companies (input manufacturers and suppliers) are the leading drivers of agricultural innovation in Romania. By contrast, although their contribution is significant, such companies are not perceived as playing the leading role in Hungary. In both countries, the farm advisory services have traditional structures that are dominated by the public sector.

Although in both countries the state is perceived to have a major role in the mediation of innovation, interviewees believe that governmental organisations could do more to improve innovation. The current measures encouraging innovation are associated with those from the Romanian NRDP 2014-2020 (MARD, 2014): *vocational training and knowledge diffusion* (M-111), *modernisation of agricultural holdings* (M-121) and *supporting semi-subsistence agricultural holdings* (M-141). Knowing these measures shows that the actors are aware of the possibilities provided by the state institutions on one hand, and of the limited support provided by the public programmes for agricultural and rural innovation on the other. A similar set of EU measures will apply in Hungary although it is not yet clear how much funding will be allocated to them. The National Innovation Office used to publish calls and disburse grants (from Hungarian government sources) from the Research, Technology and Innovation Fund for different topics including agriculture. However, the government sector related to innovation is undergoing major restructuring and there are presently no open calls. It remains to be seen whether these interventions will stimulate an increase in innovation in the two countries.

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References

Biró, Sz. (ed.), Székely, E., Rácz, K. and others, 2014. *Innováció a magyar agrár és vidékfejlesztésben* [Innovation in Hungarian agriculture and rural development]. Budapest: AKI.

Bock, B.B., 2012. *Social innovation and sustainability; how to disentangle the buzzword and its application in the field of agriculture and rural development.* Studies in Agricultural Economics 114(2), 57-63. https://doi.org/10.7896/j.1209

Bótáné Horváth, N., Katona Kovács, J., Szőke, Sz., 2015. *Building an entrepreneurial environment in rural regions: a possible way to develop human and social capita*l. Studies in Agricultural Economics 117(1), 20-26. https://doi.org/10.7896/j.1428

Bougrain, F., Haudeville, B., 2002. *Innovation, collaboration and SMEs internal research capacities*. Research Policy 31(5), 735-747. https://doi.org/10.1016/S0048-7333(01)00144-5

Brunt, P., 1997. *Market Research in Travel and Tourism*. Oxford: Butterworth-Heinemann.

EC, 2006. *The LEADER approach. A basic guide*. Fact Sheet. Brussel: European Commission.

EC, 2012. *Communication from the Commission to the European Parliament and the Council on the European Innovation Partnership 'Agricultural Productivity and Sustainability'*. COM(2012) 79 final. Brussel: European Commission.

EC, 2013. *Rural Development in the EU. Statistical and Economic Information Report 2013*. Brussel: European Commission.

EC, 2014. *CAP context indicators – 2014 update* [www document]. http://ec.europa.eu/agriculture/cap-indicators/context/2014/indicator-table_en.pdf (accessed April 2015).

ENRD, 2015a. *2014-2020 Rural Development Programme: Key facts & figures: Hungary*. Brussel: ENRD.

ENRD, 2015b. *2014-2020 Rural Development Programme: Key facts & figures: Romani*a. Brussel: ENRD.

FAO, 2011. *Save and Grow. A policymaker's guide to the sustainable intensification of smallholder crop production*. Roma: FAO.

FAO, 2012. *Report of the FAO Expert Consultation on Agricultural Innovation Systems and Family Farming*, 19-21 March 2012, Rome, Italy. Roma: FAO.

FAO, 2014. *The State of Food and Agriculture: Innovation in family farming*. Roma: FAO.

Fieldsend, A.F., Tudor, M.-M., Varga, E., Florian, V., Rusu, M., Biró, S., Chiritescu, V. and Kruszlicika, M., 2015. *Knowledge sharing to promote innovation in agriculture and rural development in Hungary and Romania*, in Vásáry, V., Voicilas, D.M. (eds), Agricultural Economics and Rural Development at the beginning of the programming period 2014-2020 in EU member states – Comparative analysis for Romania and Hungary. Budapest: AKI.

Gray, C., 2006. *Absorptive capacity, knowledge management and innovation in entrepreneurial small firms*. International Journal of Entrepreneurial Behaviour and Research 12 (6), 345-360. https://doi.org/10.1108/13552550610710144

Jung, T., Ejermo, O., 2014. *Demographic patterns and trends in patenting: Gender, age, and education of inventors*. Technological Forecasting and Social Change 86, 110-124. https://doi.org/10.1016/j.techfore.2013.08.023

MARD, 2014. *National Rural Development Programme 2014-2020. Bucureşti*: Ministry of Agriculture and Rural Development.

OECD, 2005. *The Measurement of Scientific and Technological Activities: Guidelines for Collecting and Interpreting Innovation Data: Oslo Manual*, Third Edition. Paris: OECD.

OECD, 1999. *Managing National Innovation System*s. Paris: OECD.

Rivera, W.M., Alex, G., Hanson, J., Birner, R., 2006. *Enabling agriculture: the evolution and promise of agricultural knowledge frameworks*. Proceedings of the 22nd Annual Conference of the AIAEE, Clearwater Beach FL, USA, 580-591.

SCAR, 2012. *Agricultural Knowledge and Innovation Systems in Transition – a reflection paper*. Brussel: European Commission.

VM, undated. *Nemzeti Vidékstratégia 2012-2020* [National Rural Development Strategy 2012-2020]. Budapest: Vidékfejlesztési Minisztérium.

WB, 2006. *Enhancing Agricultural Innovation: How to Go Beyond the Strengthening of Research Systems*. Washington DC: World Bank.

Zawislak, P.A., Alves, A.C. Tello-Gamarra, J. Barbieux, D., Maciel Reichert, F., 2012. *Innovation Capability: From Technology Development to Transaction Capability*. Journal of Technology Management & Innovation 7(2), 14-26. https://doi.org/10.4067/S0718-27242012000200002