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Contents

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Foreword

Once again, issue number 1 of *Studies in Agricultural Economics* is produced by AKI in cooperation with the European Rural Development Network (ERDN, www.erdn.eu). It includes selected papers from the fourteenth ERDN conference held in Budapest, Hungary on 3-5 October 2016. The conference explored 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. Those papers not included in this issue are published in the conference proceedings.

The challenges faced by the post-socialist economies of the European Union (EU), such as the low uptake of innovation and modern technologies, and the low level of cooperation, are hindering the sustainable growth of the whole EU. A two-fold approach is needed to address these challenges. Firstly, through international cooperation, researchers from Eastern EU Member States must become more integrated into the European Research Area (ERA). Secondly, researchers and policy makers from the region should pro-actively influence the policy agenda, especially now that the debate on the shape of EU innovation policy post-2020 has started. The Budapest conference was designed to contribute to both of these objectives.

The EU FP7 project Impresa examined the impacts of scientific research on agriculture across the EU. Midmore reports that data availability in the post-socialist Member States is generally good but, in terms of funding research, the government sector seems to be declining in relative importance. Furthermore, the institutional structure in the region is not yet able to focus resources on farm-level needs in order to develop, disseminate and implement appropriate innovations.

In the Czech Republic, Hlavsa, Hruška and Turková found that farms supported by funds from the 2007-2013 Rural Development Programme have higher levels of economic performance and higher labour productivity than unsubsidised farms. They also have a higher level of fixed assets per hectare, suggesting that they have invested in new technology. A higher subsidy per hectare of UAS is evident in Less Favoured Areas (LFA) than in non-LFAs.

Székely used changes in commuting patterns between 2001 and 2011 as an indicator of the economic sustainability of territories covered by Slovakian LEADER Local Action Groups (LAGs). While there are marked differences between individual LAGs, his analysis shows that the position and attractiveness of most LAGs as local labour markets has weakened over the ten-year period. This may in part be a consequence of weaknesses in LAG governance.

Four papers look at ways of stimulating innovation. The EU H2020 project AgriSpin is exploring approaches to innovation brokering. Wielinga, Koutsouris, Knierim and Guichaoua describe the results from the programme of 'cross-visits'. Successful innovations often arise from technical, organisational and institutional synergies, the first spark for an innovation can occur anywhere in a knowledge system, and networks have an important role in creating synergies and encouraging innovation.

Lessons learned from the triple helix (industry, knowledge workers and governments) cooperation in the different regional 'Greenport' clusters in the Netherlands are synthesised by Geerling-Eiff, Hoes and Dijkshoorn-Dekker. Partners firstly need to build a proper working relationship and a common language. Primary aims for innovation should not be formulated too ambitiously. Later collaboration can focus on taking the innovation ambition to a higher level.

In Wales, the Agrisgôp programme uses Action Learning, where groups of farmers and foresters are recruited and subsequently facilitated by an experienced facilitator, to enable organisational change. Owen shows that Agrisgôp group intervention resulted in participants having increased confidence; improved communication skills; greater ability to apply new information to their business; a more positive attitude to change; and were more likely to have a long term business strategy.

The experience of transferring the LEADER approach to Georgia, a non-EU country, is described by Oedl-Wieser, Dax and Fischer. Despite the short period of work with these ideas, there has been a high degree of acceptance and interest among rural stakeholders and residents to taking up such an approach. Tangible results in terms of strategy development, project establishment and employment creation are reported.

ERDN has now been established for over 15 years and is uniquely placed to play a major role in strengthening the ERA and shaping EU innovation policy. These points are explored further in a policy brief included in this issue of *Studies in Agricultural Economics*.

Andrew Fieldsend
Budapest, March 2017

Peter MIDMORE*

Agricultural science research impact in the Eastern European Union Member States

Improving agricultural research impact is an important goal for the European Union (EU). The EU Framework 7 project Impresa studied the process of research impact across Europe, and this article selects and discusses results drawn from the 11 Eastern EU Member States. The major methods used were a survey of the levels and trends of research expenditures by the public and private sectors, case studies identifying impact pathways of individual science-based innovations, and quantitative analyses of the relationship between research investments and their final impacts. The conclusions drawn are that, despite the potentially high payback from public investments in agricultural science, insufficient resources are being invested by the post-2004 EU accession countries, and improvements in innovation capacity and networking should enhance the efficiency of research impact.

Keywords: research and innovation policy, Central and Eastern Europe, impact evaluation

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Introduction

The European Union's (EU) long-term growth policy gives a prominent role to research-based innovation. Initially, the Lisbon Strategy aimed for a competitive and dynamic knowledge-based economy. Its successor, the Europe 2020 Strategy, has targeted smart, sustainable and inclusive growth. In Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia, collectively referred to here as the Eastern EU Member States, agriculture is economically relatively more important than elsewhere in the EU, but its performance in terms of productivity, environmental impact and spatial and social equity could be considerably improved. Understanding the agricultural science base, from which innovation in agriculture should predominantly arise, is thus an important first step in enhancing innovation and beneficial impacts within the sector. It is therefore of some concern that relatively little is known overall about the impact of agricultural science in Europe. In the ex-ante impact assessment of the reformed Common Agricultural Policy (CAP) introduced in 2014, the annex on research and innovation noted that "it is not possible to draw a complete picture of the overall (agricultural research) effort since there are no data on private investments" (EC, 2011, p.5).

A substantial amount of activity is devoted understanding the impacts of science on innovation and the benefits to wider society in low-income countries (particularly in relation to the Millennium Development Goals: see, for example, CGIAR, 2005). Much less effort has been made in Europe, at least until the European Commission funded the Impresa (Impact of Research on EU Agriculture) project in 2013, which has examined the economic, social and environmental impacts of scientific research on agriculture across Europe. Its objectives were two-fold. The first was to describe the contemporary evolution of public and private agricultural research (bearing in mind that recent scientific and supply chain developments blur the boundaries of the discipline, as traditionally defined). The second was to explore its resulting impacts, using a variety of qualitative and quantitative approaches. It surveyed trends, sources and objectives of agricultural research across Europe, to establish the range, degree of integration and effectiveness of research activities. It selected a number of regional case studies to represent agro-ecological and socio-economic diversity for investigation of the causal framework of case-specific individual research-based innovations. Using a variety of modelling approaches, it also assessed the aggregate effect of agricultural science research on farming productivity, recognising also that, embedded in a 'European model of farming', additional policy goals relate to social, cultural and environmental targets. Pathways to impact, whether implicit or directly observed, rely heavily on effective knowledge sharing, and consequent stimulation of innovation, through the Agricultural Knowledge and Innovation System (AKIS) in all countries studied.

This article draws on the Impresa project's results to address specific issues for agricultural science and its translation into innovation and impacts in the Eastern EU Member States. Gorton *et al*. (2009) outlined the rural economic divergences between these countries and the rest of the EU. They had larger, less wealthy rural populations exposed to more likelihood of being unemployed and, if so, to be in long-term unemployment. Primary and manufacturing activities were more dominant but the services sector was underrepresented. Where rural people work in agriculture, they are less productive but work in a sector that contributes relatively more to national income than elsewhere in the EU; they worked on farms which in terms of average size were much smaller. While there is substantial variation, the most recent figures show that these 11 Member States employ 51 per cent of the EU labour force working in agriculture, contribute 29 per cent of total EU land utilised by agriculture, and produce 14 per cent of gross agricultural value added in the EU. Yet in terms of total public budget allocations for agricultural science, spending was only 6 per cent of the EU total, and an average of 0.017 per cent of Gross Domestic Product (GDP), a little over three-quarters of the EU average of 0.023 per cent.[1]

These data represent structural problems for economies with low agricultural productivity where science could contribute innovative technological solutions, whereas research investment is concentrated elsewhere in the EU. In the cen-

[1] Figures are sourced from Eurostat and relate to 2014.

tral planning period, especially in the final quarter of the twentieth century, solid agricultural output growth had been achieved, mainly as a result of heavy capital investment, and consolidation of production into large state farms and cooperatives during the central planning period. However, this went into reverse in the 1990s (Ciaian and Swinnen, 2009), and a bimodal structure of farm holdings resulted, with very large capital-intensive holdings at one end of the spectrum and very small part-time or subsistence plots at the other. Importantly, the agricultural research and dissemination system that existed prior to transition was relatively large, well-funded but bureaucratically unwieldy. Its priorities and programmes were set through interaction between the individual interests of research institutions and central planning authorities which set the national objectives for agriculture (Csaki, 1998). Hence, it was "appropriate to large-scale farming and geared to the relative prices of the communist period, which were considerably different from those of the present" (Sarris *et al*., 1999, p.323), and thus served the needs of neither branch of the dual production structure that emerged after transition.

Thus, understanding of the context and relevance of agricultural science in the more recently acceded EU Member States is required to address political barriers to solution of their problems. To achieve this, the article is organised into three main sections. The following section outlines the results of the Impresa project's research in the Eastern EU Member States, and this is followed by an examination of the project's overall results as they apply to these countries. The final section discusses the implications that arise and provides some conclusions to support future policy development, both for the Member States concerned and also for the EU as a whole.

Agricultural research in the Eastern EU Member States

Official Eurostat data on agricultural science research expenditure are incomplete. The most relevant measure of activity is classification by socio-economic purpose (NABS: Nomenclature for the Analysis and Comparison of Scientific Programmes and Budgets). Data over the period 2008-2014 are entirely absent for two countries (the Czech Republic and Latvia), and are only fully available for business enterprise, government and higher education sectors in four countries (Table 1). Overall, for the three sectors and over seven years, 33 per cent of observations are absent. The overall picture is one of modest growth in expenditures (data are in current price terms and inflation is likely to have reduced real spending). However, in per capita terms and as a percentage of GDP, there is still some way to go in terms of catching up with leading European nations, especially given the proportionately larger problems that they face.

Research investment

Gaps in research expenditure data are significant because complete series are necessary for analysis of their impact on productivity, an important measure of their effectiveness. Where data are missing, it is sometimes possible to supplement them from national sources, although under-reporting is a significant problem. For this reason, and also because the definitions used do not necessarily capture the fast-moving scope of contemporary science for agriculture, with its spillovers from biosciences, robotics and remote sensing, a survey was undertaken to supplement the Eurostat data. It aimed to complement and enhance the available Eurostat information with information on expenditures from alternative sources. It took advantage of the opportunity also to explore the structure of the agricultural science and innovation system in each country. This provided information about structural changes in the conduct of agricultural science across Europe and investigated perceptions of senior scientists and managers about future prospects for the discipline.

This survey covered 20 European countries, and a synthesis of its results is available in Chartier *et al*. (2014). A small number of countries (Germany, Spain, the United Kingdom, Italy and France) are responsible for over 70 per cent of public agricultural science budget allocations, and a substantial minority account for less than 5 per cent. Hence these larger countries were complemented with a representative selection of the other 27 countries then in the European Single Market (the EU, EAA and Switzerland). Seven Eastern EU Member States were surveyed: Bulgaria, the Czech Republic, Hungary, Latvia, Poland, Romania and Slovenia (see, respectively, Slavova *et al*., 2014; Ratinger, 2014; Fieldsend, 2014; Zēverte-Rivža *et al*., 2014; Podlaska, 2014; Ibna, 2014 and Juvančič and Erjavec, 2014).

The findings filled gaps and provided elaboration on the aggregate data presented in Table 1. The data collection strategy focused on identifying alternative indicative sources for missing Eurostat data. The diverse information sources used and varying data availabilities in individual Member States preclude the presentation of results in a consistent format to complement Table 1. Consequently, the situation in each country needs to be discussed separately prior to developing an overall conclusion with regard to Eastern European agricultural research investment. In two of the countries studied (Hungary and Slovenia), all information on agricultural research expenditure is available. However, while in Hungary the quality of this data is assessed as good, in Slovenia some concerns are raised concerning private enterprise research financing data, in terms of reliability and how well it reflects and increasingly complex underlying pattern of activity.

In Bulgaria, information on agricultural research expenditure is available for Private Enterprise and Government, but not for Higher Education. This is because of the wide discretion available to universities regarding how much of their budgets should be devoted to research, from 0.5 to 10 per cent for research in total, and diverse sources of funding which include state subsidy, EU Cohesion and Structural Funds and funding from international (i.e. EU RTD or similar projects) and national research programmes. So, for example, data from annual financial reports show that for the three specialist universities relating to forestry, agronomy and food technology allocated EUR 0.29, 0.30 and 0.22 million in 2008, 2010 and 2012 respectively. In Romania, Eurostat data are currently fully available only up to 2010, as

Business enterprise expenditures are missing for subsequent years. The survey produced no clear evidence for trends in these expenditures after 2010, although the sentiments of key informants indicate that public financing, which is declining, influences private expenditures on agricultural research which are also likely to be declining.

The NABS division of research expenditures by socioeconomic nomenclature more accurately describes contemporary

Table 1: Agricultural R&D Expenditure by NABS* in the Eastern European Union Member States, 2008-2014

Member State	Measure of expenditure	2008	2009	2010	2011	2012	2013	2014
Bulgaria	Gross expenditure (EUR million)	19.5	26.9	19.3	20.4	18.2	20.4	17.8
	Gross expenditure (% GDP)	0.052	0.072	0.051	0.049	0.043	0.048	0.042
	Gross expenditure (EUR per inhabitant)	2.6	3.6	2.6	2.8	2.5	2.8	2.5
	Of which: Business enterprise (EUR million)	0.7	2.6	:	3.6	1.7	:	3.8
	Government (EUR million)	18.7	23.8	16.2	16.2	16.2	16.6	13.7
	Higher education (EUR million)	:	:	:	:	:	:	:
Croatia	Gross expenditure (EUR million)	37.3	35.7	30.6	33.0	30.4	26.0	25.4
	Gross expenditure (% GDP)	0.077	0.079	0.068	0.074	0.069	0.060	0.059
	Gross expenditure (EUR per inhabitant)	8.6	8.3	7.1	7.7	7.1	6.1	6.0
	Of which: Business enterprise (EUR million)	10.1	9.3	6.3	8.7	6.0	2.0	2.1
	Government (EUR million)	4.9	5.8	6.2	5.9	6.0	5.6	5.5
	Higher education (EUR million)	22.2	20.6	18.1	18.3	18.5	18.5	17.9
Estonia	Gross expenditure (EUR million)	8.6	8.5	9.8	15.8	17.4	16.3	14.2
	Gross expenditure (% GDP)	0.052	0.060	0.067	0.095	0.097	0.086	0.072
	Gross expenditure (EUR per inhabitant)	6.4	6.4	7.4	11.9	13.1	12.3	10.8
	Of which: Business enterprise (EUR million)	0.3	0.0	0.1	0.1	0.1	0.2	0.1
	Government (EUR million)	2.2	2.4	2.7	2.5	2.6	1.7	1.9
	Higher education (EUR million)	6.1	5.9	7.0	13.3	14.7	14.4	12.2
Hungary	Gross expenditure (EUR million)	81.2	79.1	77.9	84.7	86.2	106.3	97.0
	Gross expenditure (% GDP)	0.075	0.084	0.079	0.084	0.087	0.105	0.092
	Gross expenditure (EUR per inhabitant)	8.1	7.9	7.8	8.5	8.7	10.7	9.8
	Of which: Business enterprise (EUR million)	18.9	18.9	26.3	32.7	41.1	60.8	45.0
	Government (EUR million)	37.1	33.1	31.5	31.3	26.9	29.4	34.9
	Higher education (EUR million)	25.2	27.1	20.2	20.7	18.3	16.0	17.2
Lithuania	Gross expenditure (EUR million)	17.1	14.3	11.4	13.6	8.3	13.8	16.9
	Gross expenditure (% GDP)	0.052	0.053	0.041	0.044	0.025	0.039	0.046
	Gross expenditure (EUR per inhabitant)	5.3	4.5	3.6	4.5	2.7	4.6	5.7
	Of which: Business enterprise (EUR million)	:	:	:	:	:	:	:
	Government (EUR million)	9.4	6.9	5.3	7.0	:	8.1	8.2
	Higher education (EUR million)	7.6	7.4	6.1	6.6	8.3	5.6	8.6
Poland	Gross expenditure (EUR million)	:	:	:	:	:	:	:
	Gross expenditure (% GDP)	:	:	:	:	:	:	:
	Gross expenditure (EUR per inhabitant)	:	:	:	:	:	:	:
	Of which: Business enterprise (EUR million)	:	:	:	:	:	:	:
	Government (EUR million)	:	102.4	112.9	103.9	104.1	96.7	104.1
	Higher education (EUR million)	:	:	:	:	:	:	:
Romania	Gross expenditure (EUR million)	59.6	38.2	40.5	:	:	:	:
	Gross expenditure (% GDP)	0.042	0.032	0.032	:	:	:	:
	Gross expenditure (EUR per inhabitant)	2.9	1.9	2.0	:	:	:	:
	Of which: Business enterprise (EUR million)	26.2	19.1	11.6	:	:	:	:
	Government (EUR million)	11.5	6.9	15.7	24.5	21.8	22.8	27.2
	Higher education (EUR million)	21.8	12.1	12.9	5.4	7.6	11.0	5.9
Slovakia	Gross expenditure (EUR million)	40.4	13.9	20.6	27.0	30.6	9.3	37.9
	Gross expenditure (% GDP)	0.061	0.022	0.031	0.038	0.042	0.013	0.050
	Gross expenditure (EUR per inhabitant)	7.5	2.6	3.8	5.0	5.7	1.7	7.0
	Of which: Business enterprise (EUR million)	24.2	0.9	1.5	1.5	1.5	1.5	1.6
	Government (EUR million)	13.6	9.4	15.9	20.7	20.1	2.8	29.3
	Higher education (EUR million)	2.6	3.6	3.2	4.8	8.9	5.0	7.0
Slovenia	Gross expenditure (EUR million)	11.2	12.7	12.8	15.5	18.0	16.4	16.4
	Gross expenditure (% GDP)	0.029	0.035	0.035	0.042	0.050	0.046	0.044
	Gross expenditure (EUR per inhabitant)	5.6	6.2	6.2	7.5	8.8	7.9	7.9
	Of which: Business enterprise (EUR million)	1.6	2.1	2.2	4.4	6.1	5.4	5.5
	Government (EUR million)	4.7	5.1	4.9	3.8	4.6	3.5	6.2
	Higher education (EUR million)	4.8	5.5	5.7	7.2	7.2	7.5	4.6

* Nomenclature for the Analysis and Comparison of Science Budgets and Programmes 2007
: Data not available
Source: Eurostat

Table 2: Agricultural R&D expenditure by FOS* in selected Eastern European Union Member States, 2008-2014.

Member State	Measure of expenditure		2008	2009	2010	2011	2012	2013	2014
Czech Republic	Gross expenditure (EUR million)		80.7	80.3	76.8	93.1	94.8	66.5	80.0
	Gross expenditure (% GDP)		0.050	0.054	0.049	0.057	0.059	0.042	0.051
	Gross expenditure (EUR per inhabitant)		7.8	7.7	7.3	8.9	9	6.3	7.6
	Of which:	Business enterprise (EUR million)	23.8	23.4	23.0	28.2	27.3	17.2	29.5
		Government (EUR million)	31.8	29.3	28.4	31.6	20.2	18.8	24.4
		Higher education (EUR million)	24.6	27.1	25.1	33.0	47.2	30.5	25.9
Latvia	Gross expenditure (EUR million)		14.1	6.5	11.1	12.7	:	:	:
	Gross expenditure (% GDP)		0.058	0.035	0.063	0.063	:	:	:
	Gross expenditure (EUR per inhabitant)		6.4	3.0	5.3	6.1	:	:	:
	Of which:	Business enterprise (EUR million)	0.1	0.3	0.3	1.0	:	:	:
		Government (EUR million)	9.4	4.4	6.1	8.1	11.1	10.3	9.3
		Higher education (EUR million)	4.6	1.8	4.8	3.7	4.2	4.1	5.2
Poland	Gross expenditure (EUR million)		156.3	131.8	199.9	202.2	159.0	175.7	246.6
	Gross expenditure (% GDP)		0.043	0.042	0.055	0.053	0.041	0.045	0.060
	Gross expenditure (EUR per inhabitant)		4.1	3.5	5.3	5.3	4.2	4.6	6.5
	Of which:	Business enterprise (EUR million)	15.8	12.1	16.0	26.2	23.7	25.6	78.4
		Government (EUR million)	115.0	83.3	123.8	:	:	:	100.6
		Higher education (EUR million)	25.6	36.4	60.1	61.1	48.4	51.1	67.4

* Fields of Science 2007
: Data not available
Source: Eurostat

research, contrasting with the more widely used Fields of Science classification which does not allow a 'value chain' approach: research on food and beverages, bioproducts, biomaterials or biofuels are classified in categories other than agriculture. However, although for the Czech Republic, Latvia and Poland the NABS measure is missing, expenditure classified by the more traditional Field of Science measure is mostly available, except for Latvian Private Enterprise research expenditures from 2011 onwards (Table 2). However, the scale of these is likely to have remained very small, relative to Government and Higher Education expenditures in Latvia.

It is not possible to identify an accurate overall trend in agricultural research expenditures across the Eastern EU Member States, although in individual countries rising, falling or broadly stable levels of expenditure can be discerned. As well as changing overall research expenditure, there were shifts occurring in the form in which expenditures were made and the topics covered. Core public funding for agricultural science seems to be everywhere being reduced and increasingly large proportions of budgets are distributed through programmes of competitive calls for proposals. For example, in Bulgaria core funding is now insufficient to cover operating costs of agricultural science institutes and they must rely on winning competitive projects in order to remain viable. Conversely, however, data reporting may underestimate total research income of institutes as sources other than state subsidies are not always reported; for example, divergence between Eurostat and national sources which can be attributed to this was evident in Romania. Compensation for declining research funding by greater utilisation of EU sources, such as Operational or Framework Programmes, is common elsewhere, for example in Latvia and in Hungary.

Two Member States, the Czech Republic and Poland, reported rising agricultural expenditures and strengthening expenditure on research by the private sector. In both countries this is associated with a general increase in research expenditure; in the former, however, agricultural science is receiving a diminishing share compared with other research areas. In the latter, requirements for business participation in the 'Complex Sustainable Systems' programme have been a stimulant for this interest. In most other countries surveyed, though, business expenditures on agricultural research were small in comparison to public funding. In Slovenia, private funding of agricultural research is worryingly low, due either to underdevelopment, failure to recognise the investment need, or margins that are too low to generate investment, any of which would be cause for concern. In Hungary, tax advantages temporarily boosted public-private research partnerships for agricultural science institutes, but recent restructuring of the tax system has reduced investment from that source.

Transition from the original Soviet model of Academies of Science is still ongoing, and for many countries government agricultural research institutes are still the main channel for research investment. Often research in Higher Education institutes is undertaken through cross-subsidisation from teaching revenues, or funded from outside sources. In Hungary much effort is being devoted to the restructuring of institutes under the overall framework of the National Agricultural Research and Innovation Centre (NAIK), although a consequence of this has been delay in developing an official research strategy for agriculture. In this and other countries surveyed, a process of restructuring to create more efficient frameworks to conduct agricultural research is in progress, often with a focus on reducing administrative costs.

The type of research being undertaken has almost entirely shifted from basic to applied, and in some circumstances is at the technical and near market end of applied research. Nevertheless some basic research continues to be conducted. A shift in publicly-funded research themes can also be identified. While food safety and productivity remain research topics of interest, most of the countries surveyed are placing more emphasis on natural resource management, biodiversity conservation, adaptation to and mitigation of climate change, and bioeconomy production.

Future prospects are viewed with some pessimism. In Bulgaria, agriculture is absent from the National Roadmap

for Research; declining government expenditure is unlikely to be compensated by a private sector mostly composed of small businesses lacking entrepreneurial culture, skills or motivation. In Latvia, Slovenia and Romania, less emphasis is expected on agricultural science in public research in future, compounding the problem of weak private sector interest. Poor strategic orientation and ineffective ex-post evaluation systems also hamper the performance of the research systems in these countries.

While expenditure data on scientific research on agriculture are generally better in Eastern EU Member States than elsewhere in the EU, there are still some significant gaps, and the more detailed perspective that this survey has uncovered identifies substantial concerns for the future, particularly with regard to the weakness of private sector engagement. The government sector appears to be diminishing in relative importance and the institutional structure is not yet able to focus resources on farm-level needs in order to shape research activity, or to develop, disseminate and implement appropriate innovations.

Detailed study of an innovation process: the Ecostop® plate

A methodological framework for detailed assessment of the impacts of specific agricultural science research projects has been developed for the Impresa project. In order to develop and test the approach, it was applied to six previously-developed innovations, selected from across a number of EU Member States. The method adopted was based on Participatory Impact Pathway Analysis (or PIPA: Springer-Heinze *et al*., 2003; Douthwaite *et al*., 2007). PIPA challenged the previously dominant logical framework approach to evaluation (described, for example, by Coleman, 1987) which represented the innovation process as a single causal chain, linking activities, outputs, outcomes and impacts in a chronological sequence. While retaining these elements of the process, PIPA instead recognises that a number of sequences can be identified, feedback loops can exist, and innovation can combine with important contextual factors to explain the change process more effectively.

Mixed methods were used in case study analyses to define and validate innovation pathways from initial research to overall impact. However, unlike the ex-ante orientation of the original version, an ex-post version was applied, outcome harvesting was developed as a supplementary validation approach, and more emphasis was placed on the role of the actor network than in the original method (see Schmid *et al*., 2016 for further details). The approach had the advantage of identifying enabling and hindering factors in respect of the development of trust, networks and role of economic and institutional frameworks, and also the existence of both unintended and unexpected effects.

Six case studies were conducted by the Impresa project, in Bulgaria, France, Germany, Italy (2) and the UK. All cases used the same investigative procedure. Initially, potential cases were screened for suitability, by identifying actors and other stakeholders, original research questions and potential impacts. Working with stakeholders, an initial impact pathway map was developed, refined and validated from triangulation of a range of forms of qualitative and quantitative data. The resulting innovation impact pathway was discussed in a feedback round with stakeholders, from which conclusions were drawn for both research practice and public policy development.

Only the Bulgaria case study, development of the Ecostop® plate to treat Varroatosis in bees (Box 1), is relevant to this paper, although it should be noted that the German case study (Hülemeyer and Sterly, 2016) was carried out on the territory of the former GDR. The challenge for the Bulgarian case study analysis was to understand the success of this innovation in a post-socialist context. Interaction with the stakeholder group described in Box 1 produced the impact pathway map set out in Figure 1, which categorises the events and their timing in order to produce the impacts from the original innovation.

The way in which the research influenced the final economic impacts can most plausibly be described through five key enabling factors. Firstly, a typology of existing drugs, their constituents, use and effects was produced to support development of a new product to counter Varroatosis resistance in synthetic medicines. From this, possible links between drug characteristics and resistance development proved important, mainly because essential oils appeared to have lower resistance risk than conventional treatments, and these informed the laboratory and clinical trials that adjusted the substances, the carrier, and the product package. Secondly, the research team integrated two important network structures, veterinary scientists and the beekeeping communities. Their integration played a role in understanding beekeeper practices and transmitting relevant feedback. The most important outcomes from this networking were identification of the need for an easy-to-use product and the

Box 1: Development of the Ecostop® plate.

Beekeeping is an important agricultural sector in Bulgaria (Koprivlenski *et al*., 2015) which has grown significantly over recent years. As elsewhere internationally, it faces a major challenge from the parasitic Varroa mite. This problem has worsened as the mite has been steadily acquiring resistance to existing medicines, most of which contain substances that are harmful for both bees and humans. The innovation chosen for study was a privately-funded and research-based treatment for Varroatosis, the Ecostop® plate. Two previously publicly-employed veterinarians, with complementary expertise in in pharmacology and biomineralogy, established a commercial enterprise which developed this alternative to conventional pesticides. It is based on essential oils impregnated into a mineral carrier. These are entirely natural substances, harmless to bees, which do not engender resistance. The innovation has achieved high penetration of the domestic market and growing international sales on the basis of limited private investment, in the absence of public funding for research and limited administrative capacity.

The plate was developed in collaboration with farmers and a network of other scientists, particularly apiculturists. Both main actors had worked together in the state sector, from the 1980s on, to develop precursor anti-Varroa products. From this they had developed a network, one which was not based on formal organisational structures but on professional and private social ties, which evolved as the foundation for their commercial enterprise. The structure of this actor network is hierarchical and self-contained with respect to expertise and control of information flows. The close involvement of beekeepers in it assisted product development, and was crucial for subsequent diffusion and adoption. The high level of informal trust between actors was necessary because confidence in post-communist public institutions is minimal, and consequently their effectiveness is weak.

Source: Slavova *et al*. (2016)

confidence gained from opinion leaders which helped to promote uptake. The third factor was technical. Adjustment between substances and carrier took four and a half years to develop from prototype to final product. This produced a unique carrier, a plate that needs to be introduced only once a year, producing gradual evaporation of the substance in the hive over the entire period necessary for treatment. Once established as a viable product, it was certified for organic beekeeping. Conventional beekeepers also found it useful because of its non-toxicity, effectiveness and timesaving. It also involves zero waste, a further beneficial environmental impact. Fourthly, leading beekeepers were closely involved in trialling the product. The prototype problems would not have been recognised as quickly without this engagement, and also dissemination of the product occurred rapidly as a result. The final factor was the adoption of the product for use by the National Beekeeping Programme. This provided significant subsidies for its use.

However, the inherent riskiness in scientific product development constituted a barrier, compounded by the negative role of the institutional framework. The Ecostop inventors made a number of applications for public funding, unsuccessful for two reasons that they describe: the high cost of consultancy to prepare the applications and the corrupt payments needed for the project to secure public support. In the event the enterprise was established on the basis of private funding only. Other major barriers were experienced in dissemination of the product. New markets outside Bulgaria in other EU Member States have been difficult to access, as registration costs are prohibitively high. Also, within Bulgaria, producer conservatism and black market sales of imitation products constrained sales growth.

The nature of the product complicates the assessment of the impacts. It is a successful, radical innovation and has contributed to maintenance and development of producer incomes through maintaining bee health, with further benefits to nature conservation and pollination as an ecosystem service, although only when applied with other appropriate anti-Varroa methods. Its introduction is also relatively recent and as a result it may be too soon to assess the full range of impacts, primary and secondary, positive and negative.

Many of the lessons that arise from this case study are shared with those from the other five case studies undertaken elsewhere in the EU. In essence, successful impact from an innovation arises from the existence of an influential and motivated individual (or individuals); a favourable context of

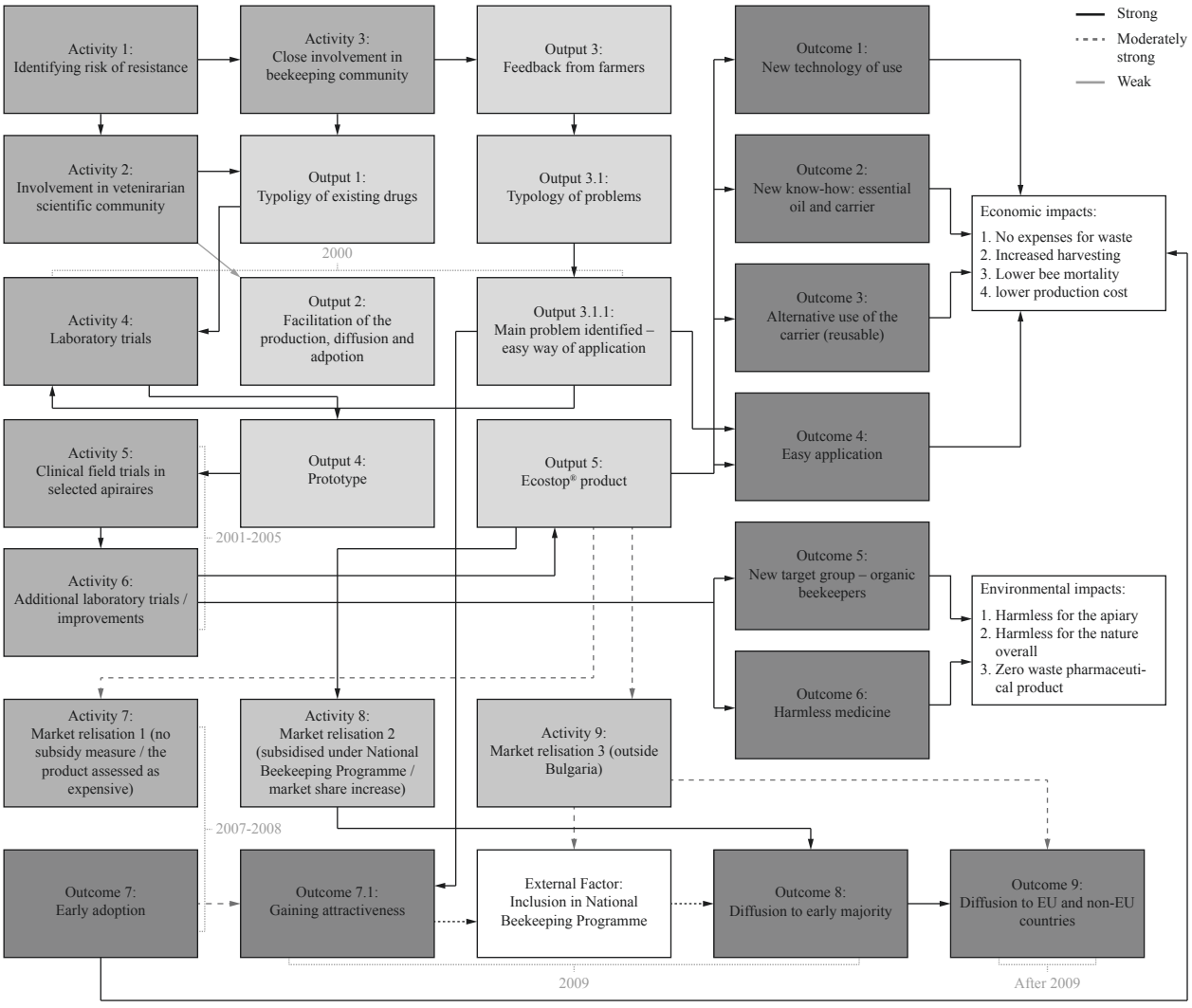

Figure 1: The Ecostop® Innovation Impact Pathway Map.
Source: Slavova *et al.* (2016)

trust among actors to foster networks and collaboration; and economic incentives facilitating the impact pathway. These issues are revisited in the concluding section of this article.

Quantifying research impacts: an Eastern EU Member States perspective

The impacts of scientific research on agricultural productivity growth have been the subject of a voluminous literature (summarised by Alston *et al*., 2000; and more recently in Mogues *et al*., 2012). In essence, changes in agricultural total factor productivity (TFP) are affected by a range of factors, including (both public and private) investment in agricultural research. However, in the particular context of the agricultural sector, composed of large numbers of small farm businesses with heterogeneous agro-climatic and structural factors influencing production, the full effect of science-derived innovation occurs some years after it is originally introduced. To account fully for this effect, and to control for other influences on productivity such as the weather, a knowledge stock approach is generally used. This assumes that in any particular period the effect of research can be represented by a weighted sum of previous research expenditures (also taking into account spill-overs from research conducted internationally, or embodied in imported inputs). For statistical efficiency, these historically-weighted effects are assumed to have a weighting pattern that follows a smooth curved function, and then econometric judgment is used to determine the shape and length that provides the best fit to the data. Further decomposition of the results allows calculation of the Internal Rate of Return (IRR) on research expenditures.[2]

In general terms, such studies confirm that lags between expenditure and their effects on productivity are lengthy: in the USA case, a minimum of 35 years rising to 50 years, with peak effects in year 24 (Alston *et al*., 2010). While rates of return vary considerably, Mogues *et al*. (2012, p.41) found that "Comprehensive meta-analyses spanning the second half of the 20th century show that the majority of estimates of internal rates of return … to investments in agricultural research are greater than 20 per cent, and a substantial 40 per cent of estimates find an IRR greater than 60 per cent".

Such studies require data series that extend over several decades, whereas – as noted above – in Europe as a whole and for many EU Member States, availability of data is intermittent and is also potentially unreliable. A further difficulty is that (especially over the last three decades) much research expenditure has been devoted to ameliorating the adverse environmental impacts of farming, which has tended to offset productivity increases.

Hence there have been few attempts to measure the impact of European agricultural research on productivity and, unsurprisingly, no analysis has yet been undertaken for the EU as a whole. Five studies in individual European countries of this type can be identified: for Italy, Esposti and Pierani (2003); for the United Kingdom, Thirtle *et al*. (2004), Piesse and Thirtle (2010); and for France, Butault *et al*. (2015); the report of Ratinger and Kristkova (2015) on the Czech Republic is the sole national study from the Eastern EU. These estimate national internal rates of return to be between 14 and 32 per cent.

Impresa conducted two studies to quantify the aggregate impact of European agricultural research. The first analysis addressed the impact of public expenditure solely on productivity. Vollaro *et al*. (2016) addressed the difficulty of insufficiently lengthy data series through use of a panel-data econometric approach, combining 16 countries over a number of time periods. However, this required countries to have sufficient standardised expenditure data and thus excluded any of the Eastern EU Member States. Expenditure data were based on government budget predictions, with production and input measures drawn from FAOSTAT. Two specifications were deployed, with production and TFP as dependent variables. In general terms, the results confirm the substantial contribution of European agricultural research to productivity increases, with a time lag of between 9-18 years and a Marginal Internal Rate of Return (MIRR) estimated at 7-15 per cent over the period 1980-2010. The MIRR is an average indication of impacts of agricultural research indicating that, because of differences in the volume and scope of their agricultural research activities, returns could be higher or lower in individual countries.

To account for the multiple effects of research, the second analysis (Bartolini *et al*., 2016) used a structural equation modelling approach to characterise causal links based on impact pathway analysis. The causal chain involved relationships between inputs of public and private research expenditure, via a number of outputs and outcomes, to impacts on renewable energy production, health, rural incomes and unemployment, as well as on productivity. Again, a selection of 14 countries was made, none of which was an Eastern EU Member State. The results showed that government-funded and private agricultural research expenditures affect competitiveness, environment and social welfare through different pathways, although the strength of influence of government expenditure is greater than that of business enterprise investment. The latter mainly contributes to added value increase, whereas the pathways of the former are more complex, and mainly support improvements in rural quality of life. The transmission of social welfare effects depends strongly on the type of research and the institutional environment in which it is performed.

Since none of these results were based on observations from Eastern EU Member States, none of these can be safely be inferred to apply to them. This neglect partly reflects the adverse bias noted in the introduction to this article, but there is a deeper concern with respect to the structural break involved in the transition from centrally-planned to market economies that began early in the 1990s. As Ratinger and Kristkova (2015) observe, in common with other formerly centrally-planned economies, the Czech Republic experienced a severe reduction in agricultural output, inflows of foreign capital and technology, and restructuring of land ownership in the years following 1989. Their approach involved using employment data as a proxy for expenditure prior to transition and correcting for the shakeout of non-scientific personnel working in research prior to transition. This

[2] Technically, the IRR is the rate of interest that "when used to discount all cash flows resulting from an investment, will equate the present value of the cash receipts to the present value of the cash outlays" (Drury, 2008, p.298).

provided 38 years of data, a relatively short period compared to previously-conducted studies. They used an error correction model to deal with cointegration in the time series. On that basis, and using 15-year gamma distribution lag to estimate the change in knowledge stocks, they estimated an average IRR of 40 per cent; when foreign R&D spillovers are taken into account, the average they calculated fell to just over 30 per cent.

The changing nature of agricultural research infrastructures before and after transition is a dramatic illustration of a more deep-seated problem in quantitative estimation of the relationship between research and its impacts. The Eastern EU case shows that research expenditures only serve as approximations for scientific effort. Consequently, when measured over very long time frames, they might be quite unstable, due to structural changes such as transition, but also substantial shifts in the technology of science (for example, as affected by information technologies), the entry of multinationals into domains that were traditionally publicly financed, and the diminishing proportion of overall research spending that addresses productivity enhancement. All could lead to underestimation of the elasticity of productivity with respect to research expenditure.

It is highly likely that (in Eastern EU Member States as elsewhere) time lags between expenditure and impact on productivity are long, and rates of return to public research are substantial. The unsatisfying conclusion, though, is that it is very difficult to measure these effects, but without such simple numerical arguments it is more difficult to convince policymakers of the value of investing public resources in this way.

Towards a European agricultural science impact strategy

The results described in the previous section were combined with others from elsewhere in the EU to develop an overall perspective on agricultural science impact and to draw general conclusions and recommendations for research practice and policy (for a summary, see Impresa, 2016). These reflect the continuing importance of agricultural science, in the face of the so-called 'agricultural trilemma' (Steinbuks and Hertel, 2016). Research investment is fundamental to alleviating the tricky trade-offs between the concurrent challenges of achieving food security for a growing global population, adapting to climate change, and reducing natural resource degradation. Because of significant market and coordination failures in the agricultural sector, the state needs to play a leading role in this science; the failures include, but are not limited to, the imperfect competition characterising industries both upstream and downstream of farming in the agri-food value chain, which exerts a cost-price squeeze and reduces resources for investment; the public good nature of research and the free-rider problems that it involves; and the positive external environmental benefits which are achieved from improved agricultural practices.

So despite caveats that need to be made on very high rates of return to investment in agricultural science, these denote in a practical way the substantial social benefit that expenditure brings. Disturbingly though, in Eastern Member States as elsewhere in the EU, trends in expenditure are declining, despite a doubling of the relevant agricultural science budget in the Horizon 2020 programme. While overall research spending is growing (from which agricultural science also gains) in a few Eastern EU Member States, this is from a low base, and even here the catch-up process to equal the spending levels of the larger EU Member States will be protracted. Hence, problems that can be resolved through applied science are increasing, while resources available are declining, or at best at a standstill.

Impresa's main evidence-based recommendations to address the need to improve impact efficiency can be clustered into two separate themes. These are associated with, respectively, improvement of understanding of the scale and scope of agricultural research activity in Europe, and by inference, development of policy frameworks that improve the impact of that activity.

The first set of recommendations relate to gaining better quality information about scale and scope of agricultural science in Europe. This should start with, but not be limited to, enriched information about public and private investment spending. However, there are limits on how much additional burden can be placed on Member States' collection of statistics and their onward transmission to Eurostat, particularly because of the current policy of reducing administrative burdens on the private sector (EC, 2012). However, as the Impresa project has demonstrated, it is possible to obtain, quickly and cheaply, less formal information which is sufficient for most policy impact evaluation and review purposes. Supplementing the official sources of statistics might be achieved either through an annual survey of public research organisations or from an annual report on research investments based on a survey of the Ministries responsible for research in Member States. The former has the advantage that a small number of the largest organisations in the Government and Higher Education sectors perform a large proportion of agricultural research. Using the principle of least effort, close monitoring of expenditure trends and other key agricultural R&D indicators, such as human resources, is possible. The latter could include a qualitative assessment of recent trends in research expenditures, financing, and human resources, complemented by a commentary on how these developments affect future agricultural research activity. Either would provide a 'light touch' approach to provide essential information for monitoring research topics and priorities, while at the same time producing a consistent overview of EU investments in agricultural research.

The second set of recommendations stems from the need for improved awareness of the complex pathways through which science-based innovations are translated into impacts. The AKIS, in many respects, is more complex in comparison to other sectors characterised in the innovation literature; translation of science-based innovation into scaled-out impacts depends on enabling factors being present and on hindering factors being overcome. Specific and relevant outputs are necessary but not sufficient; there is also a need to support development of actors' innovation capacities, and promote users' ability to adapt innovations to specific con-

texts. This needs more effective capacity building and networking between agricultural scientists and other actors and stakeholders; wider engagement of stakeholders in research programming and evaluation, as well as encouragement of feedback from public and private advisors; and targeting funds for innovation brokerage. More integration between research and innovation support instruments (in particular with EU Structural Funds and the Rural Development Programmes) would release resources to fund this.

In developing the case study impact evaluation approach, the Impresa project team experienced considerable difficulty in obtaining data about research programmes after they were completed. Funders need to require, and research institutions need to develop, effective information based on a standardised structured framework,[3] particularly for projects involving private companies. Acquiring these at early stage to monitor research outputs is a priority.

Impact where it is most needed: the Eastern EU Member States

The recommendations of the previous section are of especial importance to the Eastern EU Member States, whose agri-food sectors differ from those of their counterparts in three main ways. They differ in terms of the type of outputs that are produced. In broad agro-climatic terms (Bouma, 2005), the conditions for plant and animal production are influenced by cold, relatively wet winters and mild, dry summers in the North-east zone, and the cold relatively dry winters and warm dry to occasionally wet summers in the Central zone. Within these zones local production conditions are also influenced by variation in soil types (Tóth *et al*., 2013), so that there are higher shares of grains in output than in the Western EU Member States, and correspondingly lower shares of fruit and vegetable produce, vines and livestock products. They differ in the way in which outputs are produced, in terms of landholding and infrastructures. While rapid re-establishment of a family farming system was expected to occur as a result of transition, de-collectivisation of agriculture produced a structure of farm holdings that is quite distinct from those in the west of Europe (Maurel, 2015) and perverse distributional effects resulting in from the adoption CAP payments after EU accession (Swain, 2013). They also differ in the more important role that agricultural and related food chain activities play in terms of income and employment, even after nearly two decades of economic transition. The legacy of central planning is still evident and, as a consequence, the main lessons of the Impresa project will be harder to implement.

In contrast, the majority of agricultural science research effort (in France, Germany and the United Kingdom) is initiated, and applied, in conditions that are quite different to those existing in the Eastern EU Member States. While the main preoccupation may be to maintain and enhance the aggregate impact of agricultural research in the EU, this major spatial imbalance should not be ignored. Nevertheless, the options available collectively to Eastern EU Member State governments for better targeting of overall EU agricultural research effort are limited.

To avoid the so-called 'Periphery Paradox' which suggests that prioritisation of innovation policy is not accompanied by related policy capacity or policy effectiveness (Kattel and Primi, 2012), pressures to downgrade agricultural science budgets should be resisted; the activities these fund should also become more effective. To address the first point, further investigations of the social value of agricultural research, similar to that of Ratinger and Kristkover (2015), are needed. With regard to the second point, a significant contribution could be by a shift of focus suggested in the previous section, instituting a 'culture of impact' in national research institutions, practices and policies. That requires recognition of the need to support capacity development that allows the key players to function effectively, and to establish resources within programmes to develop the soft factors that support innovation. Further, improvements could arise from coordinating their national programmes and projects to focus on activities tailored to their specific agro-climatic context, avoiding overlaps and mismatches. Finally, political collaboration, led through the activities of the Visegrad Group, is needed to secure a greater share of European research and development funds. The role of agricultural development in completing the economic transition process should not be neglected, particularly as climate change, food price volatility and agro-environmental quality are also of proportionately higher priorities for the Eastern EU Member States.

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[3] For instance, see Commission Recommendation C(2012) 4890 final on access to and preservation of scientific information.

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Tomáš HLAVSA*, Martin HRUŠKA* and Edita TURKOVÁ*

The impact of investment support from the Rural Development Programme of the Czech Republic for 2007-2013 on the economic efficiency of farms

A comparison of the performance of farms within and outside Less Favoured Areas

European agriculture is highly mechanised and its development is to a large extent shaped by the constant need for investment. By combining private capital with public funds, the risk burden associated with investment can be shared. The general economic objective of investment support is to improve the efficiency of production factors, such as labour, land and capital. The Rural Development Programme of the Czech Republic for 2007-2013 included a preferential criterion, the objective of which was to give an advantage to farms in Less Favoured Areas (LFA) by facilitating their access to funding for investments. This paper evaluates the investment activities of agricultural holdings located in Czech LFAs in the period 2011-2015, compared to those that are not located in LFAs. Binary logistic regression was employed to identify factors, such as LFA type, farm size, share of other revenues, indebtedness of a farm and stocking density of cattle, that influenced whether a farm was or was not supported with an investment subsidy. We conclude that supported farms in LFAs have higher levels of economic performance and higher labour productivity than unsubsidised farms. It is evident that many farms, especially in mountain areas, are interested in investment activities and are trying to develop their businesses. They have a lower likelihood of business failure than those farms that do not invest.

Keywords: investment activity, subsidy, farm economy, less favoured areas

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Introduction

European agriculture is highly mechanised and its development is clearly determined by technical progress (Kirchweger *et al*., 2015). To a large extent it is shaped by the constant need for investment. By combining private capital with public funds, the risk burden associated with investment can be shared. A major source of public sector co-funding for farm investment activities in Europe is the European Union's (EU) Common Agricultural Policy. Much research, for example Lefebvre (2014), cited by Wieliczko (2015), has been devoted to the impact of agricultural policy on investment decisions. Kirchweger *et al*. (2015) show that farms participating in the Austrian farm investment programme increased their production significantly more than did non-participating farms. A study in the Czech Republic (Medonos *et al*., 2012) led to similar findings. Travnikar and Juvančič (2013) examined farms participating in the Slovenian Rural Development Plan. Their results showed a positive relationship between farm investment support and agricultural labour productivity.

The investments of farms are also relevant from the societal perspective. Society is interested in competitiveness since this is of consequence for local employment and regional competitiveness (Kirchweger *et al*., 2015). Small farms contribute significantly to the budgets of townships and rural communities. The decline in unemployment and the increase in investment incentives leads to an improvement in the quality of life and generally faster economic convergence, which is especially relevant for the countries of central and eastern Europe that joined the EU in 2004 (Jeníček, 2013).

According to Abrhám (2015), one of the crucial indicators for innovations and investment activities is the legal form of the farm. Limited liability companies tend to innovate more than other legal forms. There are two possible explanations to this: firstly, the limited liability companies are often represented by sole traders (one-person firms) and micro-enterprises that seek to establish a strong position in the market. These small farms tend to innovate and invest in new technologies and processes in order to beat the competition. Secondly, small farms are less cumbersome and more creative than large ones and can spend less time dealing with tax forms and the employment and health insurance agenda, and more time innovating their products or services.

Innovation and investment activities are very closely related to diversification of farm activities. Diversification activities may be undertaken for economic reasons but also for other, non-economic related factors (Barnes *et al*., 2015). Investments in new technologies enable creation of new products and new entrepreneurial activities. Barnes *et al.* (2015) concluded that diversified farms, in the sense that they obtain revenue from two or more business activities, are more viable. The role of investment and innovation in increasing a farm's competitiveness is directly linked to technical progress that is an important factor of growth in modern agricultural growth models (Rembisz and Floriańczyk, 2014, cited by Wieliczko, 2015). It drives productivity and efficiency in production and enhances farm profitability.

The Rural Development Programme (RDP) of the Czech Republic for 2007-2013 is based on the National Strategic Plan of Rural Development which was prepared in accordance with Council Regulation (EC) No. 1698/2005[1]. The RDP consisted of four axes and, within Axis I – 'Improving the competitiveness of agriculture and forestry', was a group of measures (I.1) aimed at restructuring and developing physical potential and promoting innovation (MoA, 2008). Among these, measure I.1.1.1 'Modernisation of agricultural

[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).

Box 1: Actions eligible for financial support under measure I.1.1.1 – 'Modernisation of agricultural holdings' of the Rural Development Programme of the Czech Republic, 2007-2013.

A. Investments in livestock production: (a) construction work; (b) machines and equipment; (c) breeding technology; (d) waste management.
B. Investments in plant production: (a) machines and equipment for cultivation; (b) irrigation technology; (c) postharvest processing technology; (d) storage technology; (e) garden buildings; (f) supporting constructions for permanent crops; (g) coverage constructions.
C. Common investments for plant and livestock production.
D. Renewable energy sources.
E. Project documentation – cross-sectional for plant as well as livestock production.
F. Technical documentation – cross-sectional for plant as well as livestock production.

Source: MoA (2008)

holdings', hereinafter 'Modernisation', was designed to support the modernisation of farms where there is an inadequate level of investments, in terms of both structures and technologies, in crop as well as animal production (Box 1). The general economic objective of this investment support was to improve the efficiency of production factors (labour, land and capital). Furthermore, the RDP included a preferential criterion, the objective of which was to give an advantage to farms in Less Favoured Areas (LFA) by facilitating their access to funding for investments.

Investment spending on projects of livestock production formed 76.1 per cent of the total investment spending in the 2007-2013 RDP. One fifth of the investment spending was focused on waste management, which is a very important type of investment in terms of positively influencing the environment. Other investment trends in livestock were projects focused on the technology of cattle breeding, or more precisely dairy cows (in total 15.6 per cent of the investment spending), and for construction or renovation of feed stores (15.5 per cent of the investment spending). Investments in plant production formed less than a quarter of the total amount. Farms invested the most money in storage technology (more than 60 per cent of the investment into plant production), which will enable them to increase the quality of stored products and achieve higher postharvest prices. Investments in machines and equipment for crop production, and supporting establishment of permanent crops (each accounting for 11 per cent of the investment into plant production) were also significant. The share of investment in the technology of biomass processing was negligible within the Modernisation measures (0.2 per cent of the investment spending).

The analysis of Štolbová and Míčová (2012) of the results of the structural survey of agriculture in the Czech Republic demonstrated a more efficient use of both human labour and machinery by the large farms situated in the LFAs than by the small farms. A more efficient use of machinery is reflected in the low depreciation per hectare of utilised agricultural area (UAA) in the case of large farms. As regards meeting the objectives of the LFA measure, it was found that the LFA payments, especially in mountain areas, compensate the economic losses in the LFAs to such an extent that their net value added per hectare of UAA has almost reached that of the farms in the more favoured areas. On the other hand, when net value added without LFA payments is considered, the level of net value added is much lower in LFAs than non-LFAs. The LFAs can be characterised as those with higher costs and lower efficiency. Lososová and Zdeněk (2013) also confirm the lower profitability of Czech LFAs.

This paper evaluates the investment activities of farms located in Czech LFAs in the period 2011-2015, compared to those that are not located in LFAs. The research questions are as follows: (a) Does the size of the enterprise affect the investment activity? and (b) Are there differences in investment activities between farms operating in different LFAs?

Methodology

As we focused on the second half of the programming period which is characterised by higher activity of farms in the Modernisation measure, the modelling is based on the time series 2011-2015. The database for modelling combines various sources: Albertina (economic indicators of farms, managed by the company Bisnode Česká republika, a.s.), the State Agricultural Intervention Fund (SAIF, data from the Czech Payment Agency about recipients of subsidies) and the Land Parcel Identification System (LPIS, territorial data about UAA, including LFAs, managed by the Ministry of Agriculture of the Czech Republic, MoA). For the specified time series, the database includes 6,051 farms, 1,313 of which are in mountain LFAs (LFA-M), 2,262 in non-mountain LFAs (LFA-O) and 2,476 in non-LFA. Only farms with more than 1 ha of UAA are considered. For the classification of farms into the groups LFA-M, LFA-O and non-LFA, their share of agricultural land in the LFA was determinant. If it exceeded 50 per cent in mountain LFAs, it was categorised as a representative of LFA-M, if it exceeded 50 per cent in other LFAs, a farm was a representative of LFA-O and if a farm cultivated more than 50 per cent of its agricultural land outside of LFAs, then it was assigned to the group of non-LFA. The localisation of mountain and other LFAs in the Czech Republic is shown in Figure 1.

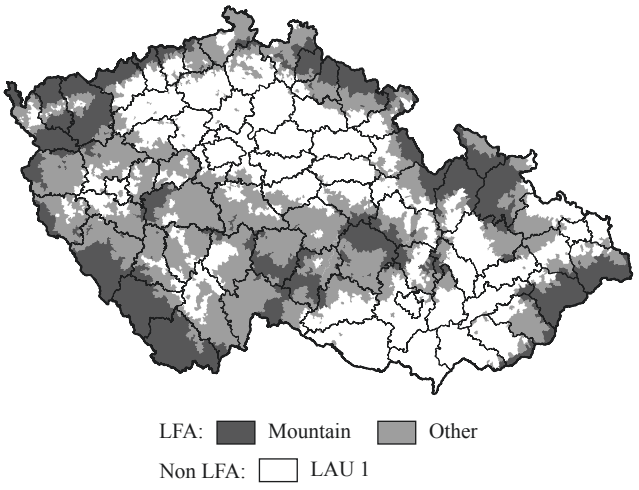

Figure 1: Distribution of Less Favoured Areas in the Czech Republic. LAU 1 administrative boundaries are also shown.
Source: own composition

Predictive model

Predictive modelling is a widely-used method in analyses of outputs in the agrarian sector. For example, Hughes *et al*. (1996); Castro-Tanzi *et al*. (2014); Di Paola *et al*. (2016) and Rad *et al*. (2015) applied predictive models for crop yield or crop production, which can be considered as an output in the agrarian sector. Thacher *et al*. (1996); Davis and Lopez-Carr (2014) and van der Sluis *et al*. (2016) dealt with the prediction of economic characteristics, such as the use of soil. The prediction of the behaviour of farmers and their involvement in profitable and non-profitable activities in agriculture was addressed by, for example, Hop *et al*. (2011) and Mzoughi (2011).

In most cases, predictive models are based on regression analysis; according to the nature of the data and their purpose, modifications are used, such as multiple regression or logistic regression. In contrast to multiple regression with a measurable response variable, a response variable in logistic regression is categorical – in our case binary (a farm was or was not supported by the Modernisation measure). The objective of our predictive logistic model is to achieve the best possible classification of farms (supported or not supported by the Modernisation measure) with regard to the selected input model variables listed in Table 1. The decision to use the logistic model was driven by the experience of authors such as Hop *et al*. (2011) and Mzoughi (2011). It is possible to use both measurable and immeasurable explanatory variables and there is no assumption of multidimensional normal distribution. The core of a logistic regression model is the odds ratio – the ratio of the outcome probabilities:

$$odds\ ratio = P(1)/[1-P(1)] \quad (1)$$

where $P(1)$ is the probability that the farm is supported.

The original relationship between the input and the odds ratio is exponential. It is converted into a linear relationship through the log of the odds ratio, we used natural logarithm ln (Abbott, 2014).

Logistic regression takes maximum likelihood estimation. In logistic regression, we maximise the likelihood of an accurate prediction when we find the set of coefficients that result in the greatest overall likelihood of obtaining this set of outcome values. The logistic model applied in the analysis in this paper is in the form:

$$\ln P(1)/[1-P(1)] = b_0 + b_1x_1 + b_2x_2 + \ldots + b_kx_k + \varepsilon \quad (2)$$

where b_0 is constant, b_1, b_2, …, b_k are the model coefficients, the variables x_1, x_2, …, x_k represent eight vectors of explanatory variables (Table 1). Let be ε residual part of the model.

We examined the theoretical relevance of the included variables, the significance of variables (we performed a Wald test for joint significance), multicollinearity (increases the standard errors of the regression coefficients) and the regression model regarding proportion of correctly predicted farms. In particular, we tested in the subsection 'Preferential points' differences in size of the Modernisation subsidy at farms with and without preferential points when they applied for the subsidy. Since data were not normally distributed, we used a non-parametric test. There we employed the Mann-Whitney test to test the equality of distributions in compared groups.

Results

Shares of farms receiving financial support

The areas of supported agricultural land as shares of the overall areas of agricultural land, according to the types of LFA, were derived from the database of receivers who requested support provided by the SAIF in the framework of the Modernisation measure of the 2007-2013 RDP, and who received the support in the period 2008-2015. The largest share of supported area, 52.9 per cent, was in non-mountain LFAs (LFA-O), compared to 45.7 per cent of the area in mountain LFAs (LFA-M) and 42.3 per cent in non-LFA (Table 2). In terms of the number of farms in the evaluated data set (Albertina, 2011-2015), a higher share of enterprises (7.84 per cent) in LFA-M was supported than LFA-O (6.01 per cent) and in non-LFA (4.00 per cent).

Indicators of economic performance

There are differences between the supported and unsupported farms in terms of economic performance (Table 3). In all three groups the former have a higher average net value added/worker (NVA/W), i.e. slightly higher viability, but they are characterised by fewer workers per 100 ha (W/100 ha). A higher value of assets per hectare indicates that the

Table 1: Variables used in analysis; descriptive analysis and logistic model including description.

Variable	Description
Model variables	
Cost factor	total costs / total revenues (CZK/CZK)
NVA/W	net value added / worker (CZK)
W/100ha	number of workers / 100 ha UAA
Share of other revenues	other revenues/total revenues (%)
LFA type	mountain LFA (LFA-M), non-mountain LFA (LFA-O), non-LFA
Size group (in ha UAA)	1: up to 300; 2: 300-499; 3: 500-899; 4: 900-1799; 5: 1800-2499; 6: >=2500
Indebtedness	(long- and short term liabilities) / (liabilities + equity)
Cattle density	number of livestock-cattle units / 100 ha
Other descriptive variables	
Labour productivity	total revenues / labour costs (CZK)
Fixed assets per ha	total fixed assets / UAA ha (CZK)

Source: own elaboration

Table 2: Utilised agricultural area (UAA) and numbers of farms that received financial support under measure I.1.1.1 Modernisation in the period 2008-2015, and UAA and numbers of all farms, by LFA type.

Area	Utilised agricultural area (ha)		Number of farms	
	Supported farms	Total	Supported	Total
LFA-M	238,690	522,600	103	1313
LFA-O	664,421	1,256,500	136	2262
Non-LFA	749,625	1,774,200	99	2476
Total	1,652,736	3,553,300	338	6051

For types of LFA see Table 1 and text
Data sources: Albertina, 2011-2015; SAIF, 2011-2015; MoA, 2016

Table 3: Selected economic indicators for farms supported and not supported under measure I.1.1.1 Modernisation by LFA type.

Area	Supported	NVA/W (CZK)	W/100 ha	Labour productivity (CZK/CZK)	Cattle density (head/ha)	Fixed assets/ha (CZK)
LFA-M	No	462,155	3.52	0.41	0.41	58,026
	Yes	571,347	2.91	0.55	0.48	66,349
LFA-O	No	525,460	3.65	1.11	0.39	63,158
	Yes	560,384	3.60	1.19	0.41	80,221
Non-LFA	No	655,465	3.81	1.01	0.27	67,986
	Yes	663,793	3.27	1.04	0.30	94,323

For types of LFA and details of variables see Table 1 and text
Data source: Albertina, 2011-2015

supported farms invest in the renewal of technology. In LFA-M, the supported farms have a higher average livestock density but in LFA-O and non-LFA the average livestock densities on the supported and unsupported farms are similar.

The development of selected economic characteristics was generally more favourable for the supported farms. A bigger increase in average net value added/worker occurred at the supported farms in LFA-O in the period 2011-2015 (Table 4). Labour productivity increased the most (31 per cent) at the supported farms in LFA-M but productivity growth was much more modest at the supported farms in LFA-O and non-LFA (14 and 9 per cent respectively). By contrast, the unsupported farms showed either stagnation (non-LFA) or slight increases (LFA-M and LFA-O) in labour productivity. The rate of diversification level, measured by the ratio of other revenues to total revenues, was generally higher in LFA-M, nevertheless, the trend in the monitored time series (2011-2015) is constant. Slight average increases in the rate of diversification are evident for both the supported as well as the unsupported farms in LFA-O, while a more significant increase is recorded for the supported farms in non-LFA.

Table 4: Changes in selected indicators for farms supported and not supported under measure I.1.1.1 Modernisation over the period 2011-2015 by LFA type.

Indicator	Supported	LFA-M	LFA-O	Non-LFA
		change (%)		
Net value added/worker (CZK)	No	14	25	27
	Yes	20	41	18
Labour productivity (CZK/CZK)	No	14	11	5
	Yes	31	14	9
Share of other revenues (%)	No	2	8	15
	Yes	5	13	21

For types of LFA see Table 1 and text
Data sources: Albertina, 2011-2015; SAIF, 2011-2015

Predictive model

The MoA, as the administrator of the RDP including the Modernisation measure I.1.1.1, is interested in the extent to which this measure has influenced the management of farms, how selected indicators of farms have changed and how their performance has improved. Based on our evaluated database of farms, the factors that significantly contribute to the fact that an enterprise will, with higher probability, use the subsidy title I.1.1.1 Modernisation were monitored. For these purposes, a logistic model was set up with a binary dependent variable 'supported within the Modernisation measure' with two options – supported and not supported. The results of the modelling are shown in Table 5.

Table 5: Logistic model: analysis of factors influencing the variable 'supported within the Modernisation measure'.

Parameter	Model 1			Model 2		
	B	S.E.	Odds ratio	B	S.E.	Odds ratio
Cost factor	-0.167	0.192	0.822			
NVA/W	0.002	0.001	1			
W/100ha	-0.06	0.043	0.895			
Share of other revenues	0.218	0.107*	1.212	0.214	0.107*	1.208
LFA type						
LFA-M	0.478	0.191*	1.624	0.419	0.181*	1.584
Non-LFA	-0.411	0.233*	0.744	-0.390	0.197*	0.658
Size group:						
1	-2.12	0.318*	0.091	-2.679	0.308**	0.071
2	-1.315	0.416***	0.283	-1.287	0.396***	0.224
3	-1.355	0.346***	0.318	-1.309	0.302**	0.308
4	-0.345	0.29*	0.797	-0.349	0.274*	0.743
5	0.047	0.351*	1.031	0.056	0.365*	1.053
Indebtedness	0.62	0.312*	1.916	0.55	0.282*	1.742
Cattle density	0.547	0.225*	1.553	0.329	0.194**	1.248
Constant	-1.711	0.415**	0.227	-2.586	0.389**	0.154
Whole model	Chi-square = 314.12***			Chi-square = 302.18***		

Note: ***, **, and * denote significance at the 0.1%, 1%, and 5% level; predicted correctly 93.2%. B = parameter estimates, S.E. = standard error
Data sources: Albertina, 2011-2015; SAIF, 2011-2015

In total, the influences of eight factors were modelled, two of which (the LFA type and size group) were of categorical nature. Two models were created. In the first model it is evident that the influence of the factors costs, net value added/worker (NVA/W) and number of workers per 100 ha (W/100 ha) are not significant for identifying whether or not a farm was supported. The second model works only with the significant variables. The variables that have the odds ratio higher than one increase the chances of support. If it is a categorical variable, a category is always determined to which the others are compared and the odds ratios are calculated. For the variable LFA, LFA-O is selected as a comparative base of the category. Based on the resulting model, the odds ratio for LFA-M is 1.584. For the representatives of this category there is an increasing chance of support in comparison to the representatives of LFA-O, by approximately 1.6 times. On the other hand, the non-LFA farms have a decreasing chance in comparison to the LFA-O farms (the odds ratio is 0.658).

In the case of the categorical variable, the group with more than 2,500 ha of UAA is determined as a reference group. The analysis implies that the farms with less land have a decreasing chance of support (the odds ratio is lower than 1). On contrary, those in size group no. 5 (1,800 – 2,500 ha of UAA) have an increasing chance of support. Furthermore,

Table 6: Average value of support under Modernisation measure I.1.1.1, according to farm size and location.

Farm size group (ha UAA)	LFA-M	LFA-O	Non-LFA
		CZK/ha	
up to 300	10,529	12,126	11,147
300-500	2,682	4,869	5,117
500-900	5,621	5,081	6,424
900-1800	2,810	3,456	1,924
1800-2500	3,556	2,092	2,158
>= 2500	1,453	1,518	1,146

For types of LFA see Table 1 and text
Data sources: Albertina, 2011-2015; SAIF, 2011-2015

the results imply that the chance for support within the Modernisation measure is increasing for the farms with a higher share of other production, i.e. farms with more diversification. Another finding is that the supported farms can be characterised by higher indebtedness and cattle stocking rates. The analysis implied that more diversification is evident for the supported farms in LFA-M; however, these farms also had greater indebtedness. The supported farms in LFA-M are also more oriented to livestock production, to where the most resources of the Modernisation measure flowed.

The average values of support in CZK/ha divided according to six farm size groups (ha UAA) are given in Table 6. The smallest size group benefited from the highest level of per-hectare support, while the largest group received the lowest level of support. This support was not tied to the size in hectares of a farm but to an investment, for example, machinery or buildings. Consequently, farms with various areas of UAA could receive a similar amount of subsidy. An overall lower level of supported per-hectare area is evident in LFA-M. Generally, a higher level is than reported by farms in LFAs. In relation to the group averages, the farms with up to 300 ha of UAA in LFA-M report roughly twice the level, in LFA-O and non-LFA a three times higher level. The size group 500-900 ha of UAA in LFA-M, LFA-O as well as non-LFA reported values above the average.

Preferential points

The enterprises farming in LFAs may gain an advantage in financing of projects approved within the Modernisation measure. If it is a construction investment, it is necessary to locate its realisation in the LFA. The condition for an applicant in case of a mobile investment (e.g. mobile milking parlour) is to have at least 75 per cent of the total land area registered in LPIS situated in a LFA. The farms that meet the conditions have the maximum level of non-refundable grants increased by 10 per cent. The subsidy for one project ranges from CZK 100 thousand to CZK 30 million inclusive.

We tested whether the average value of subsidies received by farms with preferential points was significantly different from that received by farms without preferential points. The data sources were Albertina, 2011-2015 and SAIF, 2011-2015. This testing was not conducted for the LFA-M farm subset, because all farms in this group met the conditions for preferential points. In total, 136 LFA-O farms were supported, 87 of which were with preferential points. The amount of subsidy calculated per ha of UAA differs among the groups by approximately CZK 150 per ha (CZK 4,472 for farms with preferential points; SD=6,059, CV=1.35, cf. CZK 4,613 for those without; SD=5,141, CV=1.11). In both groups the coefficients of variation exceed a value of 1, indicating that the variability in the value of the subsidies among farms is very high. The differentiation between both sets of farms was tested by non-parametric Mann-Whitney test, as both groups did not show normality of data distribution. The null hypothesis was that distributions of subsidies in the two groups of farms are equal. Based on the rank-order Mann-Whitney test, the p-value of which was 0.328, it is not possible to reject the null hypothesis of equality at the 5 per cent level of significance. Thus, based on our data we failed to show that the values of the subsidies received by the two groups were significantly different.

Discussion

Measure I.1.1.1 'Modernisation of agricultural holdings' of the Rural Development Programme of the Czech Republic for 2007-2013 aims to improve labour productivity, and increase net added value and the overall efficiency of production factors of farms. A higher subsidy per hectare of UAA is evident in LFAs than in non-LFAs. Within LFAs, a higher activity with a higher share of interested farms was observed in mountain LFAs. The subsidy paid per hectare of UAA was the highest for the smallest farms (up to 300 ha), again higher in LFAs than in non-LFAs. Farms with the largest areas, above 2,500 ha of UAA, recorded the lowest investment activity in terms of number of submitted projects. In LFAs, the most financial subsidies were channelled to livestock production (up to 85 per cent), in non-LFAs, roughly 60 per cent of the resources. These included especially investments in waste management and technologies connected with breeding of cattle. In non-LFAs, projects focused on investments in plant production, such as stores, machines and so on, dominated.

The analyses showed that the main determinants of farm involvement in the Modernisation measure are type of LFA, size group of a farm, share of other production, indebtedness of a farm and density of cattle. In case of the type of LFA, a higher probability of obtaining support is showed by the group of farms in LFA-M, while in case of non-LFA the probability of support is decreasing. The importance of farm size is confirmed also by Abrhám (2015), who found that farms with more UAA were less active, while the amount of financial resources per hectare of UAA was higher for farms with less UAA. Another significant factor is the share of other production as an indicator of diversification of the activities of a farm. Farms with a higher share of other revenues and thus more diversified are more likely to be involved in the Modernisation measure. Those with the highest share of other revenues are primarily located in LFA-M. A higher share of diversification, which is closely related to multifunctional agriculture, decreases the sensitivity of farm management to external shocks, which can be related to financial or production outages in crop or livestock production.

Investments in technological development increase productivity and efficiency and improve profitability of a farm (Wieliczko, 2015). The results of our analyses confirm these

conclusions: investment activities have a positive impact on the development of agricultural enterprises in Czech LFAs. The farms supported by the Modernisation measure show, especially in LFA-M, higher viability measured by the ratio NVA/W. These findings confirm those of Kirchweger *et al*. (2015) and Medonos *et al*. (2012). Furthermore, innovations and modernisation of technologies lead to savings in workforce. Our data show that the supported farms in LFA-M and LFA-O have a higher labour productivity and a higher value of fixed assets per hectare than non-supported farms (Table 3). This suggests that these farms have invested in modernised technology and that the applied innovation enabled either higher production or the same level of production as previously but with fewer workers. These findings are consistent with the conclusions of Abrhám (2015), who primarily considers farms with fewer employees as more active in innovations.

Furthermore, the development trends of selected economic indicators, such as NVA/W, share of other revenues and labour productivity, were also more favourable for the farms which were supported by subsidies. In the case of NVA/W, the highest increases were recorded over the period 2011-2015 in LFA-O and in non-LFA, in both cases for the farms that were financially supported. In the case of LFA-M, a more significant increase occurred for the supported farms; at the unsupported farms the increase was smaller. Labour productivity increased more significantly in LFA-M, and especially at the supported farms, in line with the findings of Travnikar and Juvančič (2013). The increase was milder at the supported farms in LFA-O and non-LFA, and there was no significant change in the given period for the unsupported farms. Other revenues are generally highest in LFA-M, especially in the period 2011-2015, however, this was not significant; values rather stagnated. A significant increase is evident at the supported farms, especially in non-LFAs.

The effects of investment support under the Modernisation measure in the form of improved net added value per worker were remarkable. In LFAs, the supported farms differ from those that were not indebted. Higher indebtedness was recorded at the former, and public sector support improves access to loans and thus facilitates investment, which is in line with one of the primary goals of the policy. Special focus should be put on smaller farms and family farms in the new EU programming period from 2020 onwards: their access to financial support under the Modernisation measure was at a lower level than for larger farms (mostly agriholdings). Smaller farms and family farms are not so competitive (they usually have higher unit costs, while larger farms have economies of scale and stronger capital structures). Smaller and family farms are more connected with the particular rural locality (they usually own the land; while the family members are often involved in the community activities in the village or within LEADER Local Action Groups.

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Vladimír SZÉKELY*

Changes in commuting patterns in the territories covered by LEADER Local Action Groups: Slovakia, 2001 and 2011

In the European Union's (EU) 2007–2013 programming period, 29 Local Action Groups (LAG) were registered in Slovakia. The rural regions covered by these LAGs have been selected for detailed time-space analysis of two specific aspects of commuting to work: (a) the share of intra-LAG, predominantly rural-to-rural commuting, from the total numbers of out- and in-commuters (indicator of intra-LAG entrepreneurial activity, economic networking, social capital and diffusion of codified and/or tacit knowledge); and (b) the share of individual LAG out-commuters abroad from the total number of out-commuters from territories of individual LAGs (indicator of 'openness' of rural communities towards new challenges which is aimed at improving their living standards). Two years have been selected for the comparison: 2001 (prior to the establishment of LAGs and the accession of Slovakia to the EU, its entry into the Schengen Area, and the opening of labour markets of the EU Member States to the citizens of the Slovak Republic) and 2011 (after the establishment of LAGs and the 'Europeanisation' of Slovakia). Statistical analysis showed the position and attractiveness of most LAGs as local labour markets has weakened during the period 2001-2011.

Keywords: commuting to work, territories of Local Action Groups

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Introduction

The LEADER programme, as an integral part of the Rural Development Programme, is perceived as the most important spatially-oriented instrument of rural policy or 'as a pan-European Union (EU) laboratory of rural development' (Ray, 2000). The main objective of its implementation is improvement of the rural economy and the quality of life in rural areas through exploitation of their endogenous potential (territorial capital) and activating local inhabitants and public and private sector stakeholders. Ideally, active representatives from different socio-economic sectors in the rural territory cooperate in order to achieve the status 'Local Action Group' (LAG), which represents the institutional background for EU financial support for the local development strategy. LAGs, groups of public and private partners (public-private partnerships) from the rural territory, are the mainstay of the implementation of the LEADER approach – the place-based bottom-up approach to rural development.

Though the professional and scientific literature pays great attention to multiple general and national aspects of the LEADER programme and LAGs (implementation, functioning, evaluation and presentation in the mass media) in the context of rural development and rural policy (e.g. Kovách, 2000; Ray, 2000; Maurel, 2008; Furmankiewicz *et al*., 2010; Esparcia, 2014; Dax *et al*., 2016; Navarro *et al*., 2016, Boukalová *et al.*, 2016), very little information is available about Slovakia (compared with Poland or the Czech Republic for example) and it remains rather a '*terra incognita*' for the rest of rural Europe.

There are some quantitative and qualitative conditions for establishment of LAGs in Slovakia. The LAG area must be (from the geographical point of view) a coherent rural territory formed on the principle of common interests, with a total population in the range between 10,000 and 150,000, and boundaries which coincide with those of the municipalities that are partners in the LAG. Under the 2007–2013 Rural Development Programme of the Slovak Republic, invitations to submit integrated territorial development strategies and the selection of LAGs have been published twice (in 2008 and 2009 – which was quite late). Based on the evaluation performed by the competent bodies and their Selection Committee, 29 entities were assigned the status of LAG (15+14, respectively, in each year) by the Ministry of Agriculture and Rural Development of the Slovak Republic. They were subsequently enabled to draw down funds from the allocated financial support to carry out projects that were part of the submitted territorial development strategies. When evaluating and approving the submitted projects which resulted in the ultimate selection of the LAGs, the geographical aspect, meaning equitable (administrative) regional distribution of LAGs, was also considered along with the quality of the projects.

The territories covered by these LAGs have been selected for detailed analysis of multidirectional commuting patterns and flows, and their temporal comparisons. Behind this research is the idea that the strength of commuting flows among rural municipalities (rural-to-rural commuting) on the territories covered by LAGs (intra-LAG commuting) can serve as a proxy for the degree of economic and social linkages between institutionally-networked rural local governments, entrepreneurs and representatives of civic society, or as an indicator of their economic sustainability (attractive local rural labour markets).

Commuting to work as a special case of spatial choice behaviour

Commuting is a significant process from the economic, social, cultural and environmental aspects, both for an individual and society as a whole (Pooley and Turnbull, 1999). In geographical, economic and sociological research, many studies (e.g. Bašovský, 1968; Bezák, 1990; Rouwendal, 1999; Pooley and Turnbull, 1999; van Ham *et al*., 2001; Székely and Michniak, 2009; Sandow and Westin, 2010; Halás *et al*., 2014; Michniak, 2016) have aimed to express the various aspects of commuting to work as one of the basic means of the spatial mobility of population.

Commuting flows connect labour and housing markets. The existing differences between the size and quality of the spatial units from the aspect of the existing employment opportunities generate commuting of a huge group of migrants, behaving (more or less) economically, to work. Their spatial choice behaviour (Golledge and Stimson, 1997) is determined by the information which they obtain partially from the environment in which they move every day. The internal information on local labour markets is generally codified and publicly available for any interested person who can acquire it at the Labour Offices, through the mass media, from the Internet and the like, on the one hand. On the other hand, a person who is interested in a job position also considers tacit information which he/she has acquired through his/her social contacts, making use of personal meetings and discussions or various types of sharing through social networks.

When gathering information on labour markets, a person really interested in finding a job, however, does not only confine him/herself to his/her immediate surroundings. He/she also actively gathers information coming to him/her from the external environment, as a rule from less-known milieu and from less-known people. Verification of the 'interregional knowledge transfer' requires more effort while his/her personal involvement in the decision-making process automatically means also a higher level of risk in terms of making a right decision. The volume, scope and quality of accepted information for highly differentiated levels of personal satisfaction during the search process depend on the personality characteristics of an individual and his/her willingness to try to find, gather and evaluate relevant information (the process is practically almost always strongly influenced by the time limits for the 'rational' final decision). The age of job applicants (in the context of their specific lifetime preferences) also influences the creation of a differentiated information background for the individual spatial choice behaviour. When choosing the place of work, the minds of all job applicants make something approaching a cost-benefit analysis aimed at comparing potential profit and loss of multifarious, not only material, nature (often considering the acceptance by the job applicant's closest people). Such an approach would be used when the number of job vacancies available exceeds the demand for job vacancies.

In the rural environment of Slovakia, which was long equated to the primary sector of the economy (i.e. agriculture, forestry and fishery), the situation is, however, much more complicated. First of all, the importance of the primary sector for Slovakia's economy has markedly declined. It is not only its share of GDP creation which has continuously declined (currently reaching roughly 3 per cent), but also the number and share of the population working in this sector (as defined statistically) has experienced a dramatic fall since the 1990s. Chrastinová *et al*. (2015) report that, in the period 2002–2013, the number of agricultural workers has fallen by more than 61,000 (to 47,800, or less than 2.2 per cent of total employment in Slovakia) while the rate of decline was markedly lower than in the previous decade (according to Demo, 2001, p.271, agriculture which, through employing "rigid in terms of migration and with low level of flexibility regarding requalification possibilities" disadvantaged groups of population in the countryside "considerably substituted the social roles of the State", employed up to 336,000 people in 1990). The decrease in the employment rate in agriculture resulted in rural unemployment and simultaneously in coexistence of the issue of finding a suitable job, an issue which was strongly influenced by the governmental social policies and never-ending, rational and irrational at the same time, discussion on the advantageousness or on the contrary disadvantageousness of properly-remunerated work, social system misuse and amplified xenophobic moods within society. Buchta (2013) is of the opinion that in the socially and economically marginalised regions of Slovakia, part of the rural population, if taking into account the subjective perception of the objective situation (which is not simple), could start to believe in traditional 'culture of dependence' on supporting top-down policy.

In rural areas, and especially in rural municipalities, the demand for jobs outweighs the supply. Short-term or long-term labour migration is a typical phenomenon of the Slovak countryside. Obtaining, acceptance and selection of the relevant information on the job positions offered and the ability to process it rationally are limited by the opportunities in the labour markets in the special case of persons having low levels of education and being poorly qualified. Therefore, the subsequent choice of a job for this category of applicants is not an optimal (ideal) one; it is more a 'feasible' choice when taking into account all existing restrictions.

Methodology

The main aim of the study is to describe and analyse selected, very specific aspects of commuting to work in the 29 regions covered by registered LAGs in Slovakia. These LEADER territories (practically 'artificial' local rural labour markets, hereinafter termed simply 'LAGs') are rural spatial units with a declared interest for solving local labour market problems. They are representative of Slovakia in terms of their geographical distribution (Figure 1), although the results obtained from them are not necessarily applicable to other marginal rural areas in the country. These territories with a predicted negative commuting balance, i.e. the total number of out-commuters will probably be higher than total number of in-commuters, are analysed according to:

- the share of intra-LAG, predominantly rural-to-rural commuting (with zero commuting balance), from the total numbers of out-commuters and in-commuters (indicator of intra-LAG entrepreneurial activity, economic networking, social capital and diffusion of codified and/or tacit knowledge) – comparison between 2001 (before the official acceptance of LAG) and 2011(after the official acceptance of LAG);
- and the share of individual LAG out-commuters abroad from total number of out-commuters from territories of individual LAGs (indicator of 'openness' of rural communities on the new challenges which is aimed to improving their living standards) – comparison between 2001 (before the accession of Slovakia to the EU, entry into the Schengen Area, and opening of labour markets of the Member States of the EU for the citizens of the Slovak Republic) and 2011 (after the 'Europeanisation' of Slovakia).

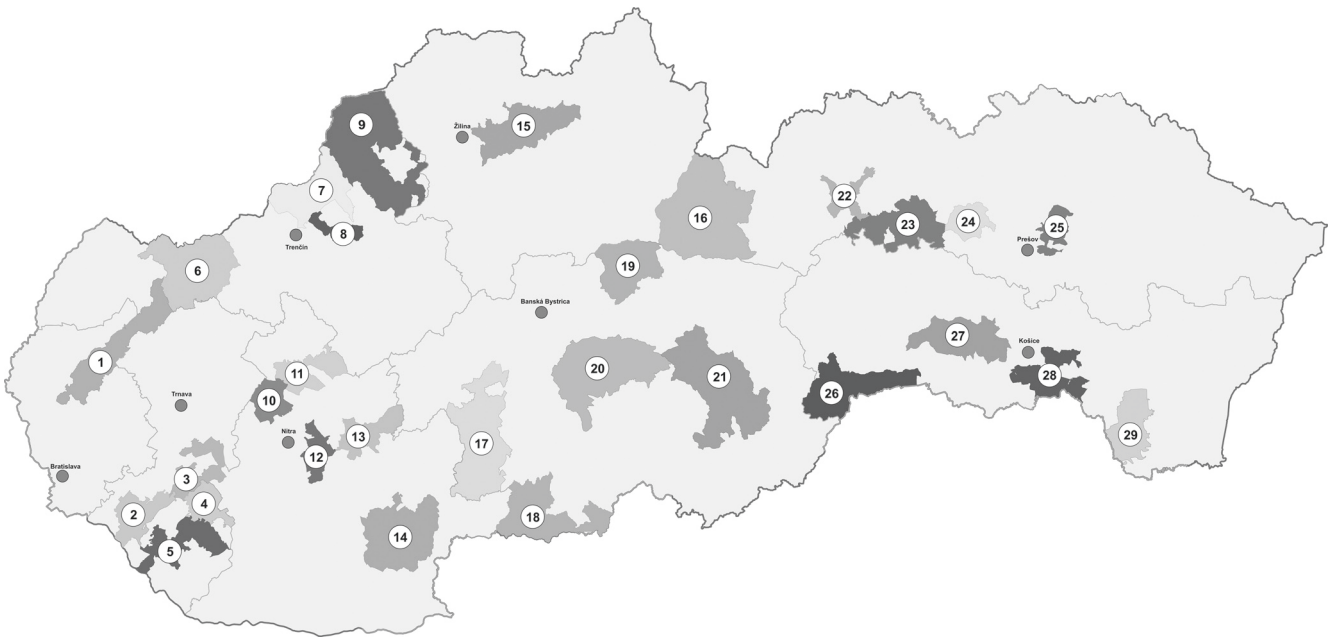

Figure 1: Registered Local Action Groups in Slovakia in the 2007-2013 programming period.

1: Civic association Podhoran; 2: Agroprameň; 3: LAG Dudváh; 4: LAG Stará Čierna voda; 5: LAG Aqua Paradise – Aquaparadiso – Víziparadicsom; 6: Kopaničiarsky region – LAG; 7: LAG Vršatec; 8: LAG of microregion Teplička; 9: Naše Považie; 10: Civic Association of microregion Radošinka; 11: Association of microregion Svornosť; 12: Regional association Dolná Nitra c.a.; 13: The civic association for development of microregion 'Požitavie – Širočina'; 14: Dolnohronske development partnership; 15: Civic association 'Partnership for LAG Terchovská dolina'; 16: LAG Horný Liptov; 17: Civic Association Zlatá cesta; 18: Partnership Krtíšske Poiplie; 19: LAG Chopok juh; 20: Podpoľanie; 21: LAG Malohont; 22: Civic association for regional development Spiš; 23: Civic Association LAG LEV, c.a.; 24: Partnership Bachureň; 25: LAG Šafrán; 26: Civic Association Kras; 27: LAG Rudohorie, c.a.; 28: LAG Hornád – Slanské Vrchy, c.a.; 29: LAG Tokaj – Rovina, c.a.
Source: http://nsrv.sk/index.php?pl=18&article=34

Definition of commuting and the character of available statistical data

The notion 'commuting to work' means travelling between the place of residence and the work place (Székely and Michniak, 2009) and represents one of the basic types of spatial mobility. The regularly-held censuses organised by the Statistical Office of the Slovak Republic (Štatistický úrad SR, 2003, 2014) – in this paper the results from the years 2001 and 2011 are compared – provide extensive statistical material, part of which are specific and quite detailed data about the declared movement of the economically-active population between the place of residence and the work place (including in- and out-commuting data) when the commuter's municipality of residence and that of work are not the same. It means that distance and time are not decisive for the qualification of commuting. In turn, the decisive and indispensable criterion is crossing the administrative boundary of the municipality of the commuter's residence. This condition, of course, makes registering of commuters very dependent on the size of the smallest territorial-administrative units, which are the urban or rural municipalities (LAU 2). The assumption that in the territory of bigger (urban) municipalities people have to overcome a fairly long distance on their way to work at certain time and financial cost is quite justified.

Unfortunately, the mobility of this group of persons that takes place in the territory of a single municipality is not reflected in the statistical data (except the biggest towns Bratislava and Košice). There is another important restriction for the available data on municipality-to-municipality commuting – the data about the size and directions of in- and out-commuters are only available for municipalities where total number of commuters to work and school is at least ten. Based on fieldwork experience it can be assumed that when investigating the rural-to-rural commuting at the lowest spatial level (just as when analysing intra-LAG commuting between municipalities), it is impossible to catch all movements of in- and out- commuters exactly. In-commuting and out-commuting between municipalities does exist also for values of fewer than ten persons. This is the reason why the data on intra-LAG commuting, which have been calculated, are underestimated. Despite these shortcomings, it is felt that censuses are practically the only source of data about commuting at the national level provided by the individual municipalities and that they are valuable and very useful for the objective of the study. The existence of and access to these data is *'condition sine qua non'* for the research.

Database creation

For each of 29 LAGs it was necessary to create special matrices for 2001 and 2011; the lines and columns in the matrices represented the municipalities creating them. The size of the matrices varied from 4x4 (LAG no. 8) to 44x44 (LAG no. 9), but not all of the cells of the matrices, expressing the number of in- and out- commuters, had numerical value. Sometimes, commuting between municipalities did not exist and sometimes it was not explicitly expressed as a consequence of the applied limit of the movement extent expressed. Subsequently, the numbers of intra-LAG in-commuters and out-commuters were summed and compared with the overall numbers of in-commuters to and out-commuters from territories covered by individual LAGs. This resulted in the differentiated shares in intra-LAG commuting (with zero commuting balance) of the total numbers of out-commuters

and in-commuters. As mentioned above, the calculated differences are, due to the nature of the applied statistical data, partially underestimated, whereas the rate of the underestimation depends on the spatial heterogeneity of small commuting flows. What is, however, essential from the aspect of the goal pursued, time-space comparison of changes in commuting, identical methodological procedure and identical practice in publishing the outcomes of commuting to work, enable to express smartly differences evoked in the individual LAG territories by both the internal and external developmental trajectories and of the responses from the local residents.

Data gathering on out-commuters abroad was simpler. Numerical values of the declared out-commuting to work abroad of the local residents existed for all municipalities and in both censuses. Therefore, the values for the individual municipalities of 29 LAGs were summed and the share of out-commuters in the total number of out-commuters was expressed (note: the values for in-commuters from abroad to Slovak municipalities are not available).

Results

The period between the two censuses 2001 and 2011 was very dynamic in Slovakia. 'Europeanisation' of Slovakia (Michniak, 2016) is considered to be the most important change influencing the labour market. Here, the term is used in the sense that the process started in 2004 with the accession of the Slovak Republic to the EU and continued in 2007 through the accession of the Slovak Republic to the Schengen Area and opening of labour markets of the EU's Member States to citizens of the Slovak Republic. The Government of the Slovak Republic started to take extensive measures with a view to kick-starting economic growth and reducing unemployment with the assistance of investors from abroad. Their consent, being a response to the direct financial subsidies and indirect support provided through tax holidays, was often evaluated in the mass media uncritically and exclusively positively as a sign of Slovakia's 'competitiveness'.

Out-commuting to work

Differences in the absolute numbers of out-commuters from the individual territories covered by LAGs reflect their different sizes and being mainly suitable to form the basis for expressing the scope of specific movements: out-commuting abroad and commuting to work within the LAG territory. In 2001, the fewest number of people (more than 1,300) abandoning the municipalities in which they lived was in LAG no. 24 (high share of Roma population having significantly limited possibilities to be successful in the labour market), while the highest number was in LAG no. 9 (more than 14,000), where important and traditional commuting (mainly industrial) centres – Púchov and Považská Bystrica – are located in the LAG territory itself and in its immediate surroundings. The position of these two LAGs – the first and the last – remained unchanged in 2011. The absolute values have changed only slightly, which indicates, especially in the case of LAG no. 24 from eastern Slovakia, that the challenge of integrating the Roma population into the labour market still persists.

Out-commuting abroad

Data on the scope and changes in the cross-border out-commuting to work, where the relative geographical position is a preeminent factor, provide more interesting results. People living in the territories of LAGs at the state border, or situated very close to the border, are hypothetically expected to find work abroad more frequently. While the share of out-commuters abroad varied from only 0.51 (LAG no. 28) to 8.77 per cent (LAG no. 15) in 2001, in 2011, i.e. after having opportunities to gain employment legally in the labour markets of other EU Member States, the interval limits have changed substantially (Figure 2), varying from 3.95 (LAG no. 10) to 25.48 per cent (LAG no. 18).

These extreme differences can be explained if the hypothetical assumption on the crucial influence of relative geographical position is applied thereon, in terms of both the closeness of the state border and closeness of significant centres of economic growth and commuting to work. While for the population living in the boundary territory of LAG no. 18, there is no such centre in their closest Slovak surroundings (Veľký Krtíš with a population of 13,000 is classified as a small town in Slovakia), the inhabitants of the relatively centrally situated LAG no. 10, when choosing their place of work, are under the strong influence of Nitra (80,000 inhabitants), situated nearby.

Another reason for the high commuting abroad of people living in LAG no. 18 is the ethnic structure of the local population. The territory borders Hungary and is characterised by a high share of declared Hungarians for whom there is no language barrier to commuting abroad. The residents, gathering and comparing information about the local labour markets available, answer to the existing cross-border disparities in salary levels and quality of the work offered, behaving in an economically rational manner. Their decisions are also markedly supported through special transport links, inno-

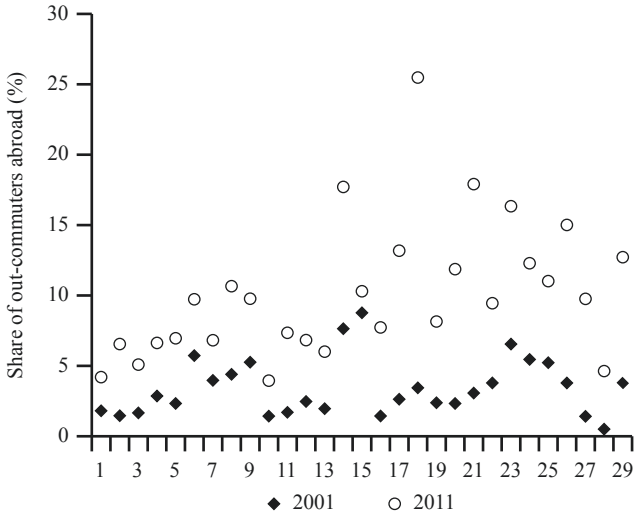

Figure 2: Changes in the share of individual LAG's out-commuters abroad, 2001 and 2011.

See Figure 1 for identities of LAGs
Data sources: Štatistický úrad SR (2003, 2014) and author's own database

vatively organised by the Hungarian employers, crossing Slovakia's territory and collecting workers for their production plants (Bleha *et al*., 2007). This illustrates the typical simultaneous influence of 'pull' and 'push' factors of commuting and a short-term win-win strategy which is beneficial for both parties involved.

Out-commuting directed to LAG's territory

Did the acquisition of LAG status, despite its short existence, have a positive influence on the local rural labour market and increase the movements between the intra-LAG (predominantly) rural municipalities? Given the size and means of demarcation of the territorial units being compared (the absence of the cores of functional urban regions as natural centres of commuting, together with the limited number of small rural municipalities), it was supposed that the shares of out-commuters travelling to municipalities located in a LAG territory will be markedly differentiated and relatively low. The numerical values calculated (which, as mentioned above, are partially underestimated) confirmed this assumption. The lowest values, 2.33 (2001) and 1.32 per cent (2011) for LAG no. 22, are not only an extreme example of evidently limited opportunities in the local labour market, but also of the attractiveness of the cities (Kežmarok and Poprad) situated in the immediate hinterland of this rural territory. On the other hand, the values calculated for the territory of LAG no. 6, which includes three urban municipalities, are 44.6 (2001) and 41.1 per cent (2011).

Comparison of the values calculated for both years and for all LAGs reveals that, while the number of out-commuters has increased in territories of 24 LAGs, an increase of out-commuters directed to LAGs territory is only evident (Figure 3) in five LAGs (numbers 2, 3, 7, 10 and 15). It is evident that the position and attractiveness of most of the LAGs as local labour markets has weakened in spite of the declared benefits from general knowledge transfer and the existence of public-private partnerships established also for the purpose of rural economic development.

LAG no. 15, on which territory one of the most influential foreign investments in Slovakia was made in between the two censuses using government stimuli, deserves special attention. The South Korean car manufacturer Kia-Hyundai, along with its co-located suppliers, have created thousands of relatively attractive jobs, and in doing so have completely reorganised the commuting behaviour in the region. The 'green field' investment offered those living in surrounding rural municipalities short-distance commuting, thereby saving their time and finance. Kia-Hyundai (an example of a traditional, top-down development strategy with an impact on a rural area) has concurrently become, as a place of work, a magnet for the population from almost the entire territory of Slovakia (see section on in-commuting).

In-commuting to work

Since the LAG territories are rural, it would be expected – considering the persisting rural-to-urban commuting in Slovakia – that the numbers of in-commuters would be lower than those of out-commuters. Through calculating the commuting balance these assumptions have also been confirmed (Figure 4), except for LAG no. 19, the location of one of the 'flagships' of Slovakia's economy, the labour-intensive steel factory in Podbrezová, where the number of in-commuters is higher than that of out-commuters. In 23 LAGs, the differences between the numbers of out- and in-commuters have increased over the period 2001–2011, which indicates that the potential of the rural territories, with regard to their creating job opportunities, has decreased. The numbers of out-commuters and in-commuters even in LAG no. 19 are converging as a result of economic recession and a subsequent dramatic reduction in the headcount at the Podbrezová steelworks.

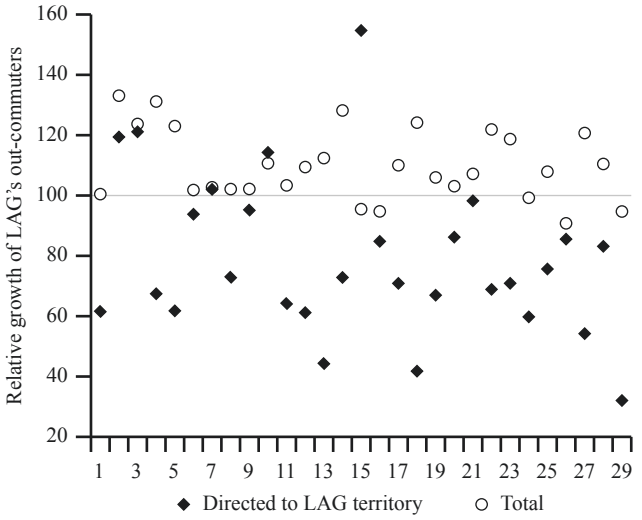

Figure 3: Comparison of relative growth of total LAG's out-commuters and LAG's out-commuters directed to LAG territory, 2011/2001.

See Figure 1 for identities of LAGs
Data sources: Štatistický úrad SR (2003, 2014) and author's own database

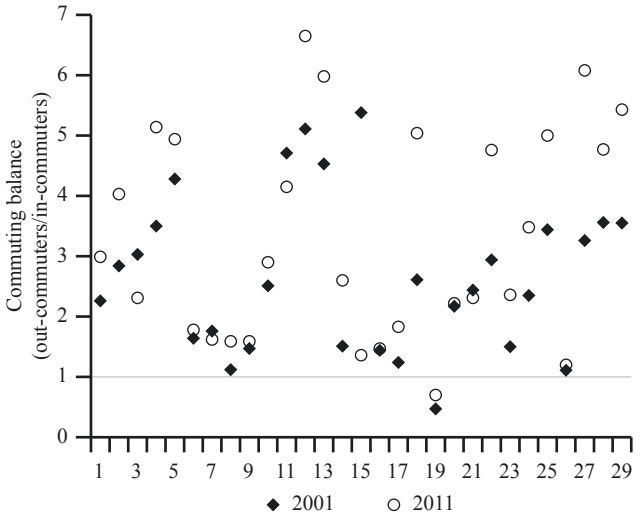

Figure 4: Temporal comparison of commuting balance (out- / in-flows between municipalities) for individual LAGs: 2001 and 2011.

Note that the spatial share balance between out-commuters and in-commuters is 1; values below 1 mean that the number of in-commuters exceeds that of out-commuters
Zero is a purely theoretical value
See Figure 1 for identities of LAGs
Data sources: Štatistický úrad SR (2003, 2014) and author's own database

Conversely, in the territories of LAGs no. 3, 7, 11, 15 and 21, the differences between the numbers of out- and in-commuters have decreased; in most cases only slightly, but in LAG no. 15, where Kia-Hyundai is located, the change is huge. It must be again highlighted, however, that besides the investor's macro-locational interest, decisions made by the relevant decision-making authorities from Bratislava took a prominent role in the reorganisation of the entire regional space. The municipalities constituting the LAG were obliged to provide land for the production lines; the sale of the land (in the public interest) and price negotiations held between the landowners and the State also had to be conducted via a top-down approach.

In-commuting directed to LAG territory

There is zero balance between the numbers of out-commuters and in-commuters who are moving within the LAG municipalities (LAG as an internal, closed, spatial unit), but the LAG territory is also visited by job seekers from municipalities situated outside the border of the institutionally-delimitated cooperating territory that constitute major or minor shares depending on the particular territory (Figure 5). In spite of the fact that those values have also been partially underestimated for the above-mentioned methodological reasons, they show a marked differentiation among the individual LAGs. While some of them are in-commuting centres for people living in the surrounding area (LAG nos. 2 and 22), in others, which thanks to their size, internal structure and functional relations seem to comply with the idea of an urban functional region (Bezák, 1990), the intra-LAG in-commuting can create (just as in the case of the intra-LAG out-commuting mentioned previously) a significant share of the regional commuting to work (LAG nos. 6 and 20). What counts, along with the above-said, is the fact that the share of intra-LAG in-commuters decreased in up to 21 LAGs in between the two censuses, which again indicates a worsening of the rural labour market situation (Figure 5).

What changes happened in the rural territories being examined? While seven LAGs reported an increase in the total number of in-commuters, an increase in the number of in-commuters from specific LAG territories was only identified in five LAGs (Figure 6). Decreases in the numbers of in-commuters to rural territories were quite dramatic in some cases (LAG nos. 29 and 18), mainly in the light of the fact that a more dramatic decrease has been calculated for the local residents from LAGs. All outcomes suggest the identification of the rural residents with the LAG, the developmental activities of which they should participate in, can be hindered considerably when they belong to a different 'place of work' territory.

In Figure 6, however, the territory of LAG no. 15, mentioned several times before as the origin of the automotive industry cluster, attracts most attention as it experienced a marked demand of the employers for workforce. With the relatively small territory of the rural partnership and the age structure and educational levels of the local residents, it definitely was not able to meet the demand for workforce, which resulted in in-commuting of persons meeting the specific qualification criteria to its territory from the nearer, but also farther surroundings. An almost four-fold increase in the number of people coming to the rural territory using public or individual transportation is logically closely interlinked mainly with the increase in the burden on transport in the territory.

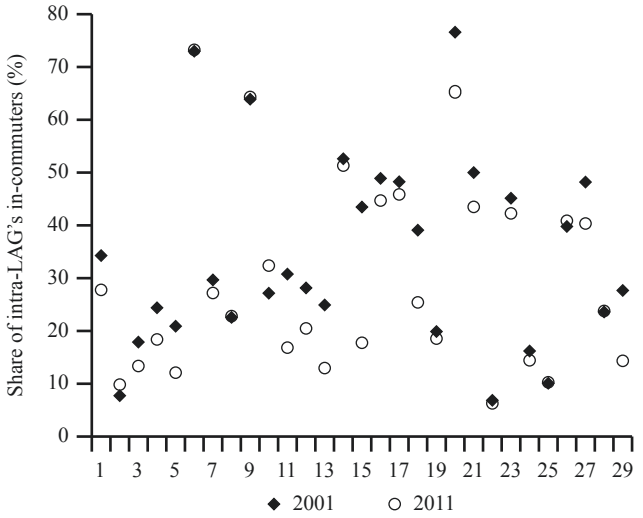

Figure 5: Changes of shares of intra-LAG's in-commuters from total number of LAG's in-commuters: 2001 and 2011.

See Figure 1 for identities of LAGs
Data sources: Štatistický úrad SR (2003, 2014) and author's own database

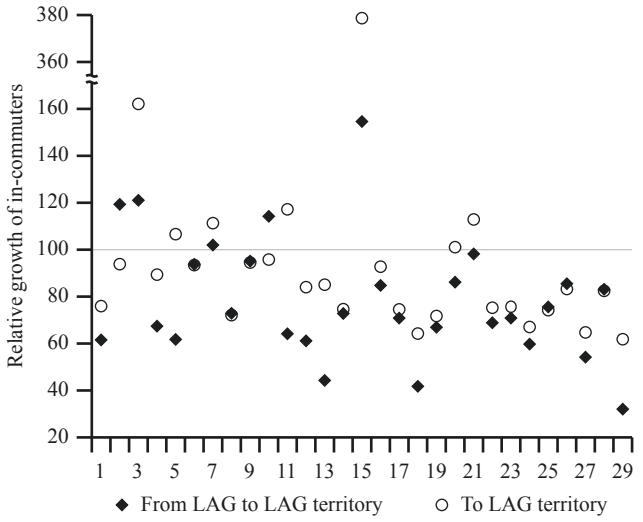

Figure 6: Comparison of relative growth of total LAG's in-commuters and LAG's in-commuters directed to LAG territory, 2011/2001.

See Figure 1 for identities of LAGs
Data sources: Štatistický úrad SR (2003, 2014) and author's own database

Discussion

The outcomes presented, documenting mainly the continuing decrease in the importance of rural areas as attractive places of work, prompt a number of questions, mainly regarding the ability and possibility of rural stakeholders to carry out large-scale developmental projects built on fair benchmarking of the territory they control, which opens discussion on expectedly limited possibilities of exclusive (neo) endogenous development of rural areas, and in turn of their

potentially incorrect understanding and interpretation of this key term.

What was and still is essential from the viewpoint of the changes in the commuting to work analysed, the unemployment rate of 2001 was successfully reduced by 2011 (in spite of the impacts of the global financial and economic crisis) from 18.6 to 13.6 per cent (Švecová and Rajčáková, 2013). The reduction in the unemployment rate and creation of new employment opportunities were not spatially equitable. The existing regional (and inner-intraregional and/or urban-rural) disparities in the spatial labour markets, deepening over time, reflected differentiated and multidimensional territorial potential (relative geographical position, transport infrastructure and spatial accessibility, structure of population and economy, or the like), historically inherited, the value of which influenced the location-related decisions of investors and concurrently the viability of the existing state and private enterprises. Some territories and locations have become more attractive from the aspect of employment opportunities than others where limited or less attractive job opportunities can exist. Therefore, economically-active individuals who do not want to change their places of residence perceive undesired commuting as the only theoretically potential solution and free decision on the spatial mismatch between the location of places of residence and places of the (more attractive) work.

Territories (often missing functional linkages) spontaneously formed based on the interest of their representatives to join forces and prepare integrated plans of territorial development have been selected as basic spatial units for time-space comparisons. When making decisions, mainly aimed at obtaining LAG status, they could be motivated by multifarious factors, but the possibility to draw down EU funds is a fundamental motivation. It is, however, important to highlight that in relation with the implementation of the LEADER programme and creation of the LAGs from the group of public, voluntary and business stakeholders at the local level, misinterpretation of the importance of their existence, sometimes intentional, happens quite often. When the LAGs were established at the beginning of the 1990s, their essential purpose was to activate the local people to participate in the activities and in the decision-making regarding the development of the territory where they live. The LAG is currently perceived more pragmatically and in the mass media is presented almost exclusively as the regional subsidy agency redistributing the funds (Boukalová *et al*., 2016).

There is, however, much more to come. The creation of LAGs in Slovakia has been initiated predominantly by local government representatives (mayors of municipalities); in some cases, the necessary share of private and civic sectors required is often a result of their social networking (relatives or friends). This type of partnership can theoretically produce a specific group of persons that are separated from the wider community of local residents, showing little loyalty to the developmental priorities of the existing partnerships presented. This idea, which infringes the fundamental principle of the LEADER initiative, namely accentuating the participation of all strata of the local population in rural development, is not only a theoretical speculation specific for Slovakia. Critical studies dealing with the LEADER initiative assessment (for example, Furmankiewicz *et al*., 2010 and Navarro *et al*., 2016) are also focused on the ability to select the right participating members for LAGs, emphasising the negatively-perceived exclusion of some marginalised population strata. On the other hand, invocation of interest in active involvement and acceptance of the opinions of all groups of the population in creating rural developmental programmes will require a change in the way of thinking of not only the local stakeholders, but of all those who have a cordial interest in rural development. This should result in building of the social capital of the rural territory where its residents will try to stop building barriers between each other and start building bridges of understanding whereby they could join together in a consensual vision for conducting their developmental programme.

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Generating space for innovations in agriculture: the AgriSpin project

Good initiatives for sustainable innovations are everywhere. The biotope selects. How can a conducive biotope be created where such initiatives will flourish and develop into successful innovations? Where can initiators easily find partners and funds to make their dreams come true? What can innovation support agencies do concretely to make a difference? These are the central questions in the European Union Horizon 2020 project AgriSpin. Here, we share our first experiences from AgriSpin, in which 15 partner organisations in 12 European regions are learning from and with each other about successful approaches to innovation brokering. Firstly, we summarise some bottlenecks that are frequently mentioned in the literature. Then the design of the project is described. A key element is the series of 'cross-visits' hosted by the partners. At the time of writing, all cross-visits have been made, and the project has entered a digestion period in which we try to make sense of what has been observed. The next step is to design action plans for each partner organisation and the key actors in the regions where they operate. So, this paper reports work in progress. Nevertheless, some interesting 'pearls' and 'puzzles' can already be reported.[1]

Keywords: innovation support services, networks, partnership, EIP-Agri

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Introduction: innovation as an emergent process

The European Union Horizon 2020 project 'AgriSpin' (Space for Innovations in Agriculture; http://agrispin.eu/) runs from March 2015 to October 2017. Focusing on innovation processes, it is designed to relate concepts to practice and to enrich theory from practice through the in-depth exploration of a series of innovations at farm level with special focus on what support service providers actually do to stimulate such innovations. Of the 15 organisations in the project, which are drawn from 12 European Union (EU) Member States, twelve are farmers' organisations and farm advisory services with an intermediate role between farmers, researchers and other stakeholders, and the remaining three are scientific institutes with a focus on knowledge systems in agriculture. This paper summarises the main features of the project and presents some first 'pearls' and 'puzzles' collected so far from the perspective of the science-related members of the consortium.

AgriSpin aims to contribute to system-oriented innovation research in agriculture, complementary to the EU policy instrument European Innovation Partnership 'Agricultural Productivity and Sustainability' (EIP-Agri). The idea behind EIP-Agri is that innovation emerges from interaction between stakeholders. Following this idea, the focus of attention shifts from diffusion of innovations to ways of creating space in which interaction might lead to innovation as a co-creative process. Currently there is concern about a number of bottlenecks pertaining the generation, dissemination and use of innovation in agriculture such as (EU SCAR, 2012, 2014; WB, 2012):

- Research is insufficiently related to practice; science-driven innovations remain 'on the shelf' due to no/little dissemination activities;
- Farmers' needs are not sufficiently addressed during innovation generation, and hence innovations are not relevant (enough);
- Innovative ideas from practice are not captured and spread, i.e. local or practised generated innovations with strong potential for dissemination are not recognised or diffused;
- A shift from science-driven to innovation-driven research has not yet taken place, the institutional, methodological and behavioural changes that are required for such a shift are not yet comprehensively explored, findings and experiences are not systematically documented and assessed.

Such tasks used to be part of the mandate of state/public funded bodies aiming at bridging the gap between agronomy-science and farming practice, i.e. mainstream or 'conventional' extension. However, as, since the 1980s, public extension has been seen to suffer from a number of shortcomings, many countries have started implementing and experimenting with different approaches (decentralisation; contracting/outsourcing; public-private partnerships; privatisation etc.) to providing extension services, resulting in pluralistic advisory services (Alexopoulos *et al*., 2009; Cristóvão *et al*., 2012). Cristóvão *et al*. (2012, p.214) highlight the importance of a "new extension approach aiming at participatory group learning and networking with extension agents acting as facilitators" but note that facilitation is "largely underdeveloped, especially on the part of European extension organizations" (p.219). Furthermore, European Agricultural Knowledge and Information Systems (AKIS) are very diverse (Knickel *et al*., 2009; Hermans *et al*., 2015; Knierim *et al*., 2015). Thus, the provision and performance of extension varies considerably.

Given such issues pertaining agricultural innovation enhancement within the EU, the EU innovation policy for rural development currently pursues the establishment of the EIP-Agri. This policy instrument relies on partnerships and 'bottom up initiatives', especially through 'Operational

[1] Sections of this paper were presented in the IFSA Conference in Shropshire, UK in July 2016.

Groups', in order to bridge the gap between actors across the value chain (especially between research and practice) and facilitate the co-generation of innovations through the employment of facilitators/innovation brokers (Regulation (EC) No. 1305/2013[2]; see also EU SCAR, 2012, 2014; Hermans *et al.*, 2015). The next section of this paper elaborates on the theories and concepts backing the authors' understanding of the 'facilitating the co-generation of innovations' through building bridges and creating spaces.

Discourse on innovation support: an overview

During recent decades, a number of new systems of innovations (SoI) approaches have emerged in the non-agricultural literature which see innovation in a systemic and interactive way, i.e. that innovation emerges from networks of actors as a social (and institutional) as well as a technical process, a nonlinear process, and a process of interactive learning (Koutsouris, 2014). These approaches build on networks, as social processes encouraging the sharing of knowledge and, notably, as preconditions for innovation. Communities of Practice (CoPs), for instance, are described as people engaged in a process of collective learning in a shared domain of interest (Wenger *et al*., 2002). Such concepts and approaches, therefore, focus on processes instead of the emphasis on structures. Knowledge is conceived as being constructed through social interaction – i.e. not transferred but instead continuously created and recreated. Thus, particular attention is given to (social) co-ordination and networking. Moreover, in order to avoid or to overcome gaps (cognitive, information, managerial or system) resulting in network and institutional failures (Klerkx *et al*., 2012), growing attention is given to various types of (process) 'intermediaries or facilitators'. For example, Van Lente *et al*. (2003) distinguish 'systemic intermediaries' as actors working mainly at the system or network level to facilitate actor interactions; Haga (2009) argues for the need to orchestrate networking enablers and thus for 'mediators' or 'brokers' as 'independent players' in networks aiming at (a) acting as points of passage to external actors outside the network, bringing in experience and expertise, and (b) building internal network resources and network structure – upon which network governance and processes depend; and Shea (2011) cites Gagnon according to whom "... knowledge brokers, networks, and communities of practice are innovative ways to disseminate and facilitate the application of knowledge. Integrated exchange, involving active collaboration between researchers and knowledge users, built on trust and frequent interactions, holds particular promise". Finally, Howells (2006, p.207) prefers to employ the term 'innovation intermediary' for "[A]n organization or body that acts as an agent or broker in any aspect of the innovation process between two or more parties. Such intermediary activities include: helping to provide information about potential collaborators; brokering a transaction between two or more parties; acting as a mediator, or go-between, bodies or organizations that are already collaborating; and helping find advice, funding and support for the innovation outcomes of such collaborations".

In agriculture, based on SoI approaches there has been a conceptual shift from the 'transfer of technology'[3] model to network and systems approaches such as agricultural innovation systems (AIS; see Klerkx and Leeuwis 2008a; Klerkx *et al*., 2010). Contra Rogers (2003), these approaches claim that the process of innovation is messy and complex; new ideas are developed and implemented by people who engage in networks and make adjustments in order to achieve desired outcomes (Van de Ven *et al*., 1999). Nowadays, innovation studies increasingly focus on learning itself, with emphasis on facilitation and the processes of human interaction from which learning emerges (Röling and Wagemakers, 1988; LEARN Group, 2000).

In this respect, intermediaries aim to assist agricultural/rural entrepreneurs in coping with challenges such as articulating their innovation needs and contracting appropriate services to support their innovation projects and successfully execute these projects. A typical AIS is constantly evolving towards adopting a multi-stakeholder learning approach to withstand global challenges and includes a wide range of actors such as scientists, farm advisory services, farmers/farmers' groups as well as innovation support services. Intermediaries thus aim at enhancing the interaction between such varieties of actors. Such intermediaries are seen to act as a bridge between the demand and supply side of agricultural knowledge infrastructure (Klerkx and Leeuwis, 2008a, 2008b); they focus on 'exploration', i.e. sharing and synthesising, and thus the creation of new knowledge (see Levinthal and March, 1993; Murray and Blackman, 2006). Their major role is that of the co-learning facilitator (usually found in literature as 'facilitators' or 'innovation brokers') aiming at the development of shared meaning and language between dialogue partners in order to stimulate change and develop solutions and innovation. The engagement of stakeholders in dialogue, despite its difficulties and its time-consuming nature (since (social) learning and change are gradual), is necessary so that critical self-inquiry and collaboration will be achieved.

Summarising, Klerkx and Leeuwis (op. cit.) identify three major functions of an innovation broker: (a) demand articulation, (b) network formation and (c) innovation process management. Nevertheless, despite the argument of Hekkert *et al*. (2007) on the important contribution of innovation brokers in innovation systems, the topic has not been extensively embraced by the agricultural academic and research community with the notable exception of the Dutch agricultural sector (e.g. Klerkx and Leeuwis, 2008b; Klerkx *et al*., 2010; Hermans *et al*., 2013). For example, in his study on the changing role of government in the Dutch agricultural sector, Wielinga (2001) recognised the crucial role of networks and intermediate actors who fuelled those networks in the decades in which the sector became extremely innovative, and warned that under neoliberal market conditions this

[2] Regulation (EU) No 1305/2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) No 1698/2005.

[3] Transfer of technology is the process of transferring (disseminating) technology from the places/groups it was generated to wider audiences/ places (users). Despite different interpretations, different views seem to share the basic idea of TT as "a movement of know-how, technical knowledge and/or technology from one or more sources (termed 'donors') to another entity (termed 'recipient')" (Roxas *et al*., 2011, p.7).

function was lost and should be rehabilitated. He thus underlines that innovation emerges from networks, and no network can function well without a 'free actor' who has space to do whatever is necessary to keep key actors in the network connected. Additionally, a large-scale experiment with over 120 networks of farmers in animal production showed that such networks could very well become innovative, provided that the initiative was their own, and they were facilitated in a way that was appropriate for such networks. Such facilitation requires tools that differ from what is common in project management (Wielinga *et al*., 2008).

Wellbrock and Knierim (2014) have shown that collaborations start with informal get-togethers of motivated individuals interested in a certain development trajectory in their specific area. Through these informal get-togethers, different stakeholders are given the opportunity to exchange their ideas, share their knowledge and together develop new ideas and projects. This process of joint reflexivity is arguably a crucial component of learning; it is joint reflexivity that leads to shared understanding as people learn to work together to address their development goals. The informality of the initial meetings seems important in providing a non-threatening space in which to exchange ideas and learn about each other. Such encounters can be considered to have occurred initially in an institutional void (Hajer, 2003). One could further argue that institutional voids are necessary for innovation (Wellbrock *et al*., 2013a, 2013b), because they allow stakeholders to negotiate new, joint ways of working together and to formulate new institutions that can be agreed upon by all partners in the collaboration (Wellbrock *et al.,* 2013b; Wellbrock and Roep, 2015).

Some features of the AgriSpin project

The project, besides management, and communication and dissemination, consists of four work packages (Box 1). The idea behind the AgriSpin approach is that all partners have their own experiences, ideas and approaches for supporting innovations at farm level, which are worth sharing with others. A 'silver bullet' for stimulating innovations does not exist. Every partner is working in a context that has been historically grown and that has its cultural particularities. There is a lot to learn from studying these different innovation efforts, and that is what the project intends to facilitate.

The focus is on regional innovation systems. This is because within many countries there are considerable differences in cultures, organisational structures and even policies between regions. The institutional environment has considerable influence on the capacity of a region to find new answers to emerging challenges. While we assume that good initiatives for innovations are everywhere, the thresholds for taking the necessary actions for bringing such initiatives into practice vary widely in different regions throughout Europe. Stimulating policies such as subsidies for experiments or mitigating risks can lower such thresholds, while restrictive rules, strangulating funding conditions and lack of civil acceptance make them higher. Dialogue with the 'enabling environment' about its role and possible measures is therefore an important component of the project as well.

First experiences

The book: Stories from All Corners, To Start With

Prior to the cross-visits, AgriSpin partners were asked to write a story of an innovation process in which they were involved. Partners were strongly stimulated to frame it as a story, telling how it started, what happened after the first initiative and how far the initiative has come. Additionally, the authors were asked to include their own analysis of what made the difference in this story. The kind of examples the partners came up with, the terminology they used, the concepts and the assumptions beyond these stories: all of these tell something about what the partners think about what matters most in innovation processes. Some interesting pearls and puzzles are listed in Box 2.

Box 1: AgriSpin work packages (excluding management, and communication and dissemination).

Science: a team of scientific partners guides the process with a conceptual framework including language to facilitate discussion about what matters, and with analysis of what is being observed in the project. The science team has a supportive role, by giving meaning to what is being harvested in the exchange between partners, and refrains from instructing partners what to do.

Cross-visits: with a few exceptions, all partner organisations have hosted a cross-visit of 3-5 days, in which they presented case studies of interesting innovations in which they had been involved. The visiting teams, composed on average of 7-8 colleagues from other partners, studied these cases by interviewing farmers, advisors and other relevant actors. In total, 13 cross-visits have been completed, and 58 cases have been studied, out of which 50 are being elaborated for analysis.

Best practices: AgriSpin focuses on collecting and generating ideas for stimulating innovations at a practical level. Therefore, best practices are being collected in practical abstracts and short videos which are made available on the project website as well as EU communication channels (www.EIPsupport.eu) and websites of the project partners.

Institutional uptake: some of the lessons learned about creating space for innovations refer to the institutional environment. What can policy makers and managers do to lower the threshold for good initiatives? In the fourth work package, a dialogue has started between the project partners and decision makers in the 'Multiplier Group'.

Box 2: 'Pearls' and 'puzzles' arising from AgriSpin partners' stories of innovation processes.

Pearls

Innovations can be technical, organisational and social: all angles are valid and interesting.

Initiators can be anywhere: the initiative for an innovation process can come from an entrepreneur, an advisor, a researcher, a politician or anyone else. It does not seem to matter where the first idea came from, as long as the partners in the process embrace it and make it their own.

Innovation support is about building bridges: connecting partners who carry the initiative with those who can support the process in one way of the other: this appears to be the recurrent role in practically all stories.

Puzzles

Reflection on the dynamics is needed. How do support agents make a difference? It appeared hard for the authors (mostly these support agents themselves) to clarify this question.

What can be done if bridge builders are lacking? Some stories show that intermediate structures are lacking. This does not necessarily mean that bridge builders are not there, but the threshold for doing what needs to be done is high.

The underlying assumptions are to be clarified. This first exercise of the project makes clear that it is not so easy for the partners to reflect on their own assumptions.

Developing a cross-visit methodology

At the time of writing (December 2016), all 13 cross-visits have taken place. In line with our point of departure that no-one pretends to know better, we developed the method for the cross-visits on the way as well. This was not an easy thing to do. In the literature, various methods have been described for making quick assessments of agricultural knowledge and information systems, for example the RAAKS method (Engel, 1997) and its more recent variation RAAIS (Schut *et al*., 2015). These are methods to guide a mutual learning process between major actors in an innovation system who gather around a commonly-shared problem or ambition. In AgriSpin, the objective was not to generate solutions with stakeholders, nor to describe an innovation system in detail, but to be inspired by best practices. Some challenges of a cross-visit for doing so are:

- How to focus the attention of the visitors on the most important aspects of an innovation process?
- How to create settings with optimal exchange between key actors and visitors?
- How to collect the observations made by each of the visitors?
- How to reach conclusions to share with the host and its local partners?
- How to elaborate the results in a way that is interesting for practitioners, decision makers and scientists?

During the cross-visits we identified solutions and kept on improving them. After the first few visits a manual was prepared which was constantly updated. To mention a few of these solutions:

Focus: Based on the interests expressed in the first cross-visit, four focus areas were identified: (1) the innovation process, (2) actors and networks, (3) environment, and (4) characterisation of innovation. Later on, we distributed observation cards with eight different themes, and suggestions for questions to ask. Each visitor selected two themes to focus on. In addition to the aforementioned focus areas, there were cards on (5) innovation support, (6) critical incidents, (7) dissemination and (8) future perspectives. This aids for focussing prevented visitors from asking all kinds of technical questions they were tempted to ask since most of them were technicians themselves.

Setting: The ideal situation for gathering information is to split up into small groups and discuss with the farmer and other actors in parallel. When translation was necessary, splitting up was however sometimes difficult. The host should prevent the possibility of most of the time being consumed by long, formal presentations.

Collecting observations: This seemed difficult and time consuming. We experimented with 'rich timelines', putting all relevant observations on a large sheet, and ordering them along the innovation process in time, preferably nicely illustrated. In the ninth cross-visit, the Innovation Spiral was introduced (Figure 1). This model (Wielinga *et al*., 2007) identifies seven stages in an innovation process, from the

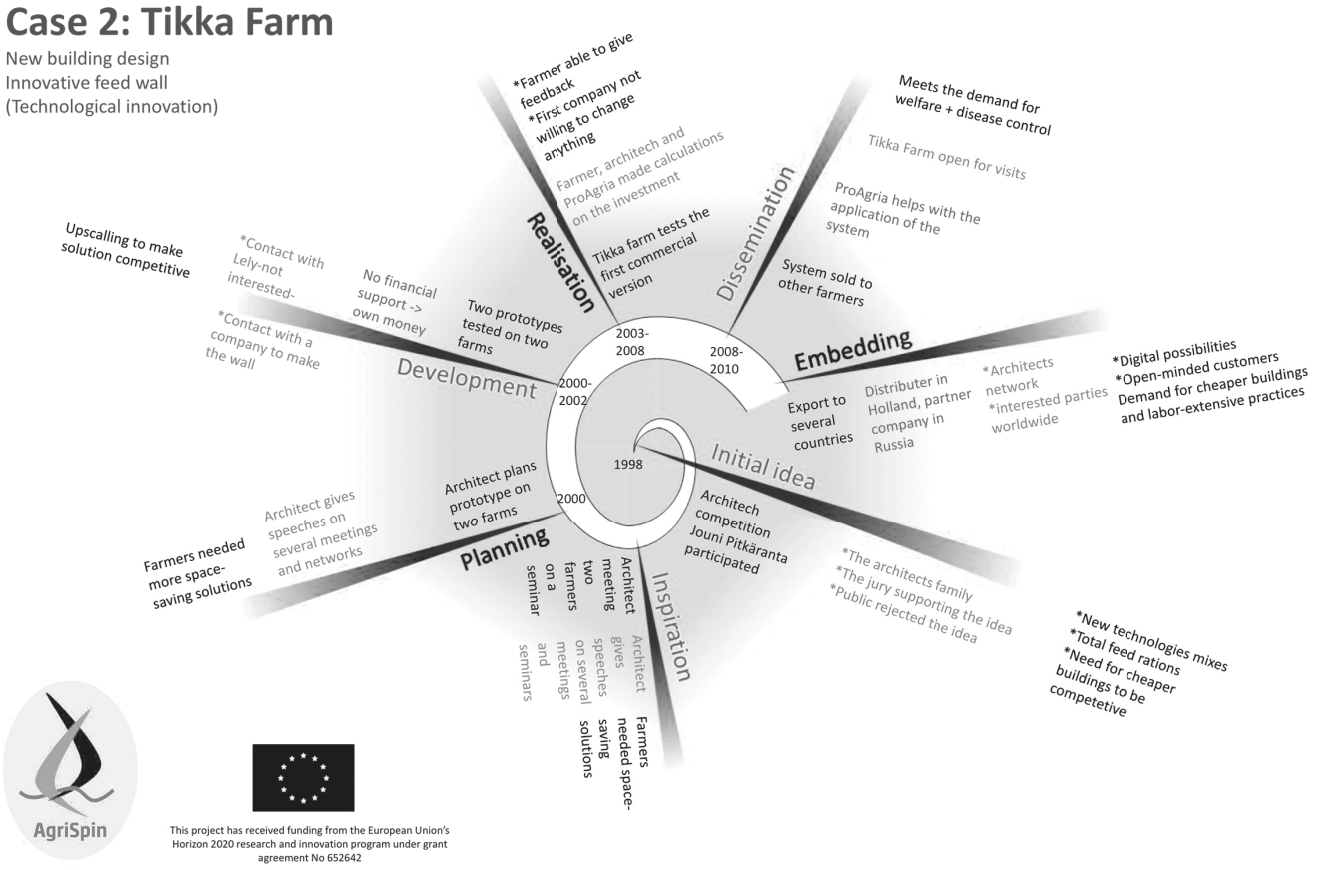

Figure 1: Example of an innovation spiral prepared during an AgriSpin cross-visit.
Source: own composition

initial idea until the embedding stage of the innovation. Printed on a large sheet, this model allowed for systematically ordering the observations in these stages of the innovation process. It also stimulated analytical questions for understanding why things happened as they did. It appeared helpful, although critics were there as well: there is a risk that the model narrows down the observations to what fits in the stages and favours the presentation of complex adaptive experimentation in a linear fashion.

Conclusions to share: After the field visits, the visiting team drew conclusions in three categories: 'pearls', 'puzzles' and 'proposals'. Pearls were those elements that had inspired the visitors. As the visitors, after only a few interviews, could not pretend to have seen sufficient to know better than the host, all doubts and critics were formulated as puzzles, giving room to the regional actors to adjust the picture as the visitors had understood it. Proposals were suggestions to take into consideration by the host, as well as ideas the visitors would take home.

Elaboration: The cases are being elaborated into 'Learning Histories' (Kleiner and Roth, 1997). A Learning History tells the story of a process, and consists of two components: the narrative, including all facts that mattered according to actors involved and their observers, and an analysis that explains why things happened as they did. Using different theories, observers can analyse the same fact differently. For the learning process in AgriSpin such differences are most interesting.

The hosts wrote the narratives, and the scientific partners made the analyses. We expect to generate fifty Learning Histories about innovations at farm level by the end of the project period.

Examples of AgriSpin case studies

As the digesting phase is still ongoing, it is too early for conclusions about effective strategies and methods to stimulate innovations. To give an impression of what has been found in the cross-visits, we give two examples.

Guadeloupe cross-visit

In Guadeloupe a policy-induced set of innovation processes was studied. Hence, there was a two-level innovation case setting: (a) the RITA (*Réseaux d'Innovation et de Transfert Agricole*) programme as such; and (b) three cases of innovative agricultural diversification measures (in citrus, yams and bee production) enhanced by the programme.

The RITA programme has enhanced the cooperation of various agricultural organisations at both the regional institutional level, so that the decision makers know each other better, and the farm level where real cooperation among the technical staff takes place. Particularly the agents of the agricultural chambers are more aware of further actors operating for the sake of farmers. Equally, greater knowledge of the work of CIRAD and INRA was gained. A further gain is the involvement of political decision makers comprising both the representatives of the national ministry of agriculture and of the regional department council. Currently, a very important shift of responsibility is to be realised through which the RITA programme will be transformed from a national top-down and ministry-governed intervention into a regionally-anchored, EU-funded instrument. So far, RITA has been successful in building bridges among the various actors so that there is mutual knowledge about agency possibilities and limits with a specific focus on science-practice interfaces. Also, RITA has created new spaces for actors such as specific farmers' organisations to formulate their research interests and needs (e.g. in livestock production). However, given the relatively short time of the programme's existence, no concrete results can be assessed at this level of innovation process.

With regard to the problem of the citrus greening disease, three innovative strategies were explored: an individual one, a science-practice cooperation and a governmentally-supported business approach. Meaningful bridges among various actors, such as the Chamber of Agriculture, a producers' organisation and the research body CIRAD, were observed in the second case. However, there was clearly no fast and satisfying answer to the problem. So, individual actors who once relied on citrus production looked for either new fruits and crops or alternative livelihood strategies. The scientifically-promoted idea of eliminating the affected citrus trees was not at all supportive for the creation of spaces for innovation – rather the contrary!

The production of yams is important in Guadeloupe as part of the population's staple food. Although confronted with severe challenges from both ecological and market aspects, there is continuing interest among farmers to produce yams despite the fact that productive and resistant plant material is missing. A long-standing breeding line of yams from INRA has failed to achieve the expected breakthrough. Supported by RITA, a new network has been created linking a farmers' organisation with CIRAD and supporting especially one farmer in making field trials with interesting plant material (building bridges). Around these field trials a field day was organised that was successful in creating spaces for the meeting and the exchange of various actors in the sector, and also attracted new farmers who were interested in engaging in commercial yam production.

The beekeeping and queen bee breeding case of the beekeepers' organisation revealed the widest and most concrete impact. Here, the organisation was almost at the level of job creation through the production and sales of a variety of locally-bred queen bees. Moreover, the organisation had lobbied successfully within municipalities for the maintenance and the reestablishment of hedges and other naturally flourishing sites in order to provide bees with fodder sources and, in doing so, building bridges among various actors within a regional, landscape level. Also, through the establishment of a shop for beekeeping equipment and for honey and honey-related products, and through offering training courses for beekeeping, the organisation creates spaces for innovative practices.

The cross-visit aroused the attention of the local decision makers. They participated in the discussions. Following the visit, the second phase of RITA was approved.

Toscana cross-visit

Several innovation cases were visited and studied in the Italian region of Toscana. As with innovation in Guadeloupe, a two-level innovation setting was observed: on the one hand the work of ARSIA/Toscana Region and, on the other, the specific innovative cases visited. ARSIA (The Regional Agency for Development and Innovation in Agriculture and Forestry) had been a technical and scientific agency for the region, but was abolished from 1 January 2011 and all activities were transferred to Toscana Region. ARSIA and the Region played/play a significant role in terms of (a) actively promoting policies at the regional level, (b) encouraging links between stakeholders, notably between scientists and researchers on the one hand and farmers and rural communities on the other, mainly through the setting up of round tables, (c) participating in international projects and putting together relevant regional projects, and (d) funding specific farmers' investments. These points were verified at least as far as the case studies visited in Toscana are concerned (see below). The Agency/Region were/are involved in a wide range of activities including social farming, agri-tourism, biodiversity, forestry, phytosanitary services, animal production, artisanal production, (typical) local products and products of geographical indications, marketing and training.

However, since the abolition of ARSIA the lack of advisory service and of coordination of the regional AKIS has been profound. This, in turn, seems to have resulted nowadays in a lack of structured links between actors – thus the increased importance of personal relationships, the lack of a clear vision on the part of the Region (for example, who to support: large or small-scale farmers; what to support and which innovations are appropriate for each of farmers' categories, and so on) as well as, sometimes, the lack of recognition of the Region's contribution to innovative projects and the understanding of its role as merely a funding provider.

The cases visited in Toscana concerned: (a) the Floriddia farm (the rediscovery and cultivation of ancient wheat varieties and the production of organic bread and pasta); (b) the Maremma cooperative (production of the Pecorino Toscano PDO cheese with nutraceutical properties implying the restructuring of the whole animal farming management system); (c) a winery producing high-quality wine and engaged in activities in order to valorise local varieties, control inputs and allow for traceability; and (d) the University of Pisa, actively involved and driving a social farming project. Interesting points drawn from the case studies are as follows.

- The role of ideology (organic farmers/Floriddia), ethical commitment (organic farmers; social farming) or local identity and fame/branding (wines) in the initiation/triggering of innovations;
- The commitment of the initiators to their innovation, despite in some cases of problems (economic viability of the projects, personal time and expenditure, etc.);
- The involvement of university staff in these projects, although on a personal basis (except in the social farming case in which the university is the heart of the innovation);
- The attempts in all cases to establish networks with relevant actors during innovation initiation and nowadays to expand them. Notably: (a) in the organic farming network (related to the Floriddia case) the role of such networks in dissemination (local farmers network to cultivate the ancient cultivars; wide network comprising farmers, scientists, bakers, processors, consumers, marketers/distributors, doctors and other medical and health specialists etc. to support the case) and policy making (national law on biodiversity for which a national network played an important role and the refutation of the European Commission proposal on seeds based on the resistance of a pan-European network) should be stressed; and (b) in the case of social farming efforts that led to the national law for social farming should be also underlined;
- The need for innovations as responses to market demand (high quality wines, Pecorino cheese with nutraceutical properties), social demand and sensitisation (social farming, organic farming) or scientific progress (cheese with nutraceutical properties and the related new animal production management systems, biodiversity and the preservation of local seeds and breeds, new technologies allowing for soil, inputs and overall production management and traceability in viticulture and wine-making);
- The step-by-step introduction of innovations in cases of complex changes (new animal farming management for the production of cheese with nutraceutical properties; from quality, related concerns to environmentally-friendly cultivation techniques to high-tech precision farming and traceability system in wine production) and the adoption of the changes from younger farmers eager to experiment with the assistance of the university staff in the first case;
- The need to secure the economic viability of the businesses in all cases, the equitable distribution of costs and benefits (between the members – animal breeders, and the cheese producing cooperative), and the contribution to local, sustainable development (for example, fewer working hours in order to increase employment in Floriddia; the environmental, social and economic role of animal farming in Maremma; and the low prices of the organic social farming products in the local market).

Reflections

The aim of AgriSpin is to learn from each other and with each other about ways to support farm-level innovations. In this respect, thus far, our work has revealed a number of interesting points worthy of further exploration.

In the first place, many examples confirm that successful innovations are often the result of synergy among three dimensions: technical, organisational and institutional; innovations are a combination of implementation of new technologies and practices (hardware), new knowledge and ways of thinking (software) and new institutions or organisation (orgware).

Additionally, it has been shown that the first spark for an innovation can arise anywhere in a knowledge system. Clearly, our stories do not support the view once commonly

held that innovation flows only from the source (research) to the end users (farmers), and that the job of innovation support consists of transferring knowledge. The multiple triggers of change (ideological, technical, market, scientific, policy etc.) should also be underlined, along with the fact that new ideas come about when actors are in a reflexive stance towards their own situation. Reflexivity implies challenging conventional thinking, problematising aspects and developing novel interpretations.

Networking has been shown to be an effective way of coordinating a shared activity and crossing boundaries, disciplines, organisations, hierarchies and scales. It can increase the number of actors (individuals and groups) who share an innovative idea and directly contribute to the formulation of projects and policies. Networks are thus spaces which bring together those involved in purpose-driven learning and knowing processes, allow for the creation of synergies and encourage (social) learning and innovation.

Therefore, the need for facilitation becomes more than obvious. Facilitation organises the learning environment and learning processes. It allows for critical discussion among participants around an activity or experience they share and in time, deeper levels of understanding, inquiry and innovation can be created within the participant network; it thus produces more effective learning in participants' domains of existence.

Clearly there is work to do for further studying and clarifying and the main issues to be further explored within AgriSpin are: (a) why some innovations become successful while others get stuck, (b) what the support service providers actually did to help farmers realise an innovation, and (c) can particular phases of an innovation process be identified and what is needed and helpful in each phase. It is also interesting to explore partners' theories-in-use and where the interaction in the project will lead to in terms of concepts and approaches.

Based on the detailed analysis of all the 13 cross-visits, the project collects best practices and will make them available to a wider public; the aim is to enable local, regional, national and European actors involved in supporting innovations at farm level to improve their practices and support services and thus to create space for innovations. Additionally, the project shall develop a toolkit of best-fit innovation practices and support services across Europe which can be used by stakeholders to strengthen their innovation capacity; it will provide new insights and ideas on how to improve innovation and demand driven research in the agri-food chain. In this respect, in the second phase of the project partner organisations will organise relevant seminars with authorities and other key actors in their region.

Finally, colleagues who meet each other several times in intensive cross-visits build up relationships which can lead to new joint activities. The start has been made, but it is still too early to predict how this will evolve. The space for a professional network that lasts after the project has ended has been created.

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Triple helix networks matching knowledge demand and supply in seven Dutch horticulture Greenport regions

This paper investigates the triple helix (industry, knowledge workers and governments) cooperation on knowledge co-production and valorisation for innovation, which took place in seven horticultural regions in the Netherlands. It thus provides more empirical insight into the functioning of this form of cooperation. Based on a secondary multiple case study analysis, this paper sets out to ascertain what enabled triple helix cooperation in the seven regions with respect to the organisation, the formulation and support for goals and action on knowledge co-production and valorisation. The results indicate that in order to stimulate innovation through triple helix cooperation, the different partners first need to build a proper working relationship and a common language. In order to accomplish this, primary aims for innovation should not be formulated too ambitiously (i.e. too far beyond the entrepreneurs' daily practice, in particular SMEs). Knowledge workers and policy makers often want to stimulate knowledge co-production and valorisation more radically and quickly. Hence, they have to temper their ambitions. Procedures regarding the cooperation should be rather simple and flexible. Once a steady working relationship and a common language are developed, then the triple helix collaboration can focus on taking the innovation ambition to a higher level in order to realise more valuable change. At first, entrepreneurs have to experience how they can profit from the cooperation and learn to incorporate knowledge co-production and valorisation step-by-step in their business strategy, including financial investments.

Keywords: knowledge co-production, valorisation, innovation, triple helix, horticulture, clusters

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Introduction

Agriculture has become more competitive and knowledge intensive over the years. Agricultural knowledge infrastructures are changing to better accommodate future economic and societal challenges (SCAR-AKIS, 2012, 2013). From the 19th until the end of the 20th century, Dutch agricultural policy was mainly aimed at intensifying food production through modernisation. In the 1950s, policy focused on enhancing the economic position of agriculture and agricultural entrepreneurs (Vermeulen, 1989). In the 1960s, both national and European subsidies aimed at the intensification of agricultural production in order to protect food production and international competition. This led to the introduction of the 'knowledge triptych' (Leeuwis *et al.,* 2006) as a policy instrument for knowledge production and dissemination through research, extension and education, to support developments and innovation in agricultural sectors. It was not until the 1990s that, partly as a consequence of increasing environmental challenges and societal criticism, the system for agricultural knowledge started to change (Mulder, 2004). Policy makers argued that new market-oriented knowledge, developments and innovation programmes were needed to contribute to the sustainable development of agriculture (Hoes, 2011). Nowadays the international trend is to emphasise the role of agriculture as part of an intertwined network of food, bio-based chains and other sectors such as water, energy, health and ICT (SCAR-AKIS, 2016).

The challenge for the agricultural domain is to develop a transdisciplinary knowledge infrastructure in which multi-actor networks are able to respond to the dynamic challenges faced by agricultural production and consumption (Hubeek *et al.,* 2006; Wielinga and Geerling-Eiff, 2009; Beers and Geerling-Eiff, 2013). This article addresses changes in the Dutch agricultural knowledge infrastructure towards the formation of networks in which multiple actors from different backgrounds cooperate in transdisciplinary settings, to live up to the dynamics of both economic and societal challenges. In particular, the article focuses on the cooperation between different actors on knowledge co-production and valorisation, to better match knowledge demand and supply. It takes the form of a secondary multiple case study analysis of seven Dutch horticulture regions. In 2012 the Dutch horticulture sector produced EUR 22 billion worth of outputs with an added value of EUR 10.3 billion, which was almost one quarter of the added value of the entire Dutch agricultural industry. The sector then consisted of 24,600 enterprises that offered employment to roughly 400,000 people (Topsector, 2015). Six of the studied horticulture regions are formally indicated as 'Greenports', one region (Gelderland) is indicated as a Greenport satellite region. Together the seven regions are part of Greenport Holland[3]. In the Greenport regions enterprises such as cultivators, auctioneers, distributors, trading companies, exporters, suppliers and seed producers operate within one regional cluster.

Since 2012, the national Dutch government has been stimulating public-private partnerships between industries, knowledge institutes and governments to enhance the Dutch economy (MEA, 2014). In public-private cooperation, private actors and public actors join forces through investments based on finances, labour and time to create innovations aimed at all parties involved (Hall, 2006; Spielman and Von Grebmer, 2006). This stimulated the Greenport regions to follow a similar approach. In the period 2012-2015, different knowledge workers (from research, education and advisory services[4]), entrepreneurs and in particular small and medium

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[3] The term 'Greenports' was introduced in 2004 by various Ministries formalising the cooperation between local, regional and national governments with the industry to enhance the economic position of horticulture clusters in the Netherlands. The name is derived from the term 'Mainport', which stands for a similar cooperation regarding the port of Rotterdam and Schiphol airport. The aim of the Mainport cooperation is to enhance the economic and viable position of logistics, trade and transport. The Greenports and Mainports also work together on logistical topics concerning horticulture.

[4] Note that the Netherlands does not have a public extension service.

enterprises (SMEs), developed multi-actor knowledge programmes with policy makers to stimulate knowledge co-production and valorisation in their specific region (Table 1). The intended outcome was that knowledge was both co-produced and valorised for Dutch horticulture clusters to be able to further develop, innovate and flourish at international level. The topics of the knowledge programmes were diverse, varying from the reduction of energy consumption, greenhouse gases, air or water pollution in combination with cost reduction and sustainable production methods, to topics on short supply chains, mechanisation, precision agriculture, innovative products, public relations and new markets opportunities, and so on.

Knowledge co-production and valorisation

Although the message is not new, knowledge and practice should better bridge the gap between them (Tijssen and Van Wijk, 1999; Debackere and Veugelers, 2005; Klerkx, 2008). Our knowledge-based economy is challenged by globalisation and sustainability issues such as climate change and scarcity of natural resources. Individuals and organisations need to be able to generate and exploit knowledge to develop solutions that address these challenges (Boreham and Lammont, 2000; Poppe *et al.*, 2009). In such dynamic settings, the co-production between different actors and the valorisation of knowledge follows an interactive, often transdisciplinary path. A path in which knowledge is actively constructed by different actors with diverging interests and values, thus not merely absorbed, unaltered, by individuals, companies or networks (Gibbons *et al.,* 1994; Prahalad and Ramaswamy, 2000; Beers and Geerling-Eiff, 2013).

Etzkowitz and Leydesdorff (1995, 2000) refer to the cooperation between industry, knowledge workers and governments on knowledge co-production as Triple Helix (TH) networking. In these TH networks, overlapping boundary interests and stakes are sought to combine public-private forces on knowledge production to stimulate knowledge valorisation. Boundary objects (Star and Griesemer, 1989; Turnhout *et al.,* 2007; Regeer, 2009) are the common and collective grounds that all three helices connect, yet they may have different meanings for each helix. The challenge is that the three helices commit themselves to cooperation based on these boundary objects through common trust, needs and stakes. By doing so, they reframe their own needs and visions into a common ambition (Sol *et al.,* 2013). Knowledge valorisation refers to the process of being able to convert knowledge into commercial, feasible products, processes, services and/or societal value (Leloux *et al*., 2009; Drooge *et al.,* 2011; Arits and Duijvesteijn, 2012). In other words, knowledge co-creation and valorisation support innovation. Knowledge valorisation is not a linear process but occurs through the interaction of multiple actors in diverse phases (SCAR-AKIS, 2013).

The interaction between the three helices is an important factor for change. Structural TH cooperation can support continuous creative destruction (Schumpeter, 1942) which creates a dynamic upward spiral for learning, innovating and so-called third generation knowledge production

Table 1: The seven Dutch horticulture regions and their knowledge programmes.

Regional programme	Partners involved	Main activities
Northern North Holland (NHN): Agrivizier	Greenport NHN, the regional and national governments, two research institutes, one school, one cooperation on education, one advisory organisation.	Innovation projects, thematic meetings and explorations to enhance innovation in agri-business in the NHN region. Main topics: markets and chains, sustainable production, 'more with less', energy and green resources, health and welfare.
Aalsmeer: the Innovation Motor	Greenport Aalsmeer, the national sector organisation, one chamber of commerce, the regional and local governments, one research institute, one university of applied sciences, one advisory organisation, one publisher.	Innovation projects, thematic meetings and working groups to enhance: (a) the innovation potential of regional horticulture, (b) knowledge exchange and (c) innovation processes and developments.
Gelderland: Spearhead knowledge and innovation	Horticulture business cluster Gelderland, six horticulture and business representative organisations, the national sector organisation, one chamber of commerce, one innovation support organisation, the regional government, local governments, one research institute and various regional schools.	Various innovation projects to realise the ambition that Gelderland will become one of the top five most sustainable and competitive horticulture regions in the European Union.
Venlo: GreenBrains	Greenport Venlo, one regional innovation support organisation, the regional government, one research institute, one school, two universities of applied sciences.	GreenBrains acted as a knowledge service point, aimed at conducting knowledge projects to support entrepreneurs in horticulture with various innovation challenges.
Westland-Oostland: six Innovation and Demonstrations Centres (IDCs)	Greenport Westland-Oostland, two sector organisations, the former levy board, the regional, local and national governments, three research institutes, Greenport related schools, one education centre, two universities for applied sciences, one advisory organisation, one bank.	Six physical IDCs organised and conducted innovation projects, thematic meetings, demonstrations and innovation support to enhance knowledge co-production and valorisation for innovation. The topics were: robotics, taste, energy, water, cultivation and LED lighting.
Duin- and Bollenstreek: IDC flower bulbs and plants	Greenport D&B, five horticulture representative organisations, the regional and local governments, one research institute, the education centre, one knowledge centre.	See Westland-Oostland. Main topics: phytosanitary aspects, bio-based production, precision agriculture and logistical technology.
Boskoop: Knowledge and innovation impulse	Greenport Boskoop, one sector organisation, three business support organisations, one business association, one chamber of commerce, two local governments, one research institute, the regional study club, one school, two advisory organisations, one bank, one high council.	Innovation projects, education and knowledge exchange to give the innovation capacity of the horticulture cluster for trees and plants an impulse, to develop sustainable entrepreneurship and to take care of sufficient and qualified personnel, currently and in the future.

Source: own composition

(Wissema, 2009). This refers to demand-driven knowledge that is co-produced and valorised to enhance both economic- and societal-oriented innovation, next to traditional forms of knowledge production such as curiosity-driven academic research or dissemination through education and advice. Critics argue that theories on transdisciplinary knowledge co-production need more empirical support (Hicks and Kats, 1996; Weingart, 1997; Godin, 1998, all cited by Hessels and Lente, 2008; Shinn, 2002). This paper provides more insight into the cooperation between different actors in TH networks, by studying the seven knowledge and innovation programmes in the Greenport regions. In all these networks the aim of the TH cooperation in the knowledge programmes was to better connect different knowledge workers, entrepreneurs and policy makers, to enhance the match between knowledge supply and demand and to enhance the enabling environment to do so. All actors involved cooperated on strengthening the economic, innovative, sustainable and resilient position of the horticultural clusters at the regional level. In almost all knowledge activities in the different Greenports, multiple enterprises were involved. Most participating enterprises were SMEs.

Methodology

For this paper we performed a secondary analysis (Long-Sutehal *et al.,* 2010) based on the results and publications of 34 research projects that were conducted and connected under the wing of one research programme, which ran from 2012 to 2015. All research projects addressed a particular sub-question and they were closely interconnected because of the intensive cooperation within the research team. Our research approach was twofold: (a) analysing the developments in the TH networks for knowledge co-production and valorisation, the aim of which was to derive lessons learnt and to serve as a mirror for reflection for the three helices involved, to learn and improve for further developments; and (b) facilitating research per Greenport to support the TH partners in their cooperation on knowledge co-production and valorisation.

This type of both empirical and facilitating research is identified as reflexive (Van Mierlo *et al.*, 2010) and action research (Almekinders *et al.*, 2009; Van Paassen *et al.*, 2011) in which the researchers intervene in the actual developments. All studies included a qualitative research approach consisting of observatory research, semi-structured interviews, workshops, focus group discussions, other meetings, field trips and literature research. A total of 252 different actors were interviewed and/or participated in group discussions organised by the researchers. Some actors were interviewed multiple times and several interviewees also participated in workshops or group discussions. In addition to the qualitative research methods, a survey was conducted which resulted in additional data from 60 enterprises.

Understanding TH collaboration on knowledge co-creation is complex because of the multiple interacting factors. Therefore, an overall multiple case study analysis (Stake, 2006; Yin, 2009) was constructed based on all 34 studies in the seven Greenport regions. To do so, the researchers organised two annual meetings with all project leaders of the knowledge and innovation programmes. In these gatherings, the developments in the different programmes were reconstructed and exchanged, using a timeline method and narrative analysis. This is an approach to study qualitative data in depth (Coffey and Atkinson, 1996). The results of the multiple case study analysis were published in Dutch (Dijkshoorn and van Os, 2015; Geerling-Eiff and Dijkshoorn, 2016).

The secondary analysis described in this paper addressed the following research question: 'What enables TH transdisciplinary cooperation on knowledge co-production and valorisation in the different Greenport regions?' We decomposed this research question into the following two parts: (a) How did the Greenports organise TH collaboration in their region? and (b) How were goals and action for knowledge co-production and valorisation collaboratively formulated and supported in all Greenports?

Results

In the different Greenport regions, visions, agendas and approaches to knowledge and innovation were developed independently from each other. This resulted in unique ways in which the different Greenport regions organised TH collaboration. In addition, in all Greenport regions private partners, and in particular SMEs, collaborated to empower the competitiveness of their regional horticulture cluster. However, the degree of partnership differed per region. In this section we first address how the Greenport regions organised TH collaboration. We do this by first describing three cases that differed the most, on which we subsequently reflect. Then, we address how goals and action for knowledge co-production and valorisation were collaboratively formulated and supported in all Greenports.

Ways in which Greenport regions organised TH collaboration

The different ways in which Greenport regions organised their TH collaboration is best illustrated by comparing three out of the seven Greenport cases. For reasons of privacy, these three cases have been anonymised. Case A primarily focused on identifying practical knowledge questions on innovation challenges by entrepreneurs. Case B, on the other hand, illustrates a structured approach in which time and effort were spent in realising a shared vision and agenda among all partners involved. Case C started out with formulating ambitious innovation projects. However, because this was done without a clear structure, this was not effective and the partners involved changed their strategy after a difficult start.

The primary objective of case A was to execute projects in which multiple entrepreneurs and other TH partners collaborated, which were valued highly by the entrepreneurs involved. To realise this, the initiators of case A organised TH events to articulate the knowledge needs of the regional entrepreneurs. The first event was not so successful because

mostly researchers, teachers and intermediary actors were present, while entrepreneurs formed a minority. For the following TH event, much effort was put into raising awareness of the events, approaching and stimulating regional entrepreneurs to participate. This was successful: many regional entrepreneurs attended the subsequent TH events. The interaction between the different TH participants led to 70 projects in which 300 entrepreneurs were involved. This was neither foreseen nor planned before the start of the programme and it was considered successful. The involvement of this number of entrepreneurs and their active participation in the projects were due to the fact that these addressed topics which were closely related to the daily work of the entrepreneurs.

Case B, on the other hand, initially focused on developing a shared vision, plan and structure among the programme partners. Eventually it took 30-36 months to come from preliminary discussions to finalising the common vision, strategy, roles and tasks among the 14 different organisations that were initially involved. Collaboration between the different TH actors was already common in this region, which is characterised by a relatively small independent horticulture cluster. Many of the enterprises have been there for generations and many different TH actors know each other well, both on a professional and non-personal level. Collaboration between different actors on knowledge activities was already common, both on formal and non-formal basesí. However, the development of the regional agenda was time consuming. It was people's work which can be best referred to as 'putting the pieces of the puzzle together' when the timing was right. Priority had to be given to carrying out their own jobs. Perseverance, willingness, belief in the intended cooperation and pride in their cluster, in particular among a few actors that took the lead in forming the cooperation, were important factors that led to a successful shared problem definition. The time and investment in discussing 'who does what and when' was well spent, because the implementation of the intended knowledge activities went rather smoothly afterwards, as illustrated by the example given in Box 1.

The programme team in case C was ambitious in wanting to stimulate breakthrough innovation in which the THs collaborated both at strategic and operational levels. This meant that the partners involved in the knowledge programme decided on and fine-tuned the content of the projects together, in strategic management meetings. Next, the protocol prescribed that researchers, advisors and teachers had to work closely together in each selected innovation project. However, the innovation ambition in the knowledge programme was too far removed from the regional entrepreneurs' demands. Also, it was difficult to match vocational education to the formulated ambitions which better connected to academic and applied scientific knowledge co-production. The actors in case C learned from the more flexible approach in case A, resulting in an adaptation of the programme ambition and approach. A distinction was made between a steering group who focused on the strategic implications of the knowledge results and an operational core group that was responsible for the execution of the knowledge activities. The intervention took quite some energy and caused some friction among some partners. Yet it also led to the clarification and fine tuning of each other's roles and capacity, necessary for the continuation of the programme. It was a reflective process among the actors involved, which led to more understanding and willingness to enhance the TH cooperation. An evaluation by an external party highlighted that this intervention had strengthened the TH network.

Box 1: Case study: development of a series of masterclasses in Greenport Case B.

A major challenge was based on the indication by the regional entrepreneurs that there was a lack of educational activities in the region to fulfil the sector's needs. Education, research, advisers and entrepreneurs then combined their skills to develop a series of masterclasses together. The entrepreneurs involved brought in the topics and vocational school students were stimulated to join the masterclasses. The interaction between students, entrepreneurs, researchers, advisors and teachers led to refreshing ideas and the follow-up of innovative developments in the sector. In total, nine masterclasses were organised with 300 participants. The masterclasses were evaluated in the research programme and the results showed that the masterclasses were appreciated among the actors involved. Its success led to a structural education programme which brought sector-oriented education back to the region.

Source: own composition

The three cases show us that an incremental, step-by-step approach to articulate and operationalise the knowledge demand into practical knowledge activities can successfully unite entrepreneurs' knowledge demands with the knowledge supply. Furthermore, the cases illustrate that knowledge co-production and valorisation is a creative process in which entrepreneurs exchange their experiences with knowledge workers to be able to adapt and build further on existing knowledge, based on new information and insight.

Formulation of goals and action for knowledge co-production and valorisation

How were goals and action regarding knowledge co-production and valorisation for innovation collaboratively formulated and supported? Despite the illustrative examples described above, for many knowledge activities in all the seven Greenports, it was predominantly the knowledge workers together with the different representative organisations of different horticultural branches that formulated the knowledge activities, often with the support of policy makers. Individual entrepreneurs often did not know which possibilities there were, or indicated they did not have the time to think about their knowledge needs properly. This was partly due to a lack of information and effective communication strategies to inform entrepreneurs about the particular knowledge programme and its possibilities. Entrepreneurs could 'not ask for what they did not know'. Hence, in all regions the knowledge partners utilised their existing networks of entrepreneurs, business representatives and policy makers, expertise and experience to articulate the goals and actions regarding knowledge co-production and valorisation. Advisors played an important role in involving and inspiring SMEs in particular, because of their capacity, experience, proximity to the SMEs and personal contact. For example, the joining of an advisory group in the core team of case C provided a boost in the number of knowledge applications.

Although representative organisations of different horticultural branches played an important intermediary role to articulate the goals and actions for knowledge co-production and valorisation, the challenge remains to inspire and attract individual entrepreneurs to articulate their own knowledge demands that match the innovative ambitions of knowledge workers and policy makers. The different approaches in the knowledge programmes revealed good examples of how to better match knowledge demands by business partners and knowledge supply. Many entrepreneurs participated actively in the projects and other knowledge activities. However, the knowledge programmes did not fully succeed in developing sustainable regional knowledge systems for horticulture based on equally supported public-private partnerships. This counts in particular for financial support.

Each region had the ambition to attract more enterprises for knowledge activities and to stimulate private cash investments in knowledge activities by the entrepreneurs involved. Yet their contribution was mostly in kind (in hours and time), although some would pay cash for, for example, fees and some provided materials or facilities. From the interviews we learned that entrepreneurs were willing to support projects that directly corresponded to their own business strategy at that present time, with a time span of roughly 1-2 years. They did not have the will or capacity to invest in knowledge activities from which the entrepreneur will likely profit after a longer term (>3 years). This leads to contradictory interests between industry and governments as public demands for knowledge are often focused on strategic solutions for societal problems focused on the long term. Furthermore, we found that most enterprises involved were not keen on sharing knowledge for which they had paid. They argue that: 'he or she who pays, should gain' and free rider's behaviour should be avoided. However, although knowledge production is not seen as a core business by most entrepreneurs in horticulture, they do acknowledge that new knowledge development becomes more and more important for survival in the current knowledge-based society.

Discussion

The Netherlands has emerged from an era in which the government took care of the agriculture sector, yet it is moving towards an era in which equal TH collaboration provides for the agricultural sector. In other words, agriculture is moving towards a shift in which the helices worked more separately from each other, to TH integrative cooperation. In this transition phase, governments, at both the national and regional levels, are rethinking their roles and strategies. Within the agricultural knowledge infrastructure, they are moving from their steering position in the front seat towards an equal cooperative partnership role. The Greenport cases show us that it is not an easy transition. In a multi-actor setting, learning depends on incremental steps, based on iterative learning and rethinking strategies by all parties involved. This corresponds to earlier findings by Argyris and Schön (1978).

In the knowledge programmes TH collaboration was organised differently. Some Greenports focused on realising bottom-up projects that were considered desirable by the entrepreneurs involved (as illustrated by Case A), while others focused on stimulating ambitions, in terms of multi-stakeholder collaboration and innovativeness (as illustrated by Case C). Case B started with the development of a shared regional knowledge agenda that specified what the involved TH partners wanted to achieve and which support was needed to establish this. The cases illustrate that starting knowledge programmes with bottom-up projects is a good way to include and activate entrepreneurs in transdisciplinary knowledge co-production. For example, in case A this strategy resulted in 70 projects in which more than 300 entrepreneurs participated. A downside of this approach is that the projects were not very ambitious in terms of innovativeness and stimulating TH collaboration. However, in the transition phase towards TH collaboration, it is advisable to take some intermediary steps first in which entrepreneurs, researchers, advisers and teachers start to collaborate in less complicated projects to build up a good working relationship and a common language. These preliminary steps are required to be able to learn from experience and build on previous experience. These initial steps were not taken in case C, which started so ambitiously that no projects were granted, leading to frustration among the actors involved.

Also, if a relationship between TH partners is formed through preliminary bottom-up actions (e.g. projects), it is easier to develop a shared vision in which the partners agree on what they want to achieve together in their region. Developing a shared, common vision sounds self-evident but it is quite complicated to achieve reframed ambitions between multiple actors that have collective but also conflicting needs and stakes. This corresponds with the work of Sol *et al.* (2013). In particular, case B illustrates that it is time consuming and it takes quite some investment in the TH network and each other to build up trust and common commitment to reframe individual mind-sets into a collective vision. After all, it is people's work, depending on the perseverance, beliefs and persuasion of the actors involved.

Furthermore, our study illustrates that it is challenging to develop a knowledge and innovation agenda with related research questions in collaboration between entrepreneurs, researchers and regional governments. Although there was recognition and acknowledgement for the need to engage entrepreneurs in the exploration and decision-making of the knowledge and innovation agenda, it was still hard to realise this in practice. Individual entrepreneurs lack the time, experience and sense of urgency to be actively involved in formulating goals and operational actions such as projects for knowledge co-production and valorisation. Often it was the horticulture representative organisations that acted as the TH partner on behalf of the entrepreneurs themselves.

A major challenge in the TH collaboration was to match both economic and societal stakes. The government and public focuses on knowledge production to develop long-term strategic solutions for societal problems. Industry is more interested in knowledge production that offers practical solutions for problems they encounter in the short term. As such, SMEs invest mostly in content that best suits their

business strategy on the short term. This relates to the findings of Hermans *et al.* (2013). In addition, the advantages of open knowledge and innovation models were acknowledged by the different parties involved in the Greenports, yet the dominant mind-set among the involved entrepreneurs was to keep the developed knowledge to one's self. They do not have the capacity or will, meaning it does not fit their business strategy, let alone the means to invest substantially in the infrastructure, to coordinate, organise and disseminate knowledge and innovation activities and results. The latter is (still) considered to be a primary task for governments and knowledge workers.

Finally, all activities in the knowledge programmes were at least 50 per cent publicly financed on a project basis. The programmes had a time span of four years. This influenced the continuation of knowledge activities and the interactions between the actors involved. If the TH cooperation in the programme with the four-year time span had not been successful in embedding the collaboration in a sustaining regional TH network, the initiated collaboration stopped.

Despite these challenges, the Greenport cases teach us that regional clusters can indeed provide a good basis to form TH networks. The various ambitions are closely interrelated. Regional governments need resilient and viable enterprises to enhance a sustainable regional economic position. Different knowledge workers create the learning environment for sustainable and resilient entrepreneurship. The Greenport cases show that direct contacts between THs play an important role in enlarging the chance of regional knowledge co-production and valorisation to succeed. This is in line with other work on regional clustering which claims that for innovation to succeed, industry and governments have to collaborate with knowledge workers on forming a critical knowledge mass with multi-disciplinary expertise and diverse competences (Hekkert and Ossebaard, 2010; Looy *et al.,* 2001; Vaas and Oeij, 2011).

In order to sustain TH cooperation on knowledge co-production and to be able to demonstrate and disseminate results for valorisation, further investments have to be made in the development of a structural TH knowledge infrastructure. Inherently, instruments and subsidies for knowledge (through research, education or advice) should be more often or better combined with instruments and subsidies that stimulate (social) innovation. Organising knowledge and innovation contests or stimulating contact between entrepreneurs and financial intermediaries (such as banks, venture capitalists or business angels) with regard to knowledge and innovation developments are also possibilities. More synergies between publicly-financed instruments and private funding mechanisms are a prerequisite to optimise TH knowledge co-production and valorisation.

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Wyn OWEN*

Action Learning to enable organisational change in rural businesses

Menter a Busnes (MaB), an economic development company based in Wales, UK, has been using group processes and specifically Action Learning with rural businesses since 2003. Action Learning is fundamentally a coaching process with the coachee being supported by a facilitated group of like-minded individuals who must be willing to learn and to change. The process is designed to develop management capabilities, instigate change and empower and encourage group members to create viable and sustainable businesses for the future. Action Learning is used by MaB's management development programme for Welsh farmers and foresters, namely Agrisgôp. This paper reports the results of a longitudinal mixed-measures study designed to evaluate the impact of the Agrisgôp programme. Three different questionnaires were developed and completed by over 1,000 Agrisgôp group members pre-, mid- and post-group participation. The results indicate that Agrisgôp's Action Learning intervention is successfully encouraging and supporting its group members to seek out, instigate and embrace change. The respondents reported increased confidence, improved communication skills, were better able to apply new information to their business, had a more positive attitude to change, and were more likely to have a long term business strategy as a consequence of the Agrisgôp group intervention. The quantitative analysis was supported by qualitative data. Some conclusions are drawn with regard to lessons learnt and possible ways forward, both for Agrisgôp and for this approach to programme evaluation.

Keywords: Menter a Busnes, Agrisgôp, facilitation

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Introduction

The use of group processes to encourage innovation and to transfer best practice is relatively novel in the agricultural sector. However, Menter a Busnes (MaB), a Welsh economic development company, has been utilising this approach since 2003, with a view to engaging more farmers for a variety of purposes and with a broad range of different groups. This article outlines how the company initially became involved with and subsequently developed group processes through the design, launch and delivery of the Agrisgôp programme which utilises Action Learning to strengthen management capabilities, develop new business ideas, instigate positive change and resolve issues. Whereas Owen and Williams (2012) discussed the broader Farming Connect programme, this paper focuses specifically on the Action Learning methodology utilised with Agrisgop groups and particularly the longitudinal mixed-methods tool developed to measure the impact of the programme.

During the initial development and establishment of the Agrisgôp programme, Action Learning (McGill and Beaty, 2001) was selected as the process best suited to Agrisgôp groups. To utilise Action Learning as a facilitation process with very traditional Welsh farming family businesses was in itself ground breaking and innovative, and also risky. However, despite being typically used previously in very large corporate institutions, Action Learning has proven to be a highly successful and flexible tool which continues to be the primary group facilitation technique used by the group facilitators – known as Agrisgôp Leaders (Pearce and Williams, 2010). It has been valuable in the development of ideas and resolution of issues; moreover, its group methodology involves the combination of support and challenge which is a key factor in changing mind-sets and attitudes to change. Burnes (2004) reports that the successful organisations in the twenty-first century are those that continually instigate change, despite the fact that seven out of ten change interventions actually fail. In the Agrisgôp context, the support of a group of like-minded individuals through the challenging change process is considered not only to be very beneficial but also to increase the probability of successful change interventions.

Action Learning has enabled Agrisgôp Leaders to engage a target audience with a range of abilities and knowledge and has encouraged and strengthened commitment to the process and the group. Action Learning involves a group of committed individuals who regularly meet with an experienced facilitator, with each group member being given the opportunity to develop an idea or resolve an issue with the support of the group. Other group members are encouraged by the facilitator to ask clear, open, neutral questions with a view to supporting the group member to develop their own solutions. Butler and Leach (2011) cite many similarities between Action Learning and coaching, and Martin (2006) propounds that Action Learning is effectively group coaching, in that it involves a communally supportive group in which all members in turn share an issue, while the rest of the group act as coaches. Having facilitated Action Learning Sets since 2003 and increasingly being involved with coaching and mentoring, the author agrees that Action Learning is fundamentally a coaching process with the main difference being that a group of people (as opposed to a coach) are facilitated to coach the individual.

MaB has constantly researched and developed new group facilitation techniques for use in tandem with Action Learning. Agrisgôp Leaders continually introduce, trial, develop and share new and innovative, informal and typically short group facilitation techniques with their groups. Nonetheless, Action Learning continues to be the preferred primary technique utilised with Agrisgôp groups. The main reasons for this are that one of the main characteristics of the Action Learning process is a strong ethos of confidentiality, which not only very quickly establishes trust within the group but also instils commitment to the group and the process. The

fundamental Action Learning principle of support and challenge also creates an environment where positive change is encouraged and this consequently enables and empowers individuals to make difficult decisions because they are working with others. Indeed, the fundamental positive principles of Action Learning have largely become synonymous with the Agrisgôp philosophy and the relationship between Agrisgôp Leaders and their groups, even when not actually undertaking Action Learning. Action Learning is an extremely flexible and adaptable process and this has proven invaluable to Agrisgôp Leaders, all of whom develop (and have been encouraged to develop) their own variants – albeit still facilitating within certain important guidelines. Finally, the MaB experience would certainly support the assertion of the founding father of Action Learning, Professor Reg Revans, that Action Learning is 'deceptively simple – surprisingly powerful'.

During the development and delivery of the Agrisgôp programme, studies have been undertaken in order to monitor, review and improve its delivery. One such study evaluated Appreciative Inquiry (AI) and Creative Problem Solving (CPS) as an alternative group facilitation processes to Action Learning. The results indicated that group potency was significantly higher in teams which had undertaken AI than in the CPS teams (Owen, 2008). A summary of this study is presented in the Annex. A second study considered whether personality can be used to predict effective facilitators of organisational change and was described by Owen and Williams (2012). The main findings of this study indicated a strong correlation between consultant effectiveness and the factor of 'agreeableness' on the so-called Big-Five scale (Goldberg, 1990) and a less strong yet significant relationship between 'extraversion' and consultant effectiveness. This paper focuses primarily on the implementation and results of a third, more recent and more elaborate study based on a longitudinal mixed-measures questionnaire.

Rationale behind the study

As described above, Agrisgôp groups are recruited and then facilitated by an experienced Action Learning facilitator, employed by MaB and known as an Agrisgôp Leader. Over time, each group develops a close relationship with their Agrisgôp Leader and although later in the process the groups may bring in relevant experts and visit other businesses, the early stages of the group involve confidential, 'behind closed doors' Action Learning sets facilitated by their Agrisgôp Leader. Action Learning focuses group power and synergy to support and challenge each group member to embrace change and subsequently design, develop and implement action points to achieve the goals that they have identified. The group's relationship with their Agrisgôp Leader typically lasts fifteen months from start to finish (although in practice this can vary from three months to three years), with groups meeting at least six times and usually between twelve and fifteen times, normally on a monthly basis. The vast majority of groups have eight members; however, the range is between six and ten.

As a result of increasing pressure from several quarters, not least the funders, to quantify the impact (financial, perspective, attitudinal and continuing) of group-based organisational change programmes such as Agrisgôp, a study for this purpose was instigated. Evaluation of Action Learning programmes can either be undertaken to assess the impact or to improve future programmes (Pedler, 2008) and while the primary objective of this study was the former, the latter was also of interest. The study aimed to determine whether, through Action Learning, the Agrisgôp programme positively affected participants' capability and capacity to become more effective managers and therefore develop more viable and sustainable businesses. The null hypothesis (H_0) therefore states that for participants in this study there will be no significant difference in confidence, communication skills, resistance to change, ability to apply new information to and develop long term strategies for their businesses. The study's five experimental hypotheses are as follows:

- H_1: There will be a significant difference in confidence scores for Agrisgôp group members when comparing pre-, mid- and post-group participation;
- H_2: There will be a significant difference in communication scores for Agrisgôp group members when comparing pre-, mid- and post-group participation;
- H_3: There will be a significant difference in applying new information to the business scores for Agrisgôp group members when comparing pre-, mid- and post-group participation;
- H_4: There will be a significant difference in attitude to change scores for Agrisgôp group members when comparing pre-, mid- and post-group participation;
- H_5: There will be a significant difference in business strategy scores for Agrisgôp group members when comparing pre-, mid- and post-group participation.

Methodology

A longitudinal mixed-measures approach was adopted, and the study started in September 2011. Three different questionnaires were developed and completed by over 1,000 Agrisgôp group members pre-, mid- and post-group participation, and collated and analysed in 2014. The questionnaire design drew upon the principles used to measure similar and related psychological constructs, namely Bandura's Self Efficacy scales (Bandura, 2006), Spector's Locus of Control scale (Spector, 1988) and Oreg's resistance to change scale (Oreg, 2003).

Each questionnaire has two sections, the first is a quantitative section with five, nine-point Likert scales (labelled I to V) which are identical on all three forms (pre, mid and post-group participation). Agrisgôp group members were required to indicate how strongly they agree or disagree with each of the following statements:

I. I am confident in unfamiliar circumstances;
II. I consider myself to be a good communicator;
III. I can evaluate new information and apply it to my business;
IV. I have a positive attitude to change;
V. I have a long term strategy for my business.

Thus the quantitative element of the study consists of a repeated measures design with one categorical independent

variable (IV1) measured on three occasions. The continuous dependant variable (DV) is the Likert scale measurement from the questionnaire; therefore, with five Likert scales there are effectively five separate dependant variables DV1-DV5. The study's focus is on the interaction between the independent variable measured at three different points in time and the dependent variable in each of the five cases. The quantitative data were analysed with an IBM SPSS version 20 package (IBM Corporation, Armonk, New York, United States), utilising one way (repeated measures) ANOVA. This analysis was undertaken separately for each of the five DVs.

The quantitative analysis was supported by qualitative data collated from the questions (labelled a to c) listed in the second section of the questionnaires. Miles and Huberman (1994) suggested that linking qualitative and quantitative data can be useful for enabling one to support the other, enrichment of the analysis through development or amplification and through triggering new ideas and insights into the research question. The questions differed slightly on each of the three versions of the questionnaire, with group members being asked to outline (a) their three most important expectations (pre-group participation); (b) their three most important developments to date (mid-group participation); and (c) their three most valuable outcomes (post-group participation). This approach is consistent with the template method of thematic text analysis. The mixed-methods procedure utilised is based upon concurrent embedded strategy (Creswell, 2009) whereby the quantitative and qualitative data are collected simultaneously but the primary method – in this case quantitative – directs the research supported by the secondary qualitative data.

The qualitative data were therefore analysed with an initial template analysis used to consider themes which reinforced or added value to the quantitative analysis. The approach adopted is based upon King's (2006) thematic analysis of text. This methodology proposes that multiple interpretations can be made with any research and that therefore more flexible techniques with fewer constraining parameters are required. Template analysis differs from other thematic methodologies as it allows the researcher any number of coding levels and also combines top-down and bottom-up methodologies. Template analysis is particularly recommended for occupational psychology and business management research and is considered appropriate for applied type, large scale between case studies (Gibbs, 2012). NVivo 10 for Windows (QSR International, Melbourne, Australia) was used to code the data.

Agrisgôp Leaders were briefed to facilitate the completion of the questionnaires by all group members as follows: pre-group questionnaire – as soon as possible and at the first group meeting at the latest; mid-group questionnaire – as close to the middle of the group's life as practicably possible; and post-group questionnaire – as near to the end of the group as possible, operationally this will usually be at the last official meeting of each particular group. In line with guidelines for constructing questionnaires (Thomas, 1996; De Vaus, 2002), the first draft of the questionnaire was scrutinised and adapted by a panel of five senior Agrisgôp delivery and management staff, then piloted with three Agrisgôp groups and subsequently reviewed again by the panel to produce the current version.

Results

Quantitative results

For each of the five quantitative measures, Mauchly's test indicated that the assumption of sphericity had been violated, therefore degrees of freedom were corrected using Greenhous-Geisser estimates of sphericity. A repeated measures ANOVA carried out on the data showed that differences between conditions were unlikely to have arisen through sampling error and an overall effect size in each of the five measures indicated that the variation in error scores could be attributed to the Agrisgôp group intervention as follows:

- Increased confidence (49 per cent);
- Improved communication skills (51 per cent);
- Were more able to apply new information to their business (52 per cent);
- Had a more positive attitude to change (52 per cent);
- Were more likely to have a long term business strategy (13 per cent).

The results show that the null hypothesis (H_0) is rejected. Furthermore, the five hypotheses (H_1, H_2, H_3, H_4 are H_5) are supported, with significant differences being found in confidence, communication, applying new information, attitude to change and business strategy when comparing pre-, mid- and post-group participation.

Qualitative results

Owing to the fundamental longitudinal nature of this study, the qualitative data collected from the pre-, mid- and post-participation questionnaires are discussed separately. An overall comparison of the three sets of results indicated a shift over time in mind-set from an individual ("What is in this for me?") to a team ("How can I help this group succeed?") approach.

Pre-group participation

The pre-group questionnaire invited participants to state their three most important expectations for the group. This information is the first qualitative snapshot as new Agrisgôp group members start their participation in the programme, and represents the baseline from which the mid- and post-participation assessments will progress. Utilising template methodology for thematic analysis, the main codes (themes) and the subsidiary lower order codes developed after several revisions of the transcripts are listed in Table 1. There are relationships between some main codes in that "Learning" could fit under "Develop myself" and "New experiences" as well as under "Develop my business". Similarly, "Gain knowledge" would fit under "Develop myself"; however, within the flexibility of the template analysis methodology, this was considered to be the best fit at the final coding interval. The strong references to confidence and communication skills are clearly linked to the first two Likert scale questions.

These themes are very much those that might be expected

from participants entering a new programme, with the mixed feelings of excitement and apprehension relating to its newness and a sense of wanting to make the most of the opportunity. The completed questionnaires included many references to the newness of the situation, such as "Gather new ideas for the future"; "Learn how other people farm"; "Build upon the skills I already have"; and "Interact with like-minded people". There is a clear sense of a will to develop, to make the most of the experience and to build relationships which will be both satisfying and useful.

Mid-group participation

The mid-group participation questionnaire invited participants to state their three most important developments for the group to date. The main codes and subsidiary lower order codes are listed in Table 2. The results suggest an increasing sense of group power, synergy and positivity (even elitism) from being a member of the group. The overall impression obtained from the thematic analysis is that "Learn" and "Change" refer primarily to developing the business and "Group" and "Network" are more related to personal development. However, these are of course inextricably linked, particularly with family farming businesses, and relationships between some main codes continue to occur. For example, "Interesting visits" could fit under "Learning" almost as comfortably as "Network". There are also elements of learning under the "Group" main code. The link between "Change" and the Likert scale question on change is more tenuous in this dataset, but the overriding impression is that change is something that the Agrisgôp process is actually instigating and encouraging. Equally, references to increased confidence are predominantly attributed to membership of the group.

These themes are noticeably different from the pre-group participation codes and convey an impression that group members have a sense of urgency to move their businesses forward and to apply the newly-gained knowledge and positive enthusiasm to their businesses as quickly as possible. Example quotes for each of the main codes are "I think my business will benefit from new ideas"; "Group meetings have provided useful ideas and information that I can apply to my own business"; "We are all more confident and enjoying working as a group"; and "Visiting the woollen mill gave me an insight into adding value to produce". There is a clear sense that participants now have many experiences they want to share on the questionnaire and that they are not struggling to think what to write.

Post-group participation

The post-group participation questionnaire invited participants to give their three most valuable outcomes for the group. The main codes and subsidiary lower order codes are listed in Table 3. Again, these themes differ considerably from pre- and mid-group participation results, in part due to the fact that the qualitative questions vary slightly in each questionnaire, but also indicating attitude change and developing skills as a result of Agrisgôp participation. There is a greater sense of purpose, of individuals who are more confident in their business skills. Relationships occur between some main codes such as "New" and "Learning", and the lower order codes are mostly transferable, however the overriding themes sit clearer under each main code than with pre- and mid-group participation data. As regards links to the quantitative questions, it can be argued that the Likert scale question on change is connected to the three main codes of "New", "Learning" and "Business", and equally that this is a positive development, considering that instigating change is the main purpose of the intervention. "Confidence" (the topic of the first Likert scale question) appears as a sub theme under "Business".

The overall impression conveyed by this dataset is that there is less of a focus on the group than there was at the mid-group participation stage, although the group benefits continue to feature strongly. The sense of a development process is replaced by one of increased capacity as managers, and a desire to go out and make a real difference in their businesses. Moreover, in comparison to the pre-group participation stage the emphasis has shifted considerably from developing the individual to developing the business. Example quotes for each of the main codes are "Discuss new ideas to make agriculture profitable as we move forward!"; "Talking about each other's farm businesses and comparing each other"; "The opportunity to share views and discuss solutions in relation to developing my business"; and "Good group Action Learning process helps share knowledge".

Table 1: The most important expectations of new Agrisgôp group members formulated using template methodology for thematic analysis.

Main code	Lower order codes
New experiences	Fresh ideas; gain knowledge; share information; see other businesses; identify opportunities.
Develop my business	Learn; consider diversification; improve profitability; clarify aims.
Develop myself	More confidence; better communicator; different viewpoint.
Meet people	Network; develop contacts; exchange views.

Source: own composition

Table 2: The most important developments noted by Agrisgôp group members during their participation formulated using template methodology for thematic analysis.

Main code	Lower order codes
Learn	New ideas; gather information; useful talks.
Change	Transfer; improve; apply; develop.
Group	Discuss; share information; other members; confidence.
Network	Make new contacts; interesting visits.

Source: own composition

Table 3: The most valuable outcomes identified by Agrisgôp group members following their participation formulated using template methodology for thematic analysis.

Main code	Lower order codes
New	Ideas; information; initiatives; improved abilities.
Learning	Know about; discuss/talk; gain knowledge; develop.
Business	Develop; diversify; confidence; people skills; better management.
Group	Support; members; discussions; sharing problems.

Source: own composition

Discussion

The expectation of MaB was that the significant change in the attitudes and abilities of those managers who have experienced the Agrisgôp process will enable and empower them to lead their own businesses creatively through the requisite change as advocated by Walinga (2008). The results of this study indicate that Action Learning based interventions such as Agrisgôp are effective in enabling and empowering managers so that they can successfully lead their organisations through change and consequently be part of more viable and sustainable business in the future. This fully aligns with the fundamental Action Learning concept that group members must be open to change and that the process itself supports and challenges this.

A question arises regarding the relatively low, albeit positive, value for respondents' scoring on question V, relating to long-term business strategy. The reason for this is not clear but anecdotal evidence (largely supported by the qualitative data) suggests one possible explanation. Some participants entering an Agrisgôp group believe (and therefore report pre-group) that they have a long-term business strategy, but the Agrisgôp process of business analysis and change management engenders a realisation that in fact they do not. It is also possible that the relatively short term nature of the Agrisgôp process allows insufficient time to examine/evaluate the business fully and develop a long-term strategy, whereas the other four measures are more easily achievable within the timescale. A fourth follow-up questionnaire (for example two years after the group's final meeting with the Agrisgop Leader) might shed more light on this point.

According to Bridges (2013), it is typically the transition through change that causes individual distress and the subsequent failure, and Burnes (2004) reports that around 70 per cent of change interventions fail. In relation to this, the qualitative data from the current study strongly indicate the importance of the support of the Agrisgôp group in sharing problems, developing ideas and increasing confidence. Being part of a supportive and forward-thinking group can assist group members through the difficult transitional phases. This is in line with the fundamental Action Learning principles of positively supporting and challenging group members through change (McGill and Beaty, 2001; Pedler, 2008; Butler and Leach, 2011). Furthermore, the quantitative data also support this premise in that they indicate a significant, increasingly positive attitude to change across the Agrisgôp timeline.

Action Learning, its process, rationale and methodology are key to the successful delivery of the Agrisgôp programme, but the approach is not a 'cure-all' and does not always succeed. Pedler (2008) reports that the process is neither infallible nor all-encompassing and there are several instances where Action Learning was not successful (Casey and Pearce, 1977; Oliver, 2008; Vince, 2008). Pedler (2008) also stresses the necessity for individuals and businesses to commit time and energy initially, because the payback benefits occur later. The Agrisgôp experience supports this view, with Leaders often reporting initial difficulties in recruiting and empowering new groups. This is because the eventual power that stems from the trust and confidentiality of established groups occurs only as a result of considerable initial commitment and effort from group members who are typically sceptical in the first instance. This is consistent with the qualitative data where at the pre-group participation stage responses primarily relate to *develop myself* and *my business,* with references to *group, support* and *share* occurring later at the mid- and post-group participation stages. The initial time and effort involved in establishing a culture of confidentiality and trust within groups is generally justified by the resulting positive support and synergy displayed by the majority of groups.

Pertinently, De Loo (2008) states that sharing failures is as important as promoting successes and that the reluctance of the Action Learning community to reflect upon and learn from negative experiences effectively ignores the fundamental principles of Action Learning. Managers and Leaders involved with the Agrisgôp programme certainly would not suggest that Action Learning always works well or that all Agrisgôp groups are successful. Nevertheless, it is overwhelmingly evident that Action Learning's flexible facilitative approach is well suited to supporting and challenging group members through positive change (Butler and Leach, 2011) and that it succeeds by focussing on the individual and empowering them to discover, develop and implement their own solutions (Revans, 2011).

Relevant literature consistently reports that the presence of effective change agents is essential for organisational change to succeed and that these may be external or internal (Hurley *et al*., 1992; Burnes, 2004; Walinga, 2008; Buchanan and Badham, 2010). However, it is of note that the qualitative data in the current study makes little mention of the change agents, namely the Agrisgôp Leaders. It is difficult to believe that their impact is inconsequential and it is likely that, as the programme has developed, the Leaders have become adept at starting with the end in mind and gradually fading into the background as the group develops. Anecdotal evidence certainly supports this premise. It is also likely that change agents develop within the groups, a process encouraged by Agrisgôp Leaders who describe these internal change agents as 'lead horses'. It is considered good practice to encourage these internal change agents to develop their leadership skills and to instigate bottom-up change, as this not only benefits the group but also develops skills that are of value to their own business going forward (Collins, 2004). Several of these 'lead horses' have been recruited by MaB and subsequently trained to become successful and effective Agrisgôp Leaders.

By using tools such as Agrisgôp's longitudinal mixed-measures questionnaire it is possible and feasible to measure 'softer' qualitative outcomes of change intervention programmes, as described here. Greater utilisation and further development of these tools would benefit participants, delivery partners and funders. The future development of a reliable and valid longitudinal mixed measures-tool to assess the impact of coaching/facilitative type interventions is likely to be of interest to funders, project deliverers and anyone involved in coaching, facilitation or Action Learning.

In conclusion, when facilitated by well trained, highly motivated, experienced facilitators, Action Learning can be an effective tool for supporting personal and organisational

change. The Agrisgôp programme can therefore be expected to increase the number of more viable and sustainable businesses within the agricultural sector in Wales in the future. To support this process, empirically-based best practice should be more effectively integrated into the workplace and one way of achieving this is to encourage and support higher-level lifelong learning. Furthermore, programme providers need to become more involved in conducting research, in implementing the findings and sharing them with a wider audience.

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Annex

Comparing appreciative inquiry with creative problem solving

This study was undertaken in 2008 and considered other, more formal and structured facilitation techniques as alternatives to Action Learning, namely Appreciative Inquiry (AI) and Creative Problem Solving (CPS). AI was developed as an alternative approach to organisational progress and development through eradication of poor practice or mistakes (Lewis *et al*., 2008) while CPS was developed with a view to obtaining new perspectives on alternative methods of problem solving (Isaksen *et al*., 2000). Although the two techniques are unconnected, they both involve a day's facilitation in four stages which allows easy and relatively equitable comparison of the two processes. The methodology was taken from a study undertaken by Peelle (2006), who found that the direct problem-solving approach of CPS could result in negativity and a lack of joint leadership, while AI resulted in a greater sense of belonging and team confidence. For the Agrisgôp study, twenty-four participants in four equal-sized teams engaged in a day's facilitation of either AI (one Agrisgôp group and one group of Agrisgôp Leaders) or CPS (one Agrisgôp group and one group of Agrisgôp Leaders), and team potency was measured by individual questionnaires at the beginning, at the half way point and at the end of the session. The results suggested that although there was no effect on potency at the mid-task stage, group potency was higher at the post-task stage in both AI and CPS interventions. Furthermore, potency was significantly higher in the AI teams, when compared to the CPS teams. Team source had no significant effect on potency at any stage.

The Agrisgôp study indicated that CPS was more of a 'head-on' problem solving approach whereas AI was 'softer' and more creative; indeed, that CPS could be construed as more of a 'male' approach with AI being more 'female' in nature. Studies have shown that males and females behave quite differently in team scenarios, with groups with higher proportions of women being more effective (Fenwick and Derrick, 2001) while groups which have more men are more likely to experience conflict (Randel, 2002). Similarly, anecdotal evidence from many Agrisgôp Leaders suggests that women are much more group-minded than men, particularly in the early establishment stages of the group. This suggests a host of possible future studies into group facilitation techniques and the effect of gender; for instance – do men display higher performance levels with CPS and women with AI?

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A new approach for participative rural development in Georgia – reflecting transfer of knowledge and enhancing innovation in a non-European Union context

Despite achieving independence 25 years ago, Georgia is still a country in transition which is striving to overcome wide-ranging economic development problems, particularly evident through out-migration from rural areas to urban centres and foreign countries, as well as through restricted employment integration. The 'European Neighbourhood Programme for Agriculture and Rural Development in Georgia' focuses on local development in rural regions as a main national goal and offers a series of pilot actions to apply LEADER-like activities in various rural parts of the country. In this paper the application of such a pilot scheme in Borjomi Municipality, the observed case study in the Lesser Caucasus, is analysed. Reviews show a highly committed implementation process, comprising the establishment of the Local Action Group, the elaboration of the Local Development Strategy, an on-going mobilisation process of local actors and the transfer of experiences and good practices from European Union Member States. The assessment of the potential of the LEADER approach in the rural and mountainous area of Borjomi Municipality reveals a high degree of acceptance and interest of rural stakeholders and residents to taking up such an approach and engaging in innovative initiatives within the frame of sustainable rural development. Given the short period of work with these ideas so far, continued knowledge transfer, and enhanced appreciation and participation in search of place-specific opportunities in rural regions will be essential for successful rural development pathways across Georgia.

Keywords: LEADER, ENPARD, place-based strategy, participatory development approach

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Introduction

Since achieving independence from the Soviet Union 25 years ago, the Republic of Georgia has faced long periods of instability due to (civil) wars and military conflicts, occupied areas, lack of economic structures and adaptation as well as trade problems, including Russian embargos. In addition, the global economic crisis added economic and market problems to political insecurity and increased the obstacles for the recovery process. Georgia has lost much of its production scope in agriculture, such as in livestock production and in high quality food products such as wine, fruits, citrus, tea and meat, which is partly due to a reduction in the access to the related markets for these products in Russia and other former Soviet Republics. The low productivity of the agricultural sector and the weak economic situation in rural regions call for renewed strategies and long-term efforts. Over many years of neoliberal politics, investments were concentrated on Tbilisi, the country's capital, while the development of the infrastructure, the economy and the agricultural sector in rural regions stagnated. Yet, half of the population of Georgia still lives in rural areas, where low-input, subsistence and semi-subsistence farming is the major source of livelihood. Owing to high unemployment rates and poor socio-economic perspectives, out-migration from rural areas to urban centres (primarily Tbilisi) and to foreign countries is a common pattern and a persistent feature of the country's declining population base. In recent years, politicians have realised that it is essential to pay more attention to agricultural and rural development policies and to improve the quality of life for people in rural areas.

To address these serious problems, the 'European Neighbourhood Programme for Agriculture and Rural Development in Georgia' (ENPARD Georgia) of the European Union (EU) has been implemented with a budget EUR 102 million for the period 2013-2018. Within this programme, an EU support scheme for 'A New Approach for Rural Development in Georgia' was launched in 2015 which aims at elaborating LEADER-like activities in three Georgian municipalities, Borjomi, Kazbegi and Lagodekhi. Together with the Government's Agriculture Sector Strategy (MoA, 2014) of strengthening small farmers' organisations and enabling sustainable rural development (MoA, 2016), ENPARD aims at modernising agriculture, stimulating new initiatives in rural development and thereby tackling rural poverty in Georgia. Drawing on European experiences, diversification of the rural economy is seen as key and cross-sectoral measures of rural development are considered to be crucial for Georgia's rural regions. In addition to a number of diversification projects, ENPARD focuses with the pilot projects for LEADER application to achieve internal domestic experience for adopting a comprehensive rural development approach (EU, 2015).

This paper aims to assess the challenges faced when applying the LEADER approach in a context of weak economic development in a mountain region experiencing substantial population decline, and to highlight the main issues to achieve transferability of the approach. The analysis is fuelled by the collaborative support for the elaboration of the LEADER application in one of the three pilot municipalities – Borjomi, situated in the central southern part of the country in the Samtskhe-Javakheti region. As the presented case is clearly led by place-specific information, reference to other transition processes and experience from LEADER application in other Central and Eastern European (CEE) countries is provided. This addresses the conceptual framework and enables conclusions to be drawn on the relevance of the programme and implied changes in the institutional setting and policy devleopment in Georgia.

Pilot project region: Borjomi Municipality

The traditional tourism region of Borjomi Municipality was chosen because it is representative of an area that holds significant potential in the linking of nature-based tourism activities, agricultural diversification, cultural events and environmental protection activities in a mountain region. Nestled among the Meskheti and Trialeti mountain ranges of the Lesser Caucasus Mountains, Borjomi is a popular spa town that has been famous for the health benefits of its water resources since the 19th century. The bottling of its mineral waters has been the municipality's leading source of income and one of the country's major export brands. The municipality is also rich in other natural resources such as huge forest areas, biodiversity-rich meadows and pastures, lakes and water resources. A large portion of the Borjomi-Kharagauli National Park (85,000 hectares) lies within its boundaries. Despite these natural assets, the overall economic performance of Borjomi Municipality is rather poor: entrepreneurial skills are not very advanced and apart from some small businesses in wood processing and some guesthouse owners there are few entrepreneurs. Agricultural productivity is rather low because of a small-scale and fragmented land ownership structure, a lack of knowledge and insufficient machinery and technologies on the family farms. In the tourism sector, the big hotels often operate independently, without linkages or co-operation to the local tourism services in Borjomi Town and Bakuriani.

Although the beautiful mountainous landscape is the basis for tourism activities and use of natural resources it also carries risks. Large parts of the area are vulnerable to natural disasters, for example through human-caused overgrazing on pastures or illegal logging of timber which leads to deforestation. As a consequence of the difficult economic situation, the number of inhabitants has decreased by 22.6 per cent since 2002. The reasons for this population decline are linked to 'push' factors for migration to Tbilisi and foreign countries, due to limited education and job opportunities and the high unemployment rate in the municipality. Borjomi is also characterised by a high degree of ethnic diversity. Within the municipality, the share of ethnic Armenians (12 per cent) is double the average in Georgia and around 4 per cent of the population is ethnic Greek. Ethnic minorities tend to be concentrated in specific villages.

Experiences with LEADER in CEE countries

Since the 1990s, rural development has emerged as an important policy field in the EU. LEADER is a place-based neo-endogenous rural development approach which aims at making effective use of local assets and resources by strengthening the regional identity of rural residents and integrating incentives from outside the region (Bosworth *et al*., 2016; Dax and Oedl-Wieser, 2016). It provides a proactive perspective towards nurturing potentials and addressing (social) innovation such as shared learning processes and the mutual exchange of knowledge and ideas (Bock, 2012; Dax *et al*., 2016). Furthermore, the territorial orientation of LEADER is manifested by the concern for small-regional and local scales and the promotion and development of new forms of organisation at both an institutional and personal level, which result in social changes beneficial to the communities involved (Kull, 2014).

The LEADER approach was introduced in most CEE countries through the EU's SAPARD Programme (Special Accession Programme for Agriculture and Rural Development). Since then, the increased application of the LEADER approach in these countries has encountered persistent obstacles and limited use of its opportunities (Table 1). Considering the legacy and mental heritage of the socio-political system under the communist era, the passivity of local people as regards participation in local governance is still widespread. The gap between national political traditions and the participation requirements of local people according to the principles of LEADER, such as public-private partnership, bottom-up approach and co-operation, needs time to be bridged. Other factors inhibit also the programme's implementation: political influence, which is exacerbated by weak administrative networks, the antipathy to formal institutions reflected in the partnership process and a lack of initiative, as well as the programme's complexity (Marquart *et al*., 2012; Chevalier und Maurel, 2013). Despite these obstacles, there have also been good experiences and progress in implementing LEADER in CEE countries contributing to a 'catching up' process in rural development (Augustyn and Nemes, 2014).

The application of LEADER in Borjomi Municipality introduces new opportunities for enhancing local development aspirations and engaging in socio-economic and cultural development processes. The implementation of a Local Development Strategy (LDS) addresses the challenges and potential of the area, and induces place-specific initiatives. It acknowledges the problem pattern of the region, raises awareness for the needs of people, mobilises local resources

Table 1: Experiences with the implementation of LEADER in CEE countries.

Obstacles	Opportunities
Overcoming the legacy of low participation in the socialist era requires long-term processes.	Actors of greater social distance are welcome and might be part of the local development process.
Low level of trust towards formal institutions.	Starting learning process on the need of long-term involvement as a crucial factor in the implementation process of LEADER.
Limited experience with and hardly any sympathy for collective actions.	Enhancing community building and strengthening of democracy at local level.
Unwillingness of political leaders to share power and influence.	Appreciation of a new innovative local development instrument by local actors.
Leading role of mayors and strongly-positioned county councils.	Time is essential for establishing social capital in order to counteract lack of trust.
Local actors seem to lack initiative and need good practice on leadership.	Learning from and exchange of experiences with other LAGs at national and transnational level.
Passivity strengthens the traditional powerful actors and institutions, and inhibits governance adaptations.	First reflections to overcome weaknesses and learning from empowering processes.

Sources: Maurel (2008); Chevalier and Maurel (2013) [Czech Republic, Poland and Hungary]; Augustyn and Nemes (2014) [Hungary and Poland]; Szilágyi (2016) [Hungary]; Marquardt *et al.* (2012) [Romania]; Doitchinova and Stoyanova (2014) [Bulgaria]; Bedrac and Cunder (2010) [Slovenia]; Kopoteva and Nikula (2014) [Finland and Russia]

and enhances the use of opportunities of the area. As a pilot region, experiences from the local action process should provide insights into the usefulness of the objectives of LEADER for socio-economic development of other rural regions in Georgia.

In this paper, the following research questions are discussed with respect to the case study region: (a) Is the LEADER approach transferable to and applicable in Georgia? (b) Which institutional, economic and social preconditions are necessary for the implementation? (c) How can European partners support the rural development process in the mountainous region of Georgia through implementing the LEADER approach? Particular attention is paid to the potential of the LEADER approach to intensify knowledge sharing and to initiate (social) innovation.

Methodology

To implement integrative, neo-endogenous and participatory rural development approaches in rural areas, a mix of methods is needed to address the high requirements and expectations from different actors and stakeholders. During the implementation of the LEADER-like approach in Borjomi Municipality, actions at many levels were necessary to address the adequate communication efforts and transformation needs of the rural development approach to the local people. Therefore (a) *methods for the strategy development and capacity building* (facilitation methods, SWOT analysis, Needs Analysis, Focus Groups, expert interviews, accompanying observations), (b) *methods for monitoring and evaluation* of implementation efforts (Focus Groups, interviews with project applicants, document analysis) and (c) *methods for the internal and external communication as well as mediation and consultancy* (technical assistance, meetings) had to be elaborated. These are *inter alia* methods for applied sciences and consulting where the animation and mobilisation of the participants in the rural development process are in the foreground.

The methods which were used for elaborating the LDS followed the traditions of participatory development (Mohan, 2001), change management (Lauer, 2010), multirational management (Schedler, 2012) and systems theory approaches (Willke, 2001, 2005). Combining all these different approaches, it becomes clear that rural development objectives and relevant strategic pathways need to be defined by the local actors and stakeholders endogenously and only to a lesser extent they can be supported by the advice of external observers and experts. Methods like 'clarifying my role within the system' were used to sensitise the participants (LAG members) about their position within the Borjomi Municipality, which was visualised with a rope on the floor. This exercise should raise their awareness about which part of Borjomi they should have in mind when working on several questions afterwards. Since the LDS elaboration is highly participatory and process driven, for any external advice there is an inherent problem of language barrier, in our case between the experts from abroad (Austria and Scotland) and the local people. To address and solve this language barrier, the Mercy Corps team (Georgians) was trained at the outset of the workshops in the main process elements so that they were able to facilitate the workshops of SWOT analysis and Needs Assessment.

The consortium assembled by Mercy Corps (MC), the lead partner through its Georgian branch office in Tbilisi, comprised experienced LAG implementation practitioners (Angus Council, Scotland), evaluation and assessment experts (BABF, Austria) and the coordinator of the Austrian national LEADER network (ÖAR, Austria). Moreover, with respect to realising local action, both the political and administrative bodies of Borjomi Municipality were integrated into the project design from the beginning. These partners have complementary knowledge and experience in project management, rural development in mountainous regions, and elaboration and administration LEADER LDS. The pilot project in Borjomi Municipality has a two-year duration, from July 2015 to July 2017 but, in view of the long-term development need, ENPARD has already launched a second call and accepted a two-year extension of the LEADER work in Borjomi.

Results

The ENPARD pilot scheme conceived a 'LEADER-like' approach, indicating that programme holders are aware of the difference from a full-fledged LEADER process. In particular, local development action normally involves a preparation period of several years whereas in this case local actors had to form LAGs and prepare LDSs within one year. This accelerated method required highly intensive knowledge transfer at the start period up to the procedure of sub-project selection. The swift realisation of the installation tasks was achieved through the high commitment and interest of all partners and a well-organised project management.

Formation of the Local Action Group

At the beginning of the project an intensive information campaign about the pilot project was carried out, reaching approximately 1,350 participants in the 28 villages of Borjomi Municipality. In a further step the LAG was established, and comprised of 27 members drawn from the public (maximum 49 per cent) and private (minimum 51 per cent) sectors, representing different professions, different age groups and a high proportion of women (about 44 per cent). Of these, 12 are representatives of public authorities (including four members of Borjomi Municipality and two members of Borjomi-Kharagauli National Park). Sixteen members are under 50 years of age and 12 are women.

Elaboration of the Local Development Strategy

The very intensive working process of elaborating the LDS necessitated LAG members to be committed to attending (regular) meetings and collaboration in preparing the strategy. At this stage, they had a double task: to act as multipliers to inform people about the opportunities of the project implementation rules of the LEADER approach in their local community, and to deal with SWOT analysis and Needs

Table 2: Summary of the SWOT analysis of Borjomi Municipality.

Strengths
Wide range of amenities and pristine nature;
Tradition of use of location and regional 'branding';
Long history of spa and ski tourism;
Diverse agricultural products and competitive management systems;
High esteem of sports/culture.
Opportunities
Enhance tourism services;
Focus on diversification and quality of agricultural products;
Develop forest management;
Enhance nature appreciation and develop natural resources;
Develop sports and recreational resources.

Weaknesses
Infrastructure development;
Lack of human resources;
Lagging renewal and provision of tourism services;
Lack of adaptation of land management in agriculture and forestry;
Weak cooperative spirit in institutions.
Threats
Out-migration (of young people);
Constraints on land management;
Environmental degradation;
Climate change;
National context of unstable political environment.

Source: Borjomi LAG (2016)

Assessment. The reflexive workshops of the preparation process aimed at identifying main strengths, potentials and 'core competencies' of Borjomi Municipality on which a future-oriented development could build. This includes recognition of the 'past' (in terms of successes and obstacles), the 'outer world' (in terms of comparison to other regions), the 'inside view' (in terms of cooperation and identity) and aspects of envisaged 'future' development (highlighting opportunities and threats). The workshop results were synthesised by the project team (BABF, ÖAR and MC) to provide a SWOT-matrix (Table 2).

After pooling SWOT elements according to common issues into the four groups 'High quality agricultural products and services', 'Cultural and sports activities', 'Sustainable/nature based tourism' and 'Environmental protection', these thematic fields unveiled the specific needs of the municipality. Reiterative workshops resulted in clarifying objectives, pathways and relevant stakeholders, providing the base for the formulation of the intervention logic (by the project team).

The overarching aim of the LDS is to *improve the quality of life of Borjomi residents and create a more attractive destination for visitors* (Borjomi LAG, 2016, p.19). Agreement on an overarching aim should provide the background for a common strategic identity and was translated into four objectives, with associated outcomes and indicators:

- Increase the contribution of *sustainable tourism* to the local economy, making it a model for the whole of Georgia;
- Improve productivity and diversification in *agriculture*, and to enhance professional knowledge, making farming a more attractive and profitable business sector;
- Strengthen activities in *sports and culture* to enhance quality of life and encourage a sense of belonging;
- Protect the *environment* through sustainable use of natural resources, effective land and waste management and awareness raising to enable local people to take a more active role on environmental issues.

The LDS thus represents a sound interface between Borjomi Municipality´s SWOT analysis, needs, objectives and possible pathways to which future projects can be aligned. The elaboration and implementation of such a participatory and place-based approach requires a certain degree of open-mindedness by the involved stakeholders and LAG members, the willingness to cooperate and the support of the administration and political authorities of the municipality. The overarching aim of the LDS stresses the need to develop and link the different aspects of regional resilience – economic, ecological and social aspects – in an innovative and sustainable way, building on nature-based tourism development, improved agri-food chains, agri-tourism, protection of biodiversity and the environment, fostering entrepreneurship and enhancing local knowledge, including use of 'tacit' knowledge.

Table 3: Results of the grant application process in Borjomi Municipality by Local Development Strategy objective, 2016.

Objective	**Expression of interests**	**Full project applications**	**Selected sub-projects**
Total submitted applications, of which:	171	88	36*
Sustainable tourism	79	36	11
Agriculture	58	27	4
Sports and culture	28	21	10
Environment	6	4	3
Selected for next stage/ final selection	107	36	28

* Of these 36 sub-projects, 28 passed the technical assessment and sub-project agreements are signed
Source: project data

Grant application, sub-project selection process and implementation of projects

On the basis of the LDS, an intensive animation campaign covering all the parts of Borjomi Municipality was conducted and resulted in raising substantially the awareness and understanding of local people for the aims of the development strategy. The mid-term evaluation of the project, carried out in October 2016, reveals even higher involvement in sub-project applications than anticipated (Dax, 2016). The result of the grant application process (Table 3) reflects the high interest of local actors in participating in the programme.

A particularly high interest is (as with many LEADER programmes) with *sustainable tourism* projects, but grants for activities in *sports and culture* are even more numerous. For the two other priorities only four projects were selected. This distribution mirrors the involvement of public institutions and sports organisations. The low amount of grants for agricultural and environmental activities is partly due to problems finding sources of co-financing, and can partly be related to the short preparation period.

Table 4: Number of grants awarded, beneficiaries involved and estimated effects on employment through the implementation of LEADER by Local Development Strategy objective in Borjomi Municipality, 2016-2017.

Objective	No. grants awarded	Total costs (EUR 1,000)	Co-financing (own resources) (%)	Involved beneficiaries (persons per grant)	Estimated employment effects (jobs per grant)
Sustainable tourism	11	583	43.3	1,760	8
Agriculture	4	236	34.3	445	9
Sports and culture	10	932	38.8	1,180	30
Environment	3	81	16.9	1,200	3
All selected sub-projects	28	1,831*	38.7	1,300	15

* Total public grant attributed to the 28 sub-projects: EUR 1,122,000
Source: project data

The level of co-financing, as well as the average number of beneficiaries and jobs created by grants is presented in Table 4. The figures show the importance of the pre-condition of co-financing throughout all project types and the extent of the effects of the initiatives. With an average of 1,300 beneficiaries and 15 created jobs the regional impact of this first wave of projects is impressive.

Different types of knowledge transfer

Beyond the quantitative impact of job creation and beneficiaries involved, the main result of the implementation of the pilot project in Borjomi Municipality is knowledge transfer at different levels and of different types. This is an outcome that is the result of the cooperation between many different partners, organisations and rural stakeholders as well as project applicants. It is envisaged by the ENPARD process that pilot projects will kick off a fruitful process of knowledge transfer throughout rural Georgia in the coming years. The following levels of knowledge diffusion are relevant:

- *Knowledge transfer between partners in ENPARD (EU, MoA, FAO, UNDP) and the consortia (Lead partners: Mercy Corps, People in Need - PIN and Care International - CARE)*: Since its beginning, the ENPARD project has enabled continuous coordination and exchange between the three pilot projects (Borjomi, Kazbegi and Lagodekhi), and aims at a comprehensive assessment at the end of the two-year project of the approach and replication strategy of the LEADER approach. All three pilot projects have been granted an extension of two years for further implementation (with additional financial support from the EU). Similar results are expected from three other LEADER-type rural development projects selected in 2016 (in Alkhalkalaki, Dedoplistskaro and Tetritskaro), and from two more to be launched in 2017 in Keda and Khulo in the autonomous republic of Adjara.
- *Knowledge transfer between the consortia Mercy Corps, PIN and CARE (exchange, visits, study tours)*: The contact to the partner regions in Georgia (Kazbegi, Lagodekhi) and the periodic exchanges of experience support reflection of the implementation process and increase fine-tuning in administrative procedures and strategic orientation towards the different regional, economic and social conditions and contexts.
- *Knowledge transfer between the partners in the consortium of the pilot project of Borjomi Municipality* provided insights into learning from LEADER application from rural and mountainous contexts in Europe which had to be adapted to the local context for implementation (Phipps *et al*., 2017).
- *Knowledge transfer of specific expertise concerning LEADER to the Mercy Corps team and the LAG*: The Austrian partners (BABF and ÖAR) were commissioned to communicate theoretical knowledge about the LEADER approach, to highlight obstacles and favourable aspects of implementation, and to guide preparation procedures. This was relevant for the stage of the formulation of the LDS and influenced the planning of the grant selection process. The role of Angus Council, on the other hand, was to share their expertise in the practical implementation of the LEADER approach. This was extremely helpful in preparatory discussions concerning the of issue how to promote the commitment of the LAG members and involvement of local actors, aspects of rights and obligations, and to overcome constraints for project applicants.
- *Knowledge transfer to the Mercy Corps team in Borjomi Municipality*: The Mercy Corps team was trained in the LEADER approach, how to shape a LAG and how to prepare a LDS by BABF and Angus Council. This activity included a comprehensive understanding of the need for an information campaign in the villages of Borjomi Municipality from a very early stage of the project that enables local actors to consider new initiatives and notifies them about practical requirements for grant applications and implementation. The Mercy Corps team in Borjomi Municipality informed the residents about the LEADER approach and invited them to take part in the rural development process. They organised all meetings concerning the formation of the Borjomi LAG and the working process on the LDS. The team is the contact point for people who are interested in participating in the LAG or who want to submit a project proposal.

Discussion

It is considered to be essential for rural Georgia that a diverse economy is built up to support the sustainable development and livelihoods of rural communities, with a spe-

cific focus on value chains, rural tourism and sustainable management of natural resources (EU, 2016). The intention of the EU to promote rural development by initialising the LEADER approach within ENPARD underlines the novelty of the approach in Georgia. The wide scope of ENPARD provides a useful guideline towards place-based, integrated and participatory rural development, and hence an innovative approach for these areas. Seeking a strategic concept with practical initiatives enables a perspective for the serious regional problems of depopulation, poverty and absence of social and economic assistance. The aim of the programme is to improve the living and working conditions in rural regions of the country, particularly for people in remote, mountainous rural areas that represent the group most severely hit by deprivation.

The application of the LEADER approach in three rural regions in Georgia started 2015 and after a period of intensive work with local people and addressing their needs and aspirations the first projects are being implemented. The planning and preparation work for the three pilot projects in Borjomi, Kazbegi and Lagodekhi was carried out with big commitment by all involved institutions (EU, MoA, FAO and UNDP) and consortia (Mercy Corps, PIN and CARE). It was intended to maximise the knowledge co-creation between the pilot regions and the official authorities in a very short period (two years) which, fortunately, has now been extended for an additional two-year period. An important question at the beginning of this exercise was, can programmes or approaches that have primarily been developed from a western EU perspective be successfully implemented in a country of the Southern Caucasus? Even after a short period of implementation it can be concluded that the formation of the LAG, the successful elaboration of the LDS and the implementation of 28 sub-projects in Borjomi LAG indicate a high degree of acceptance of the LEADER approach. In all three municipalities, 85 rural development initiatives will provide more employment to over 1,000 rural households and improve living conditions of over 54,000 persons in the rural population. The work of intermediaries is indispensable for enhancing commitment and 'translation' tasks for the LEADER features such as the bottom-up approach, public-private partnerships, innovation, integrated multi-sectoral actions, new forms of co-operation and networking. The Mercy Corps project management team in Borjomi has made great efforts to animate people in the villages to participate in the rural development pilot project and to provide guidance, advice and technical support. An important prerequisite was that some of the Mercy Corps team members were already experienced in (international) project implementation and simultaneously have their roots in the region.

The sharing of knowledge, and the transfer of knowledge as well as innovative ideas and best practices from western countries to Georgia in the context of an integrated and sustainable rural development approach can be interpreted as the start of applying core 'determinants of successful knowledge brokering'. It seems important that rural actors in Georgia are given sufficient time (and resources) to gain their own specific experiences in a kind of 'laboratory' of rural development. In particular, in transition countries it becomes evident that quick solutions and results are illusionary wishes and new forms of co-operation, networking, elaboration of development strategies and co-creation of processes and knowledge are needed. It is important to enable experimentation and iteration, and allow for 'failures' and repeated attempts to achieve place-specific success and 'progress'. Linked to the knowledge development instigated, the rapid appreciation of the LEADER approach in the pilot region is revealed through the enthusiasm and intensive participation of the Georgian partners. Their role can be defined as a focal point, multipliers and mediators for LEADER in Borjomi Municipality. They are furthermore translators of people's needs. On the other hand, they translate the requirements of the LEADER approach because for local people the implementation of projects is a new experience, challenge and risk.

The transfer of experiences of innovative projects and the presentation of best practices from Austria and Scotland to Borjomi Municipality was a key input into the pilot project. The pilot project did not just provide 'transfer' of knowledge but the involved institutions engaged in an intensive exchange that showed, at least to some extent, features of an iterative approach that seeks to work on problem-driven perspectives and reassess strategic and procedural considerations, aiming at enhancing social innovation (Neumeier, 2012). It is important that these discussions are nurtured by expertise on place-based approaches for sustainable and multi-sectoral development of mountain regions, including good practice in eco-tourism, farm tourism, food processing, diversification on Alpine farms, socio-cultural action and multi-sectoral co-operations. As Austria has created a panoply of high-quality products in food and tourism since the 1980s it is increasingly important to underline if and how they serve the increasing demand of society for these products. Mountain areas have many assets for producing sustainable products which might include a beneficial effect for protecting the sensitive environment. This is also true for the Lesser Caucasus region in which Borjomi Municipality is located. In this regard, examples from Austria can make available good practice examples that provide incentives and inspire people and stakeholders to pursue a place-based, integrated and sustainable development in an environmentally sensible region.

The transfer of knowledge from European cases of LEADER application to the regions of Georgia and the elaboration of local appreciation of 'traditional' know-how and enhancing capacity building processes follows knowledge-brokering practices that make use of the five K* ('Kstar') method, i.e. activities in the five areas of knowledge mobilisation (KMb), knowledge translation (KT), knowledge transfer and exchange (KTE), knowledge management (KM) and making use of knowledge brokers (KB) (Phipps *et al.*, 2017). After the first period of the pilot project and stepping into the extension phase, the long-term perspective underlying these activities is growing and will become even more important in the second phase. On the basis of an interim assessment it is reassuring that the participation process set in motion in 2015 was able to address important parts of these practices, in particular through (a) raising the understanding of the political, social and economic context of partners, (b) building trust among partners, (c) developing capacity for knowledge, (d) enabling knowledge to be co-constructed, and (e)

building a culture for knowledge for all participants (Phipps *et al.*, 2017). Of course, the latter aspects need considerable further enhancement and iterative problem appraisal (Matt *et al.*, 2017) to become effective in the long-term for rural regions in Georgia.

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Policy brief

Knowledge sharing and innovation in agriculture and rural areas: more attention should be paid to regional differences across the European Union

On behalf of the European Rural Development Network (ERDN, www.erdn.eu), and as part of the 2016 Budapest Innovation Week, AKI hosted a conference on 3-5 October 2016 with the title 'Knowledge sharing and innovation in agriculture and rural areas'. This conference brought together 70 researchers, practitioners and policy makers from across the European Union, with a particular emphasis on participation from the Visegrad Group (Czech Republic, Hungary, Poland and Slovakia) and neighbouring countries. This policy brief was compiled from the debate that took place during the conference.

Andrew F. Fieldsend

Introduction

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 shape of EU innovation policy post-2020 has already started. Thus it is not too soon for researchers and policy makers in eastern central and south eastern Europe to share their experiences and ideas on how knowledge sharing and innovation can best be encouraged in agriculture and rural areas of the post-socialist Member States in order to influence the post-2020 agriculture and rural development agenda.

Conclusions from the conference

The conference pre-session reaffirmed that many farming systems in the region do not readily fit with the 'western' perception of a family farm as a commercially viable unit managed and run with family labour, producing entirely, or almost entirely, for the market. While in some post-socialist Member States, such as the Czech Republic and Slovakia, very large farming companies dominate, in others (such as Hungary) there is a dual farming structure, while in Poland and Romania, for example, the vast majority of farms are small and not economically viable. Indeed, many are subsistence or semi-subsistence farms. The conclusion from the conference was the EU's Common Agricultural Policy is intrinsically not able to address the needs of a substantial share of farms in the region. Reinforcing the role of small farms in topics such as social cohesion and rural resilience may be better addressed through the EU's Structural Funds (European Social Fund and European Regional Development Fund).

The main geographical focus area of the conference, and of ERDN, namely eastern central and south eastern Europe, belongs mainly to the Continental and Pannonian Bio-geographical Regions[1]. These regions not only have distinctive farming systems but are likely to be very sensitive to the impacts of climate change. Specific and extreme changes in the weather resulting from the very nature of these Regions (hot summers and cold winters) will lead to agriculture, forestry and freshwater aquaculture being particularly severely affected. The distribution of agricultural pests and diseases is likely to spread westwards and northwards across these territories. Research programming, including at EU level, must take into account the special needs of these regions with targeted topics, just as they do for the Alpine and Mediterranean Bio-geographical Regions, for example.

Much of the territory covered by the conference is composed of post-socialist economies that are still undergoing transition, and these economies continue to face unique challenges. These include the low uptake of innovation and modern technologies, the low level of cooperation, the consequences of the ageing population, the difference between the employment rate in predominantly rural regions and predominantly urban regions, and the extremely low level of consumer awareness. There is also a research and innovation divide in the EU that hinders both the unlocking of excellence in eastern central and south eastern Europe (not only the so-called 'New Member States' but also the countries of the Western Balkans, Belarus, Moldova and Ukraine), and the appearance of specific research topics in research programmes, including at EU level.

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 annual ERDN conference is an opportunity for research-

[1] A bio-geographical region can be defined as an area of animal and plant distribution having similar or shared characteristics throughout.

ers in the region to 'showcase' their competences, not only to researchers in other parts of the EU but also to other organisations such as the Food and Agriculture Organization of the United Nations (FAO). Thus, ERDN has a major role to play in the integration of researchers from the region into the European Research Area.

In partnership with ERDN, the BioEast strategic research agenda, with its two themes of, firstly, *climate change challenges in the Continental and Pannonian Bio-geographical Regions*, and secondly, *policy and governance challenges in the economically less developed EU regions*, can ensure the integration of the specific needs of eastern central and south eastern Europe into the EU agricultural and policy agendas. Scientific expertise is not on its own sufficient. Skills and competencies in methods, organisation, presentation must be improved so that the region not only 'is good' but also 'looks good'. It is necessary to be more innovative in science management and communication – how messages are sent to other scientists, farm advisors, farmers and politicians is very important indeed.

Agricultural and rural development in the region will, as elsewhere, be driven by innovation, which in turn depends on knowledge sharing between actors. Through the Agricultural (Knowledge and) Innovation Systems concept, the EU and FAO (and others) have adopted broadly similar understandings of how innovation takes place. Historically, knowledge flows were thought to be mainly linear, from researchers via advisors to farmers. It is now recognised that knowledge flows can be complex and take multiple forms. 'Co-production' of knowledge and innovation, for example between farmers, advisors and researchers is an important activity. The EU's EIP-Agri is one approach to fostering co-production.

However, innovation also depends on a number of 'soft' factors that can be region-specific, including policies, informal institutions, practices, behaviours, mind-sets and attitudes, the so-called 'enabling environment'. Some evidence was presented at the conference that the success of the LEADER approach in the region has been limited. The importance of these 'soft' factors plus the existence different farming systems in the region suggest that both the 'problems' of agricultural and rural development, and the 'solutions' are to some extent specific to the region and that tailored policy interventions are required.

Future direction of ERDN

ERDN has adopted a format for research cooperation that, over a 15-year period, has proved to have been outstandingly successful. No comparable organisation exists in the region. Any development of the network to further enhance its effectiveness must be evolutionary rather than revolutionary. In a similar way to AERIAS (http://www.aeriasonline.org/), a mechanism for formal affiliation of organisations to ERDN could be introduced. This will lead to stronger commitment from institute Directors that would ensure that ERDN has the freedom and resources it needs to increase its contribution to the European Research Area.

The fourteenth ERDN conference in Budapest was the most intensive effort to date by the network to engage fully with researchers across the EU (and beyond). Contact with the conference participants should be maintained with a view to future cooperation. In addition to further, similar events, ERDN should explore other ways to strengthen the position of researchers from eastern central and south eastern Europe in international projects by any available means, including sharing information on open calls and cooperating in forming consortia.

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 can help 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. But this can only be achieved as part of a multi-actor partnership [2], and not by ERDN alone. Thus, ERDN should work with initiatives such as BioEast to ensure that future EU policy takes full account of the specific development needs of the region.

Through steps such as these, ERDN can enhance its role in highlighting the fact that regional differences, especially in agriculture and rural development, continue to exist across Europe and that the failure to recognise and address these differences is hindering the sustainable growth of the whole EU.

For further information about ERDN please contact the Coordinator, Dr. Paweł Chmieliński, at pawel.chmielinski@ierigz.waw.pl.

[2] In other words, by bringing together all interested actors including researchers, policy makers, rural development practitioners, farmers' organisations and so on.

Abstracts of AKI publications

The results of AKI's research work are presented in detail in a series of Hungarian language publications. English language abstracts are reproduced below. The publications may be downloaded from the AKI website (www.aki.gov.hu) or requested in printed form from aki@aki.gov.hu.

KEMÉNY Gábor, KISS Andrea and NEMES Anna

Operation report of the agricultural risk management system 2013

Agroeconomic Information, published 2014

In 2013, the second year of operation of the new agricultural risk management system established by Act No. 168/2011, the positive developments arising from the adoption of the new system have continued to improve. The number of participants in the first pillar has increased and for the most important crops compensation fund coverage has reached almost 100 per cent. The range of crops covered by subsidised insurance has also increased. The coverage is 10 to 15 per cent in the case of arable crops and important fruit species and 5 per cent in the case of vegetables. The growth of the second pillar due to the increasing type 'B' insurances has been caused mainly by the decreasing number of non-subsidised insurances. In 2013 the volume of losses caused by weather conditions has decreased significantly, accordingly compensation payments have decreased significantly as well. Insurance payments from the second pillar have only increased due to the enlarging insured stock. Nevertheless, losses have been realised, especially in the first pillar. The reason why this has not occurred in the second pillar was that high payments were made on additional insurances which were not subsidised but could only be applied together with subsidised insurances. All in all the system has provided security for all participating farmers and the amounts of compensation fund and insurance premiums have accumulated due to the positive year.

ILLÉS Ivett and KEMÉNYNÉ HORVÁTH Zsuzsanna

The financial situation of agriculture and the food industry, 2014

Agroeconomic Information, published 2015

The aim of our analysis is to discuss the financial situation of corporations with double-entry bookkeeping in agriculture and food industry in 2014 compared with the previous year. The study basically relies on statistical ratios (share coefficient, comparative ratios over time). Representative indicators of assets, income and financial position as well as return and leverage indicators were used for discussing the activities of corporations to get a realistic view of the achievements and results of the sectors concerned.

The number of agricultural companies accounted for 4 per cent of the total number of companies. These companies represented 4.5 per cent of the profitable organisations in the examined year. The share of food industry corporations in the national economy was 2.2 per cent in 2014. The number of profitable organisations in the food industry was 3030, which represented 2.2 per cent of all profitable companies. The increase in domestic sales by the agricultural corporate enterprises was outstanding while expenditures rose moderately. The growth of export income in the food industry was dynamic, however inputs barely increased. Compared to agriculture, food industry assets grew more slowly (by 6.3 per cent), relying on an even 50-50 per cent rate on internal and external sources. Agricultural corporations' profit before tax rose by HUF 36.4 billion to a total of HUF 164.7 billion and the profit before tax of the food industry increased by HUF 25.3 billion to HUF 95.4 billion in 2014.

KEMÉNY Gábor (ed.)

Operation report of the agricultural risk management system, 2014

Agroeconomic Information, published 2016

The weather conditions were favourable in 2014; no serious damage occurred that affected all of Hungary. Mitigation payments were primarily allocated to small farms that produce fruits and vegetables and are located in areas with unfavourable natural conditions. In Pillar II of the CAP the total amount of fee payments of farmers was significantly higher than the value of the mitigation payments of insurance due to the low level of damage. For the first time, the source of insurance premium was not enough to cover the total premium needs incurred, therefore in 2014 the rate of premium decreased firstly from 65 per cent to 30 per cent in the case of 'C' type insurances, then from 65 per cent to 63 per cent in the case of 'B' type insurances. According to the analysis carried out, revision and reduction of current insurance fees can be proposed due to the low level (below 65 per cent) of damage in the last four years.

KEMÉNY Gábor and RÁCZ Katalin (eds)

The characteristics of small farms in Hungary and their development opportunities

Agroeconomic Book, published 2016

Among all agricultural holdings in Hungary, small farms have suffered the biggest setbacks both in terms of human and economic performance in recent decades. These subsistence or semi-subsistence farms play an important role by supplementing the household incomes produce a significant share of agricultural production. In our research the situation and future prospects of small, self-employed farms under EUR 4000 SO, which are typically not engaged in market production and are not professional, were examined. We present the major economic and social parameters of small farms, identify their types, border the circle of farms develop to market-oriented entities and draw up proposals with regard to the tools promoting their development. Small-scale farming is basically determined by economic activity: full-time entrepreneurs produce substantial income in a profit-oriented way, with high asset deposition and effective work; while agricultural and non-agricultural workers, pensioners and people living from social benefits produce increasingly low production value and income with decreasing expenses. A few thousand farmers with entrepreneurial backgrounds that belong to the younger age group could become full-time market-oriented farmers. To develop the other small farms is desirable from the rural development and socio-political points of view but it is conceivable only through integrated programmes which enable regular supplementary income with small-scale projects, production coordination, expanding expertise and ongoing mentoring support.

KEMÉNY Gábor and LÁMFALUSI Ibolya (eds)

Evaluation of the operation of the agricultural risk management system, 2015

Agroeconomic Book, published 2016

After a year of favourable weather conditions (2014) the incidence of weather-related damage increased in 2015, so the value of mitigation benefits and of the insurance payments rose, as did the loss rates. The most significant damage was caused by drought, hail, spring freezing and thunderstorms, with plantations, vegetables and maize suffering the most damage. The insurance premium subsidy was temporarily financed from the central budget by HUF 3 billion. The number of subsidised insurance contracts increased by more than 18 per cent. The income from insurance fees remained at the same level as in the previous year, so the income was HUF 5.7 billion. In 2015, 8,664 farmers required insurance subsidy and their claims for subsidies exceeded the abovementioned HUF 3 billion, so it was necessary to pay back such as in 2014. In the case of 'A' type insurance, the premium intensity remained at 65 per cent, while for 'B' and 'C' type insurances the intensity fell to 52 per cent and 30 per cent respectively.

JANKUNÉ KÜRTHY Gyöngyi and TIKÁSZ Ildikó Edit

Analysis of the operation and success of the Austrian food economy

Agroeconomic Study, published 2016

The study explores the reasons for the success of the Austrian food economy. Our starting point was that an economy is successful if the stakeholders in the sector realise acceptable levels of profit. The research investigated how macroeconomic, environmental, social and administrative factors support the profitability of the sector. As a first step the effectiveness and profitability of agriculture and food processing in Austria and Hungary were compared, then the domestic consumption and external trade of the two countries were analysed. After this the Austrian tax and subsidy system, and the cooperation and the extension service were researched. During the analysis the value chain approach was used; in other words, both the production of raw materials and the processing sector were investigated. Furthermore, the operation of the retail and the trademark system were described. Several databases were used during the analysis (Eurostat, HCSO, Austria Statistics, OECD etc.). The most important result from our research is that the Austrian food economy is successful as all the stakeholders in the sector achieve remarkable levels of profit, and in addition the multifunctional performance of the sector is at a high level. This is partly due to the favourable macroeconomic environment but also to the good tax and subsidy system, the cooperation of the stakeholders, the good horizontal and vertical integration in the sector, the well-performing trademark system, the extension service and the good level of education.

STUMMER Ildikó (ed.)

The market developments of the most important commodities in 2015

Agroeconomic Information, published 2016

This publication discusses the market developments of the most important commodities in 2015, mainly by presenting price trends. The material is based on the price information and data of the Market Price Information System of the Research Institute of Agricultural Economics and of various Hungarian and international sources. The producer price of milling wheat remained almost unchanged (HUF 48.5 thousand/tonne) in 2015 compared to 2014, while it increased for feed wheat by 6 per cent to HUF 44.7 thousand/tonne. The producer price of feed maize was HUF 41.5 thousand/tonne in 2015, a little above previous year's level. Sunflower seed was 13 per cent more expensive (HUF 108 thousand/tonne) in 2015 compared to 2014, and the producer price of rapeseed rose by 10 per cent to HUF 112 thousand/tonne. In Hungary 813 thousand tonnes of sugar beet were harvested in 2015, a decrease of 23.8 per cent compared to the level of 2014. As in previous years, in 2015 Hungarian pork prices followed the trends of prices in the European Union. The pig producer price was HUF 428 per kilogramme warm carcass weight, 10.3 per cent lower than one year before. The producer prices of slaughter chickens decreased by 5 per cent to HUF 261 per kilogramme in 2015 compared to the previous year. In Hungary the cattle producer prices increased by 2 per cent in 2015. The producer prices of lambs decreased by 1.5 per cent and those of raw milk price decreased by 22 per cent compared to the previous year. The production of fruit and vegetables decreased in 2015 compared to 2014, and the producer prices increased by 30 per cent. The processors' sale prices of wines without geographical indication and wines with protected geographical indication (PGI) increased by 6 per cent in 2015 compared to the previous year.

JANKUNÉ KÜRTHY Gyöngyi, DUDÁS Gyula and FELKAI Beáta Olga (eds)

The current situation and the future of the Hungarian food industry

Agroeconomic Study, published 2016

The revenues of the Hungarian food industry increased almost by HUF 1000 billion between 2003 and 2013 at current prices, but at base prices they declined by HUF 360 billion, mainly as the result of the decrease in domestic sales (HUF -631 billion). The cause of this decrease is the low purchasing power of domestic consumers which is clearly demonstrated by the covariance of the real income per capita and the sales of fast moving consumer goods. Hungarian purchasing power is low by international comparison as well. According to Eurostat data, only Bulgaria has lower annual expenditures on food and non-alcoholic beverages per capita. Exports increased between 2003 and 2013, but the increase was driven mainly by non-traditional food products (bioethanol, pet food and tobacco). The Hungarian food industry reacted to the difficulties it faced by reducing both the number of employees and investments. The industry seriously lags behind international competitors, mainly due to the lack of financial resources, lack of real pressure to innovate (relatively low cost of labour) and management issues (inaccurate understanding of capacity utilisation, efficiency and modernisation). The unfavourable situation of the Hungarian food industry arises from external (low purchasing power, macroeconomic factors) and internal (lack of technological developments and innovation ability) factors. While many of these problems are difficult to solve as they depend on factors that cannot be influenced by the players, the lack of conscious thinking in the supply chain makes the situation even more difficult. The solution can be found by precise planning, increasing cooperation along the supply chain, efficient use of subsidies, establishing a proper regulatory background, increasing adaptation to the market and by strengthening the cooperation between research and market players.

BÁBÁNÉ DEMETER Edit and VALKÓ Gábor (eds)

Hungarian Food and Agricultural Statistics 2015

Agroeconomic Information, published 2016

The publication provides information on the results achieved in 2015 in agriculture, forestry and food industry. We assured the comparability of time-series in connection with the pocketbooks published in recent years. Besides the national and branch indicators and data, the principal agricultural data are also given in detail by counties. The international data are suitable to demonstrate the main trends. The published data are compiled on the basis of the publications of the Hungarian Central Statistical Office, EUROSTAT, the Food and Agriculture Organization of the United Nations and the Research Institute of Agricultural Economics.

ILLÉS Ivett and KEMÉNYNÉ HORVÁTH Zsuzsanna

The financial situation of agriculture and the food industry, 2015

Agroeconomic Information, published 2016

In this analysis we discuss the financial situation of corporations with double-entry bookkeeping in agriculture and the food industry in 2015 compared to the previous year. Agricultural corporations accounted for 4.1 per cent of all companies and 4.3 per cent of the profitable companies in this year. The share of food industry corporations in the national economy was 2.2 per cent in 2015, while the number of profitable companies was 3,036, representing 2.1 per cent of all profitable organisations. The profit before tax of the agricultural corporations decreased by HUF 60.1 billion, from HUF 165.3 billion to HUF 105.2 billion, while the profit before tax of food industry companies rose by HUF 35.5 billion to HUF 129.8 billion in 2015. The decline experienced by agricultural corporate enterprises mainly arose from increases in expenditure, while incomes decreased. The sales revenue of the food industry was HUF 3,450.1 billion in the current year, and this was composed of 65.3 per cent in domestic sales and 34.7 per cent in exports. In contrast to agriculture, the assets of the food industry rose by 8.4 per cent. The value of assets was financed by 59.1 per cent from internal and by 36.9 per cent from external sources.

BENE Andrea, DOMÁN Csaba, FELKAI Bea and LÁMFALUSI Ibolya

The financial situation of the food industry

Agroeconomic Information, published 2016

This publication investigates the financial situation of the food industry using balance sheet and income statement data of companies belonging to the sector. In addition to reviewing the sectoral level the analysis also covers the main sub-branches and branches as well as the various size categories of companies. A rather negative picture emerged from our research regarding the financial situation of food processing. The period 2003-2013 can be characterised by disinvestment, indebtedness, loss of markets, deteriorating profitability and fragmentation of the food business. The food industry has found itself being squeezed from two sides. On one side sectoral players faced increasing raw material prices determined by world market prices, but these costs could only be passed on through product price increases to a very limited extent because of the shrinking or stagnating consumption and weak effective demand side. In Hungary the food industry does not have enough resources and external support is needed for its development. Detailed examination of the finances of the food industry indicated that the negative trends did not affect all the sub-branches in the same way, although the number of exceptions is very low.

KESZTHELYI Szilárd

Results of the Farm Accountancy Data Network in 2015

Agroeconomic Information, published 2017

The publication contains the processed data of 1586 individual farms and 379 corporate farms. Farms selected for sampling represent agricultural producer enterprises in Hungary (nearly 110 thousand farms) according to farm type, size and legal status. At the national level individual farms produced 56.1 per cent of the total net added value, while corporate farms only 43.9 per cent. The previous year has also shown similar figures. The turnover and operating costs per hectare have increased similarly (by 3 and 4 per cent), however the level of direct support has decreased significantly (by 8 per cent) first time since the EU accession. Therefore, the profitability of agriculture has decreased by 7 per cent to the same level as in 2013. The sector analysis shows that the income change is the opposite: the profit before tax of individual farms has not changed (HUF 140.1 thousand per hectare), of corporate farms has decreased by 28 per cent. The reason of this change to the opposite direction is related to development of policy support, as the basic support is eliminated in case of farms over 1200 hectares. In 2015 the incomes of grape producers (by 120 per cent), protected vegetable farms (by 31 per cent), fruit producers and field grown vegetable farms (by 8 per cent) have increased. The income of poultry farmers has not changed. Pig farm income has decreased - by 47 per cent - the most significantly. The income of dairy farms has also decreased significantly by 28 per cent, while of mixed, beef and sheep farms by 17 to 18 per cent. The income of arable crop farms has shown only a two per cent decrease.

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Audience

Researchers, academics, policy makers and practitioners in agricultural economics and rural development, especially in eastern central and south eastern Europe.

Submission of manuscripts

Submission of an article implies that the work described has not been published in English in any other peer-reviewed journal, is not under consideration for publication elsewhere, and that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out. The author will retain the copyright of the article but agrees to identify AKI as the original publisher. Papers will not normally exceed 6000 words including the reference list and figure and table captions. Authors intending to prepare a book review should first consult the Editor-in-Chief and such a review should not exceed 2000 words.

Shorter papers and comments, of up to 1500 words, will also be considered for publication. Such notes might deal with the economic aspects of policy, with the results of small research projects that do not justify a full-length article, or comment on articles previously published.

Manuscripts should be submitted in .doc or compatible format. They should be prepared using A4 format, TNR 12 pt text and 1.5 line spacing and be in single-column format with wide margins. Do not hyphenate words and use **bold** face and *italics* only sparingly, but use subscripts and superscripts where appropriate. Avoid the use of single-sentence paragraphs. Tables should be placed at the end of the manuscript and figures should be submitted as separate files, numbered accordingly. Page and line numbering (restart each page) must be used but no reference should be made to page numbers in the text. You should use the 'spell-check' and 'grammar-check' functions of your wordprocessor, which should be set to *English* English, to avoid unnecessary errors.

Manuscripts will be double-blind reviewed by at least two reviewers and may be returned to the author(s) for revision before acceptance for publication. The Editor-in-Chief will normally consider only one re-submission.

Article structure

Divide your article into clearly defined sections but do not use section or subsection numbers. Each heading should appear on its own separate line. For research papers you are urged to consider using the following structure:

- **Introduction.** State the objectives of the work and provide an adequate background with reference to the international literature, but avoiding a detailed literature survey or a summary of the results.
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- **Results.** Results should be clear and concise.
- **Discussion.** This should explore the significance of the results of the work, not repeat them. A combined Results and Discussion section should normally be avoided. You should show how your results add to existing knowledge but avoid extensive citations and discussion of published literature.

Where it is not appropriate to use the above framework, you should finish the paper with conclusions.

Essential title page information

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- **Corresponding author.** Clearly indicate the corresponding author who will handle correspondence at all stages of refereeing and publication, also post-publication. Please provide a telephone and fax number in addition to the e-mail address and the complete postal address.
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- **Keywords.** Please provide a maximum of six keywords.
- **Abbreviations.** If necessary, define abbreviations that are not standard in this field on the first page of the article.

- **Acknowledgements.** If applicable, collate acknowledgements in a separate section at the end of the article before the references. List here those individuals and/or organisations that provided help, including financial support, during the research.
- **Nomenclature and units.** Follow internationally accepted rules and conventions: use the international system of units (SI) i.e. metre, second, kilogramme etc. or accepted alternatives e.g. day, litre, tonne.
- **Math formulae.** Present simple formulae in the line of normal text where possible. Number consecutively any equations that have to be displayed separately from the text (if referred to explicitly in the text). For simple fractions use the solidus (/) instead of a horizontal line. Powers of e are often more conveniently denoted by exp. Give the meaning of all symbols immediately after the equation in which they are first used. Levels of statistical significance which can be mentioned without further explanation are: *P <0.05, **P <0.01 and ***P <0.001.
- **Footnotes.** Footnotes should be used sparingly. Number them consecutively throughout the article, using superscript Arabic numbers. Indicate each footnote in a table with a superscript lowercase letter.

Tables and figures

- **Tables.** Number tables consecutively in accordance with their appearance in the text. Each table should be accompanied by a title and fully descriptive caption. Column headings should be brief but sufficiently explanatory and standard abbreviations of units of measurement should be included between parentheses. Do not use vertical rules to separate columns. Large tables should be avoided. If many data are to be presented, you should consider dividing them over two or more tables. Reversing columns and rows will often reduce the dimensions of a table.
- **Figures.** Graphs, drawings or photographs should be supplied in digital format in monochrome and be of sufficient contrast. Figures prepared with Excel® software (or compatible format) are preferred. Captions should be included in the main manuscript, not attached to the figure, and should explain all symbols and abbreviations used. The text should include references to all figures. The use of figures from other publications is discouraged but, if used, permission of the author(s) or the copyright owner is necessary.

References

Please ensure that every reference cited in the text is also present in the reference list (and vice versa). Citations may be made directly (or parenthetically). Groups of references should be listed first alphabetically, then chronologically. For example: 'as demonstrated (Allan, 1996a, 1996b, 1999; Allan and Jones, 1995). Kramer *et al.* (2000) have recently shown ...' Citation of a reference as 'in press' implies that the item has been accepted for publication.

In the reference list, references should be arranged first alphabetically and then further sorted chronologically if necessary. They should not be numbered. More than one reference from the same author(s) in the same year must be identified by the letters 'a', 'b', etc. placed after the year of publication. The title of a non-English publication should be followed by the English translation in square brackets. Journal titles should not be abbreviated. Examples:

- **Reference to a journal publication.** Van der Geer, J., Hanraads, J.A.J. and Lupton, R.A. (2000): The art of writing a scientific article. Journal of Science Communication **163**, 51-59.
- **Reference to a book.** Strunk Jr., W. and White, E.B. (1979): The Elements of Style (3rd edition). New York: Macmillan.
- **Reference to a chapter in an edited book.** Mettam, G.R. and Adams, L.B. (1999): How to prepare an electronic version of your article, in Jones, B.S and Smith, R.Z. (eds), Introduction to the Electronic Age. New York: E-Publishing, 281–304.

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