Studies on the Agricultural and Food Sector in Central and Eastern Europe

Multi-level Processes of Integration and Disintegration

Proceedings of the Third Green Week Scientific Conference

Edited by
Franziska Schaft, Alfons Balmann

IAMO
LEIBNIZ-INSTITUT FÜR AGRARENTWICKLUNG
IN MITTEL- UND OSTEUROPA

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The papers contained in this volume are presented as submitted by the authors. Thus, each author is fully responsible for their paper's contents, figures and citations.

Halle (Saale), December 2009

Franziska Schaft and Alfons Balmann

About the MACE Project

The MACE Project is financed in the frame of the Marie Curie Actions within the European Community's Sixth Framework Programme (MSCF-CT-2005-029522). It seeks to enhance the capacity for agricultural research in the scientific community of the Central and Eastern European Countries and thus to contribute to managing the process of rural modernisation in these transition countries. It is coordinated by Humboldt-Universität zu Berlin (Germany) and jointly conducted with the following partners:

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LANDSCAPE AGROECOLOGY: MANAGING INTERACTIONS BETWEEN AGRICULTURE, NATURE AND SOCIO-ECONOMY

TOMMY DALGAARD[*]

ABSTRACT

State of the art GIS and database technologies for landscape scale analysis and the modelling of land use and environmental impacts are presented. These methods have been developed at the University of Aarhus in multidisciplinary collaboration with other research institutions throughout Europe, e.g. during the EU research projects www.mea-scope.org and www.sensor-ip.eu. In the years to come, these landscape-scale research methods will be further developed and integrated with similar frameworks in other EU countries, and used for scenario studies. Scenario studies, visualised in geographical information systems, are useful for evaluating possible future landscape developments, and for identifying potentials for and limitations to combining multiple landscape functions. Here we focus on scenario systems that explore interactions between landscape functions – e.g. the interactions between farm management, economy, nutrient losses, fauna population dynamics, plant community development, etc. Among others, scenarios for drinking water protection via increased set-aside grassland or afforestation are presented; they show that benefits from subsidies targeted to areas with special interests in the protection of drinking waters from nitrogen pollution differ from non-targeted subsidies. Experience has shown that working with scenarios and involving potential users at an early stage of development are important ways of focussing the work effort and ensuring that relevant tools are developed. Developments in data collection and collation at the EU level will allow similar systems to be developed elsewhere.

Keywords: Landscape, agroecology, scenarios, multidisciplinarity, Geographical Information Systems (GIS), multifunctionality.

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1 INTRODUCTION

This paper and the presentation for the Berlin Green week conference on "Multi-level processes of integration and disintegration (HUMBOLDT-UNIVERSITÄT ZU BERLIN, 2009) are synthesized from research carried out in relation to three European landscape research projects; MEA-scope (www.mea-scope.org), SENSOR (www.sensor-ip.eu) and Nitro-Europe (http://www.nitroeurope.eu), as well as a number of Danish research projects (for example, ICROFS, 2009 or DALGAARD et al., 2003a, 2007, 2009).

At the conference, examples from this work were presented together with some additional examples on research carried out within The Department of Agroecology and Environment, Aarhus University, Denmark. This also includes methods for upscaling (DALGAARD et al., 2003b). In this paper, selected examples are described in further detail, with an emphasis on the need for further research developments within the discipline of Landscape Ecology (WOJTKOWSKI, 2004; DALGAARD, 2005).

2 NEW NEEDS FOR LANDSCAPE RESEARCH

Today's demand for sustainability is not limited to agricultural production and profit, but includes other aspects of rural life such as the environment and landscape. Proper utilisation of future landscape requires a holistic approach where consequences of various land uses are assessed and management adjusted. At the same time, regulatory authorities in EU Member States must implement a range of EU directives that target specific policy areas, e.g. the Nitrates Directive, National Emissions Ceilings Directive, Habitat Directive and the Water Framework Directive. If policy initiatives directed towards implementation are developed in isolation, there is a tendency for the resulting regulations to be at odds. For example, as part of the implementation of the Nitrates Directive in Denmark, farmers were obliged to plant more winter cereal crops. This has resulted in an increase in the frequency of pesticide applications, a development that threatens wildlife and conflicts with the objectives of the Habitat Directive.

2.1 The development of interdisciplinary landscape scenario systems

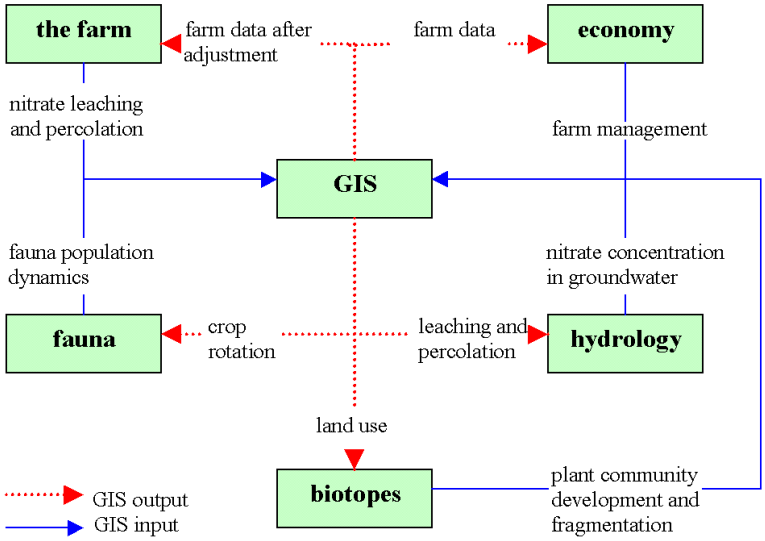
One example of an interdisciplinary landscape scenario system was developed in the project titled "Land use and landscape development, illustrated by scenarios – Interactions between nature, agriculture, environment and land management", which was initiated under the Danish research programme titled "Land use – The farmer as landscape manager" (HANSEN et al., 2002). This multi-disciplinary project involved collaboration between the Danish Institute of Agricultural Sciences, The

National Environmental Research Institute, Geological Survey of Denmark and Greenland, the University of Aarhus, Viborg County, The Danish Agricultural Advisory Centre, and the Danish Institute of Agricultural and Fisheries Economics.

The focus of this scenario study is the farm as an integrated part of the rural landscape. The objective is to develop methods that will enable interactions between policy areas to be identified and quantified. In this way, policy-makers can seek to avoid conflicting policies and promote those that are synergistic.

The policy areas currently targeted by this scenario system are agricultural production, nutrient losses, landscape, and nature conservation. The process involved when investigating a policy initiative is as follows. The policy objective is defined and one or more policy measures are formulated. Often, these policy measures are in the form of regulations or economic incentives to achieve a certain change in land use or land management, e.g. planting woodland or extending livestock farming. These measures are then applied to the target area, either by using an economic model or a decision tree, or a combination of the two, using a Geographical Information System (GIS). The results are spatially explicit changes in land use or land management. The GIS is then used to generate input files for a number of models. The models included concern agricultural production and losses of nitrogen, hydrology and plant and animal wildlife (Figure 1).

Figure 1: An example of an interdisciplinary landscape scenario system

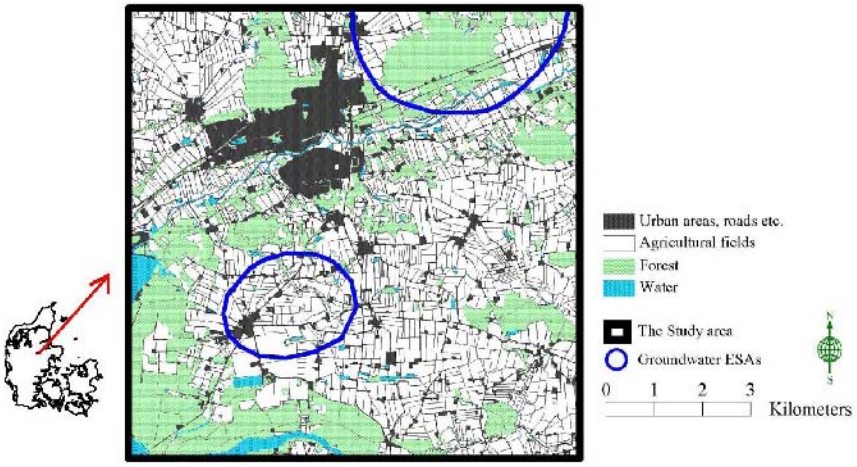


Source: HANSEN et al., 2002.

The main data sources for this scenario system are the national databases for cropping (GLR), livestock holdings (CHR), soil types and climate. The main function of these databases is to support Denmark's compliance with EU support schemes and directives; they are also used for agro-environmental analysis purposes.

The test site for the scenarios is an area of 100 km^2 in Viborg County, Denmark, (see Figure 2). Since the early 1990s, this area has been the focus of an intensive data collection campaign, including a detailed mapping of the soil, geology, biotopes and even of small landscape features such as ditches and field boundaries. The detailed data were collected to enable the importance of the scale of available data on scenario outcomes to be investigated. Data are digitised and stored in a GIS, which is the basis for the subsequent analyses. Presently, this landscape is used for scenario building in relation to the effects of revisions in the EU agricultural and rural development policy (DALGAARD et al., 2009), effects of mitigation options for the reduction of greenhouse gas emissions from agriculture (http://www.nitroeurope.eu), and potentials for bioenergy production and nature conservation (ICROFS, 2009).

Figure 2: Land use in the 10 x 10 km^2 study area, situated around the city of Bjerringbro in the Midwest of Denmark. The ESA's are environmentally sensitive areas with respect to groundwater quality

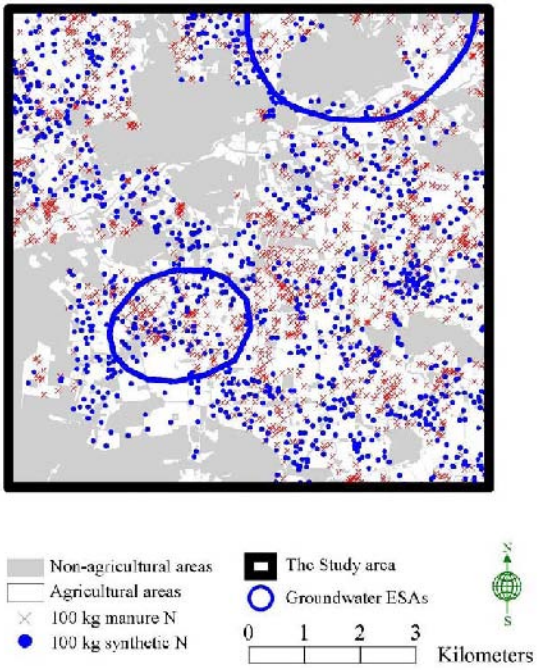


Source: DALGAARD et al., 2001c.

2.2 Example: A scenario for drinking water protection

As an example, Figure 1 illustrates how a scenario system was used to investigate measures for drinking water protection. Investigations have shown that spreading livestock manure is closely related to N-losses (DALGAARD et al., 2002a), and the distribution of livestock manure and fertilisers is the main driving factor for nitrogen (N) leaching to ground and surface waters. A model for the geographical distribution of N between fields within each farm and between farms within the study area was developed (DALGAARD et al., 2001c).

Figure 3: Example of simulated distribution of nitrogen (N) in manure and fertiliser on agricultural land inside and outside ground water protection areas (ESAs) in the project area. Especially manure N is a good indicator for N-losses, and drives the models for N-leaching to ground and surface waters



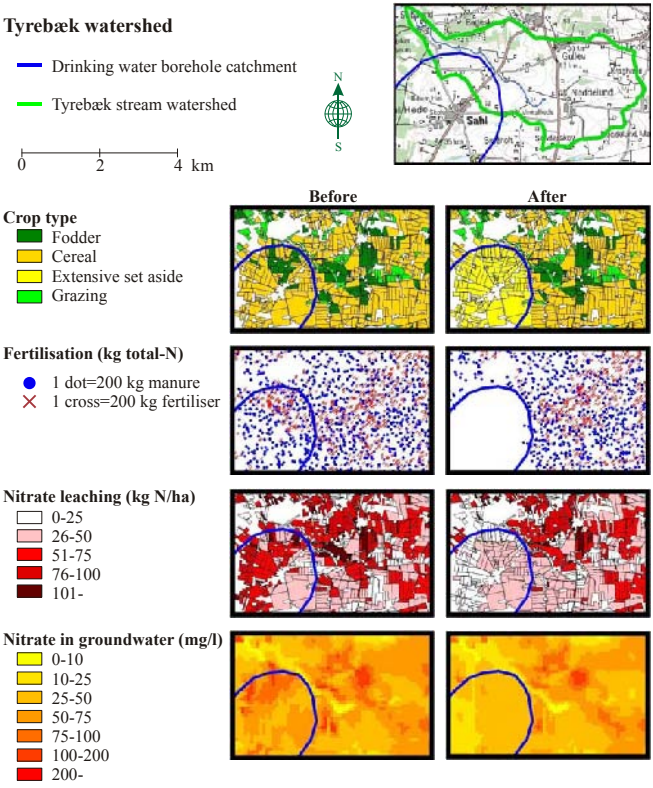
Source: DALGAARD et al., 2001c.

In this model, the N-distribution within and between farms is simulated from number and types of animals on each farm, crop rotation and the choice of cash and roughage crops for feeding livestock, soil types, distances to neighbouring farms

and the N-need for fertilising the crops on these farms. Figure 3 shows an example of simulated distribution of N in manure and fertilisers on agricultural land within the study area.

In one scenario, the effect of drinking water protection via extensification in the form of grassland set-aside in the groundwater protection area (ESA) situated in the watershed of the Tyrebækken stream is investigated (Figure 4). This scenario is especially relevant in the context of the EU Nitrate and Water Framework Directives.

Figure 4: Case study site for the groundwater protection scenario, with the Tyrebæk stream watershed in green and the catchment area for the drinking water borehole in blue. The "before" and "after" maps show the results from the crop rotation, manure, farm and hydrogeological models, before and after extensifying the borehole catchment



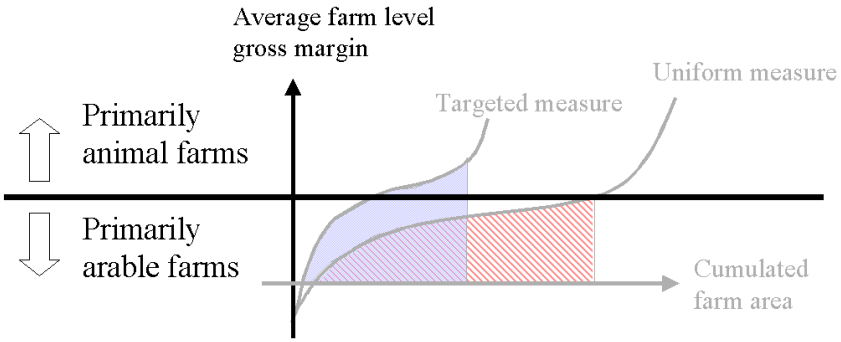
Source: After HUTCHINGS et al., 2004.

According to EU legislation, necessary measures should be implemented in order to protect drinking water quality in designated areas; i.e., the ESA in Figures 2, 3 and 4. When fields in the ESAs are turned into permanent grassland set-aside, the areas are taken out of agricultural production. In the scenario system, each farmer's reaction to these measures, in the form of changed animal and crop production, is decided from a set of rules, and the resulting change in fertilisation practice is decided from the model described above. In this way, the effect on N-leaching is estimated and interactions with other economic and ecological functions in the landscape assessed. As will be described in the following, these interactions are often non-linear and crucial to include when analysing the possibilities for creating multifunctional landscapes.

3 INTERACTIONS BETWEEN MULTIPLE FUNCTIONS

This section provides an example of the interactions between landscape functions that the interdisciplinary scenario systems can help disentangle. The two functions included in the example are the economic benefit from farm production, given by the average farm level gross margin, and the reduction of nitrogen losses resulting from the introduction of afforestation on former agricultural land (see the drinking water protection scenario described above, and RYGNESTAD et. al., 2001, 2002). The policy measures investigated were two different auction-based measures, with an equal, total afforestation subsidy of 2.7 mio. DKK used (Figure 5).

Figure 5: Example of interactions between farm income and drinking water protection via auction-based afforestation



Source: After DALGAARD et al., 2003a.

In the uniform measure all farms are invited to tender and the hatched area is afforested. In the targeted measure only farms within designated areas are invited to tender and a smaller area is afforested. However, the total protection effect of the

targeted measure is equal to that of the uniform measure, because the targeted measure affects more of the animal farms that have a higher impact on N-pollution than the mainly arable farms affected by the uniform measure. In the targeted measure, only farms within ground water protection areas (i.e., farms with most of their fields within the ESAs in Figure 2 and Figure 3) are invited to tender. In the uniform measure all farms in the study area are invited to tender, and in both the uniform and the targeted situation, it is assumed that farmers choose afforestation if the aforestation subsidy per ha is higher than the average farm level gross margin per ha.

As illustrated in Figure 5, the uniform measure leads to the largest area afforested (the hatched area). This is because the marginal subsidy needed to make farmers plant woodland increases faster in the targeted than in the uniform measure. However, the farms with low average farm level gross margins which plant woodland as a result of the uniform measure are primarily arable. In contrast, the targeted measure results in more animal farms, which typically have higher gross margins than arable farms, also planting woodland. Because N-losses are closely related to high livestock density, the groundwater protection effect of the targeted measure will be as high as the effect of the uniform measure, even though the area included by the targeted measure is much smaller (DALGAARD, 2001).

4 CONCLUSIONS AND PERSPECTIVES

The interdisciplinary landscape scenario systems illustrated are applicable at a range of scales, from small areas in which each individual farm is considered as a separate entity, to larger scales in which standard farm types are used.

Denmark has been at the forefront of collecting digital farm data in national databases and in the development of methods to combine these data with other data types (DALGAARD et al., 2002b). In recent years, similar data have become available in most EU countries, e.g. from national censuses, the EUROSTAT Farm Accountancy Data Network (FADN), landscape study site inventory campaigns like those initiated in the NitroEurope and the MEA-scope EU research projects, or in less detailed data available from national area support scheme databases (PETIT et al., 2008). Therefore it is interesting to explore the opportunities to develop methods to combine these data in scenarios for landscape development in Europe's various regions.

The ecological, economic, wildlife and visual functions of landscapes within a modern society are determined by processes that operate over a range of scales in space and time. Integrating the knowledge behind these processes into tools that can be used by people who have stewardship over the land, e.g. farmers and regulators, will require an interdisciplinary approach. Such an approach demands significant effort as it must work against the trend of specialisation and fragmentation of knowledge that has occurred over recent centuries. It also requires substantial

technical developments relating to data collation from disparate sources, data manipulation, data management and integration of information about multiple landscape functions (VEJRE et al., 2007). Therefore, working with scenarios and involving potential users at an early stage of development are important ways of focussing future research efforts and ensuring that relevant tools are developed.

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DEVELOPMENT CHALLENGES IN RURAL AREAS

Multi-level Processes of Integration and Disintegration
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PATTERNS OF RURAL DEVELOPMENT IN MOUNTAINOUS AREAS OF THE MEDITERRANEAN: BETWEEN INNOVATION AND TRADITION

ANGELA GUARINO[*]

ABSTRACT

The aim of this paper is to discuss how a small farm business located in a marginal area can re-adapt its marketing strategies and production in order to meet a specific segment of the market. The process is linked to a wider development process that involves different actors and is based on the mobilisation of local resources. Referring to the novelty concept, we argue that introducing novelties to agriculture can be understood as an active re-patterning of resource use based on local knowledge and available resources. This paper presents a case study of a cheese-making co-operative in the La Alpujarra region, located in southeast Spain.

Keywords: Less favoured areas, rural development, novelties, local food.

1 MARGINS IN MOVEMENT

Currently at the academic level there is no clearly and commonly accepted definition of what marginal agriculture is. Perhaps the most commonly accepted definition is one which is at the margin of economic viability. Agricultural marginalisation could be considered a process, driven by a combination of social, economic, political and environmental factors, by which certain areas of farmland cease to be viable under an existing land use and socio-economic structure. It may also consist of a combination of intensification and extensification of land used agriculturally. Marginalisation takes a variety of forms and occurs at different scales, ranging from the individual patch of land to sizeable regions (BROUWER et al., 1997). Most commonly at the European level, the concept of marginal agriculture is often linked with the concept of "Less Favoured Areas", a term coined by the European Union (EU) during the 1970s (EEC, 1975). Directive 75/268 was created to permit agriculture to be maintained in areas exposed to more difficult production conditions. Through this act, the EU recognised for the first time the importance of agriculture for disadvantaged rural areas; for the first time, the European Community (EC)

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decided to grant direct aid to farmers in order to compensate structural and natural disparities. Since 1975 the scheme has been revised many times. Nevertheless, the territorial concept of maintaining agricultural structures remains the core guideline.

As BROUWER et al., (1997) argue, the marginalisation of agriculture on the European farm level seems to be particularly visible in less fertile and arid zones of the Mediterranean. In these regions large areas of agricultural land are extensively farmed, are largely traditional in character and relatively well integrated with the natural environment. Livestock farming including beef, sheep and dairy are of major importance for the conservation of cultivated agricultural landscapes in these areas, as they preserve many areas of high natural value. The farms may also maintain the viability of extensive farming systems and subsequently prevent land abandonment.

The case study presented in this article refers to the highest part of the "La Alpujarra" region (Figure 1). The Spanish region of La Alpujarra is situated in the south-east of Andalusia and is classified as a "Less Favoured Area". La Alpujarra can be defined as a historical and geographical region. As there are no administrative borders, the territory is divided into the provinces of Granada and Almeria. Our case study is derived from the village of Vàlor, located in the province of Granada. The La Alpujarra granadina is a mountainous area in south-eastern Spain and a typical example of the transformation of the rural areas in the Mediterranean's north shore. La Alpujarra's landscape consists of a series of mountain valleys and gorges and possesses large altitude gradients (practically from sea level up to 3,500 meters at Sierra Nevada summits), and steep inclines, which are one of the traditional impediments to the development of its farming systems. Irrigation systems, of which many date back to the 15th century or earlier, are fed by streams and snowmelt from the Sierra Nevada summits and have permitted an intricate system of terraced agricultural land. The terrace system supports polycultures which include field crops, vegetables, tree crops and, at lower elevations, grapes and olives. This typical terrace cultivation, which is linked to the specific morphology of the region, has been the main limiting factor for agricultural modernisation and mechanisation, which rapidly transformed wide parts of Spanish rural areas more than fifty years ago. Farming activities have been gradually abandoned since the beginning of the rural exodus in the fifties. Demographic changes in the second half of this century have been quite dramatic for the region. Most of the Alpujarran villages recorded population peaks in 1950, followed by an exodus since then; populations have decreased around 50 % since 1950, with annual rates of nearly 4 % between the years 1960-1975.

Figure 1: La Alpujarra, village of Berchules and landscape from Vàlor village, 2008

Source: ANGELA GUARINO, 2008.

Migration flows have been directed towards other regions (Barcelona and Madrid) mainly to secure employment in industry or in the tourism sector of the coastal strip of the Costa del Sol (Málaga, south-eastern Spain). Labour migration was also directed to areas of high agricultural productivity, particularly the greenhouse horticulture along the Spanish Mediterranean coast. As in other European mountainous areas, migration has measurable environmental impacts. From these years, the so-called rural exodus led to a massive decrease of the rural labour force and social capital in the regions and its traditional production systems, along with a downfall of entrepreneurial spirit and associational networks. However, for the last twenty years revalorisation attempts of local production, as well as the promotion of rural tourism has been observed as a response to the crisis. This is the temporal context within which some associations and co-operatives were born and where we can observe the increasing presence of foreigners who decided to move to the area due to environmental remoteness and climate reasons.

2 GROUNDING DATA

Studies on the topic of rural development are characterised by the heterogeneity of the contributions in terms of multidisciplinary and methodology. This research refers to a qualitative methodology and reflects a background in rural sociology. It is part of a wider area of research on rural development in Less Favoured Areas that aims to highlight some theory insights gained from practice studies. Following this objective, we chose to follow the "Grounded Theory" research approach (GLASER and STRAUSS, 1967) using multiple sources of evidence which included informal talks, semi-structured interviews, and participant observation. The Grounded Theory can be described as a series of tools and flexible guidelines that provide the researcher useful insights to direct the study without rigid prescriptions. We collected the data in winter 2007 and spring 2008.

3 NOVELTIES TOWARDS THE GOVERNANCE OF THE MARKET

WISKERKE and VAN DER PLOEG (2004) describe novelties as follows: "Novelties are located on the borderline that separates the known from the unknown. A novelty is something new: A new practice, a new insight, an unexpected but interesting result. It is a promising result, practice or insight. At the same time, novelties are, as yet, not fully understood. They are deviations from the rule. They do not correspond with knowledge accumulated so far – they defy, as it were, conventional understanding. Novelties go beyond existing and explained regularities". Following this reasoning, novelties are something not completely new but contain some innovation that can be displayed in different form, they can concern the mode of production, the product itself or the way to re-organise and re-build production through a process of interiorisation, creating what NONAKA and TAKEUCHI (1995) call "contextual knowledge". These authors distinguish the "contextual knowledge" in four important processes of learning: Socialisation, externalisation, recombination and internalisation. Novelties then can symbolise the loci where external and internal elements recombine to create some innovation that can meet consumer demand. At this point, market governance plays a fundamental role. Indeed, marginal agriculture is often characterised by its economic marginalisation, which can also be understood as the inability to reach a market. Market governance is essential since it is related to the concept of increasing autonomy and power of small producers in order to reduce their vulnerability to external shocks.

Cheese making in La Alpujarra region: The case of Los Cortijuelos

As mentioned in the introduction, the squeeze of modernisation and production shifts marginalised a number of mountain livestock systems, particularly those based on rearing small ruminants. In spite of the crisis, we can observe some attempts to re-localise and revitalise local production in order to gain market shares and to maintain and develop local business.

This case study deals with the Central Lechera Alpujarreña (Alpujarran Milk Dairy Factory), a small co-operative located in the village of Válor. The co-operative began utilising EU funding in the late 1980s and collected local goat milk for cheese production. Through this activity, it opened up a new market for goat milk-based cheese, a regional product that had never before been commercialised. After decades of adjustments to ever-changing market requirements, the dairy today exports its cheese to Italy, Japan and Switzerland and is considering enlarging its cheese product range.

The eastern Alpujarra has enjoyed a long tradition of goat's milk production as a secondary product, as goats were principally reared for their meat and almost entirely bought by dealers or intermediaries, and the cheese was only locally consumed (SAYADI and CALATRAVA, 2006).

At the end of the 1980s, and mainly due to EU subsidies, the number of goats increased in the Alpujarra region. Under these circumstances, the problem of milk commercialisation was evident because there wasn't any demand for it. Observing this situation, a group of 4 friends, originary from Válor, a goatherder and three other people that had moved to Granada, decided to establish a small business to collect and commercialise the goat's milk of the region. In 1988 the Central Lechera Alpujarreña (CLA) was set up in Válor, a municipality formed by three small villages with a total of 2,431 inhabitants, with the mission to collect the milk in the area. During the first year the CLA just produced and collected the local goat milk and sold it to a large dairy in Granada (130 km away). The dairy processed the milk into a cheese called "La flor de la Alpujarra" (the Alpujarra's flower) by mixing the goat milk with cow's milk from other parts of the province.

Due to high transportation costs and low income, the CLA decided in the 1990s to process the goat milk at the co-operative directly and to benefit from the name and fame of the place. At this stage, various problems had to be faced: How to respond to market demand and how to manage the local milk production capabilities? In addition, they also had to tackle knowledge deficits on how to apply modern technologies on the production of handicraft cheese. One of the co-operative partners decided to travel to Murcia and to Barcelona to see how they make goat's cheese there. Once home, they started to experiment. Finally the production system was modernised without abandoning the handicraft system; they kept the handcraft production and restricted the use of machinery to the pasteurisation process. Attention was also paid to improve aesthetic appearance of the cheese and to the labelling in order to produce a cheese that meets not only the gastronomical taste of a number of specific consumers. In 1991, thanks to funding from the LEADER I programme, the production and sale of cheese began under the trademark "Los Cortijuelos" (The little farms) (Figure 2).

The market has initially responded well and they were able to produce and sell 100,000 kg in one year, albeit with certain problems of slowness in accessing the market due to accumulations of stock. This situation was also due to the ethics principle generated in the CLA's initial stage, i.e., they don't want to adversely affect the goatherds of the area, nor decrease the quantity of the milk purchased.

The co-operative started to search for new commercial channels, especially in the gourmet segment, through associate sales networks (e.g. quality wine, etc.). During this expansion phase, the CLA decided to approach large stores with a national-wide distribution network and primarily regional urban branches. Supported by the LEADER initiative, the co-operative was able to improve their product's presentation and labelling.

Figure 2: The entrance of the dairy farm in Valor and its products

Source: ANGELA GUARINO, 2008.

During this stage and due to the necessity of reducing stored stocks, cheese production has been slightly reduced. This trend was supported by a local reduction in goat milk production caused by a slow decline of goatherders. Finally, the CLA made important agreements with a national distribution platform through which they sell their products to the main large retailers and specialised gourmet food stores. One of them introduced the cheese in a premium product line called "Productos de nuestra Tierra", which brings together high quality gastronomic products with a guaranty on quality and origin (100 % made in Spain). Today, market problems have been solved successfully and the products are exported to Italy, Japan and Switzerland. The owners are even considering increasing their variety of products over the next few years.

4 CONCLUDING REMARKS

The case study shows how a small local business can reach market governance through innovation and adaptation. The examined company first created a market for goat's milk, then with a strategy based on territorial identity, created a market for a new local product. Another relevant aspect is the lack of young people interested in continuing the tradition of goat-herding, which is mainly motivated by the lack of social prestige related to the job in the agricultural sector. Due to the increasing regional identity that the area is experiencing, the prestige of being a goat herder is increasing nowadays (CALATRAVA and SAYADI, 2003). The existence of the CLA, in the absence of any other initiative, makes it possible to maintain traditional goat milk production in the area and supports the well-being of goatherding, which is not only an important economic factor in the area, but also fulfils other functions, e.g. contributing to the quality of the area's recreational offering, landscape conservation or a balanced development process.

The CLA's strategy has been successful; they are focusing on the production of high quality cheese by linking the product to its place of origin in order to meet

a demand segment that demands local products. Moreover, the maintenance of livestock in mountains contributes to the environmental balance, the preservation of natural grazing zones, and small surfaces dedicated to growing cereals or legumes, which are basic landscape components of the area.

The disappearance of goats in the area would not only affect many families in the region economically through shrinking incomes. Because of insufficient employment opportunities in the area, this could also imply negative social consequences, e.g. rural outmigration. Negative environmental effects have to be considered as well, e.g. the potential disturbance of the ecological equilibrium in the area. Finally, consolidating the brand Los Cortijuelos as a cheese made from goats coming from the Válor area inside the Alpujarra has influenced the way in which goatherders see themselves and how others look at them. The production of goat's milk cheese in this marginal area seems to be ensuring benefits in terms of sustainable land use and landscape conservation.

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AGRO ECOLOGY: HYPOTHESIS FOR SUSTAINABLE LOCAL DEVELOPMENT?

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ABSTRACT

The rational use of natural resources, together with the revaluation of traditional farming practices, presents an alternative development opportunity for rural areas and local economies. This case study refers to an example of organic meat production in three rural areas of Catalonia. Due to the continuing crisis of the traditional livestock sector, many farmers decided to shift from extensive production to organic farming production.

Keywords: Social capital, integrated specialties, sustainable development, governance.

1 INTRODUCTION

Until 1985, European agricultural policy was primarily based on the concept of food security according to agreements stipulated in 1950 following the Second World War. However, after 1985, due to various food scandals, agricultural policy shifted to food safety. Consumer concerns about the quality of food production drove the implementation of selective support and intervention. In a global context, where food and climate change are primary points on the many countries' agenda, the question of how to improve linkages between agriculture and nature conservation is becoming essential.

Behind this background, the division of rural areas and the use of agricultural land have been supported by the further differentiation of mass production- and integrated specialty systems. This division becomes obvious, for example, when examining the contrast between competition for quality and price: Both organisational systems require different success factors and different territorial spaces. For mass production systems, land is one determining factor, whereas integrated specialties use the land just as a means and the local community is a focal point (BECCATINI and OMODEI ZORINI, 2004).

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Along with the food standardisation process and rising consumer demands for improved food safety, new dynamics were linked to the discussions of biodiversity and nature protection. This new "need" represented an important advantage for small agricultural producers by creating new markets, public policies, satisfying a demand towards sustainability and consolidating national and regional identities.

Local actors contribute to the creation of social and economical networks that are an important characteristic of a region. The modes of interaction between different actors may support or limit further regional development. Co-operatives and associations can steer dynamics that support the creation of new economic processes. Commonly shared values and personal interests can help to cope with external market pressures. The change in the economic system has brought a radical transformation of production concepts, in particular for those small farmers that are affected by competition on the global market. In this context, public administration has an important role to promote bargaining processes and to promote participation through representation and social cohesion tools (MOYANO, 2005).

However, co-operation between different actors is characterised by complex social dynamics. Factors that determine the choice to co-operate depend directly on peoples' perceptions of the expected potential benefits. If a social actor believes the benefit will not compensate the material and personal inputs, she/he very likely might not further consider co-operating. Nevertheless, the actor will not remain outside of the process if they realise that other actors are sharing profits and opportunities (ELSTER, 2007).

The answer for small producers stems from the shared and rational use of local resources. Environmental crisis and climate change are providing new opportunities to develop and increase the social and political awareness of organic production, which represents one option towards sustainable local development. Organic agriculture and farming is a social movement that was born in the second half of the 20th century as a response to unsustainable productivity logics and to the alimentary-health and socio-environmental crisis generated by intensive farming system and the use of pesticides.

2 ORGANIC AGRICULTURE AND FARMING IN CATALONIA

From the 1970s, organic agriculture and farming started in Spain through independent co-operatives that based their activities on very strict criteria. Organic farming production particularly experienced a dramatic increase of 2,567 % between 1999 and 2002. Producers are, on average, small and medium sized farms trying to respond to external market problems by jointly selling their products, as well as creating associations that are able to protect and support small producers and guarantee a certain level of income for their members.

The demand for ecological products was intensified due to several scandals in the conventional production sector, as well as animal diseases (e.g. dioxin chickens, mad cow disease, avian influenza, etc.) which decreased consumer confidence towards certain food categories. Even after theses scandals, the demand for ecological products has maintained its intensity. This might indicate that the sector is currently in full development, and that some consumers are willing to spend more of their income on quality ecological products.

In 1989 the CRAE (Council of Organic Farming) was set up, which applied the Protected Designation of Origin (PDO) model to the organic agricultural certification system. In 1994 the decentralisation process involved the agriculture and farming sector, and tasks and responsibilities for control and certification were passed on to the autonomous regions. CRAE was progressively phasing out and making place for regional organisations. In this context, Catalonia founded the CCPAE (Organic Farming Catalan Council), which began to perform its duties in 2001.

The CCPAE is a public and private organisation, that is, it functions as a private enterprise with regards to the management of human resources and its budget, which is derived from annual membership fees. It has a public organisation character by law, as it is directly associated to the farming department. CCPAE represents a permanent consultation forum between public, private and trade unions conducted through its board, which is a maximum decision-making body composed of democratically elected members. The CCPAE's assigned tasks are twofold:

- Control and certification of organic production according to EU and Catalonian legislation;
- Promote the knowledge and application of the organic production system and its products.

The central point for CCPAE's good organisational performance is the fact that CCPAE combines the efficiency of a private organisation, independent from public subventions, and a public control system that guarantees service quality to all members without differential based on their contribution or their income. The total area under organic farming in Catalonia is 39,697 hectares. Compared to other Spanish regions, Catalonia occupies third place in organic farming production after the Extremadura and Andalusia regions. The case study concentrates on three organic production farming counties: Pallars Jussà, Pallars Subirà, and Alta Ribagorça which are comprised of 9,985.8 hectares, 13,769.6 hectars and 5,393.6 hectars, respectively, and together represent 70 % of the total organic production in Catalonia.

3 THE CASE STUDY: ECOLÓGICA DE LOS PIRINEOS

3.1 Framework and conditions

The case study chosen for this analysis is Ecológica de los Pirineos, a company based in Pobla de Segur, a small town in the county of Pallars Jussà that has 3000 habitants. The company sells organic meat (veal/beef, pork, lamb) from the joint production of 150 farmers located in the three counties of Pallars Jussà, Pallars Sobirà and Alta Ribagorça. The production consists of 7,000 head of cattle and 5,000 ovine, which together create the basis for developing local organic farming production.

Production difficulties, insufficient off-farm employment opportunities and infrastructure describe some drivers of rural migration. For the remaining residents, this entails the impoverishment of the area from a structural and services point of view. After the year 2000, public support for investing in organic livestock was heavily encouraged, largely motivated by the recently experienced mad cow disease and introduced as one solution for a severely penalised product and sector. Organic farming served as an "umbrella" that offered an alternative quality product and a certain amount of safety in its production.

The choice of examining Ecológica de los Pirineos as a case study is based on the identified similarities between the characteristics of Ecológica de los Pirineos and the criteria established before the investigation's start. Ecológica de los Pirineos represents, according to an initial analysis, a case study that responds in parts to the criteria of sustainability, local production, innovation, co-operation between producers, and multi-level relations between various actors. During this initial analysis phase, many identified companies could not serve as a potential case study for several reasons: Some companies didn't finalise the product locally, thus the production process halted at the local level during the first phase. They limited themselves to production, but didn't include, for example, the packaging process. Other companies or co-operatives imported a great deal of the products from other countries, which does not correspond to the idea of local production. In other cases, co-operation between different actors wasn't a determining factor; in some examples the co-operatives were too new to build a case study.

This investigation is the first step of a PhD research project that aims to analyse cases of sustainable local development linked to farming and agricultural organic production. Data of this specific case study was collected during 2008, through qualitative methods and explorative interviews.

3.2 Ecológica de los Pirineos

When some Pyrenean farmers converted land from conventional farming to organic farming, they were unable to market their meat as "organic" because of the lack of

infrastructure at the local level. Of the 150 total farmers, two young farmers funded an ecological meat cutting room: Ecológica de los Pirineos. Through technological innovations in infrastructure and production, producers and local administrations have progressively created conditions to sell the meat on the "organic" market. Local government provided the farmers with a local organic slaughterhouse certified by the CCPAE, and the farmers introduced the "fattening" process to their farming practice. Initially, farmers commercialised the meat as being from dairy cows, that is, they slaughtered the animals at the end of their lactation period, between 6 and 8 months, meaning the "fattening process" hadn't been carried out in their livestock. These progressive innovations in farming production provided a direct product of local origin.

The producers want to continue their work in a sustainable way that preserves the territory on the one hand, and gives profitability to their land and livestock on the other. The joint production between farmers shows the potential of these areas regarding local embeddedness and social networks, and highlights new governance challenges at various levels.

The unique stamp of Carne Roia (the organic meat brand produced by Ecológica de los Pirineos) is the only way for organic meat to access the market. Thus, producers are in a sense "forced" to co-operate. According to historical facts, the communal pastures and seasonal migration of livestock in the Pyrenees have over the years developed a propensity that could support the current "embryo" of co-operation.

The aim of Ecológica de los Pirineos and its Carne Roia seal was to occupy an untouched market niche in which they could compete with a product which is to some degree independent from the pressures and instability of the conventional meat market. Moreover, Ecológica de los Pirineos shows different elements that could characterise the sustainability of its production:

- The ecological cycle is presented from a certain "closed" (IACOPONI, 2001) point of view, as the production is tied exclusively to local processes.
- The livestock moves through seasonally, from the mountains in the summer to the farms in the winter (where forage is stored during the summer), thereby favouring the maintenance and recovery of environmental biodiversity.
- The animals are slaughtered in the communal slaughterhouse, which reduces long transport for the animals themselves and also reduces carbon emissions.
- The final production stage of quartering and packaging is always done at the local level.
- Because of the product type, a long conservation period is not allowed in order to guarantee quality. This implies that transport to distributors is very short and mainly has local characteristics.

Ecológica de los Pirineos maintains the tradition of local production, developing an industry that has always been a key element in the territorial economy of the three counties, namely livestock. Livestock has deep historical roots among the local population, and represents a set of values that mark and typify the territory. The profound changes in global and local economies have forced many farmers to change to part-time farming. Social changes also bring the livestock sector into a position of profound crisis and the sector is regarded, especially by younger generations, as a very work-intensive sector generating comparably small benefits and income opportunities in return.

In this case study, the typical characteristics of local production are combined with the maintenance of some typical local production processes and their association with elements of innovation. These latter elements allow the revitalisation of the livestock market, e.g. when it comes to creating the quartering room or updating the communal slaughterhouse. Thus, they represent two essential factors that have enabled the development of the initiative and provided a local response to a local industry, creating coordination between private and public demands. Ecológica de los Pirineos inserted in its production process the method of fattening, and producers are beginning to develop an element in their production that allows subsequent output and opens the possibility of supplying product to the consumer.

The presence of a quality seal supports the local production identity and provides consumers and regional producers the possibility to associate meat production with a territory. The topic of co-operation continues to provide an important element of the investigation, and from a public policy perspective needs further evaluation. The relationship among the case study producers and their motivation to co-operate represents a starting point to study the network dynamics more in depth. It can already be assumed that the farmers are primarily driven by their personal needs and by a lack of alternatives.

4 CONCLUDING REMARKS

Although European policies push and encourage – through the pillar of rural development – organic production as a revaluation of quality production in the EU, the lack of meso-level policies is a problem that the people interviewed stressed on various occasions. The lack of promotional policies for the ecological market is a topic for further investigation. The will expressed in policy making or rural development projects doesn't seem to achieve full implementation and sticks to the political level rather than reaching the local level, thereby illustrating that bottom-up processes tend to stop and do not further develop. Therefore, possible lines of development would be, on one side, the will and supportive institutional action, unconditioned by production, to enhance not only the weakest part of the production sector per se, but also support for all the intermediate processes up to the sale in order to develop a market and an economy that takes its strength from

its local nature. Also, it is necessary to foster co-operation among producers and between the different production sectors that aim to achieve the final sale of a product that is produced entirely locally.

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THE FARMERS' EARLY RETIREMENT SCHEME AS AN INSTRUMENT OF STRUCTURAL CHANGES IN THE RURAL AREAS AFTER POLAND'S ACCESSION TO THE EU

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ABSTRACT

The farmers' early retirement scheme was introduced in Poland in 2002, but only since EU accession has its significance been recognised. The paper analyses the evolution of the farmers' early retirement scheme in Poland and assesses its operation between 2002 and 2007. This policy measurement is an important component of the Polish Rural Development Programme (RDP), which runs from 2007-2013. Simultaneously, the early retirement scheme provides the possibility of assessing structural changes in rural areas. The paper's research findings are based on field surveys that were conducted regularly by the Institute of Agricultural and Food Economics-National Research Institute (IAFE-NRI) on a sample consisting of 3,705 farming families, data from the Agency for Restructuring and Modernization of Agriculture (ARMA), the Agriculture Social Insurance Fund (ASIF) and legal documents.

Keywords: Early retirement, structural changes, rural areas, Poland.

1 INTRODUCTION

A significant characteristic of developed countries economies is an advanced disagrarisation process (TOMCZAK, 2006). Among all OECD member states, Poland has one of the highest shares of total working population employed in agriculture (OECD, 2008). This excess employment is directly connected with scattered agrarian structure (KARWAT-WOŹNIAK et al., 2006). Small farms constitute a place of employment and living for a significant part of the population in rural areas (DZUN et al., 2008). Most of these farms are economically weak, unable to reproduce independently and not competitive on the market. In such cases the holding's property has non-productive functions and is perceived as a dwelling, capital investment or a means of self-supplying food. Units with no development potential own a

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significant portion of Poland's agricultural land (over 2 million ha) not used for production (SIKORSKA, 2008). In order to increase the competitiveness of the Polish agricultural sector and accelerate structural changes in rural areas, mechanisms are being created that will enable farmers to withdraw from agriculture and concentrate production resources (PASZKOWSKI, 2006). In this paper structural change is understood as the modification of labour resources (improvement of the quality of the human factor) and capital (concentration of agricultural land).

2 MATERIAL STUDIED

The paper focuses on the evolution of the farmers' early retirement scheme (in the following text, the expressions "early retirement" and "structural pension" are used interchangeably) in Poland between 2002-2007 and spatial differences regarding participation in the program based on data from the Agency for Restructuring and Modernization of Agriculture (ARMA), Agriculture Social Insurance Fund (ASIF) and legal documents regulating the early retirement scheme. The second source of the analysed data were surveys of families residing in 76 villages across Poland. These were conducted by the Institute of Agricultural and Food Economics-National Research Institute (IAFE-NRI) in 2005. The sampling of villages for the surveys was selectively representative, based on socio-economic features of the population and the land structure of particular regions. The survey covered 3,705 farming families living on private farms with an area of more than 1 ha of agricultural land. A number of questions concerning the functioning of agricultural holdings included living conditions in rural areas, and the education, demographic characteristics and economic activity of the rural population (SIKORSKA et al., 2007).

3 RESULTS AND DISCUSSION

Poland is in the group of EU Member States in which a social insurance system was established which aimed exclusively at the agricultural sector (KLIMKOWSKI, 2006). Since its inception, the possibility has existed for farmers to retire earlier (TRAWIŃSKI et al., 1999). The objectives of this entitlement were primarily driven by social concerns (TRAWIŃSKI, 2001), rather than supporting structural changes in agriculture and rural areas. Therefore, an additional mechanism of withdrawal from the labour market for farmers, i.e., early retirement, was introduced. Early retirement schemes began operating before Polish agriculture was included in the CAP (Common Agricultural Policy). The scheme's structure was based on EU solutions, as well as on the experience of European countries (e.g. Greece, Ireland, Portugal, Spain) in which it has a positive influence on farms (see Baltas 1997). The main task of this regulation was to improve the agrarian structure of agricultural holdings and to adjust Polish legislation to EU standards. It was planned that within a new, separate system, early retirement would cover 8,000 farmers

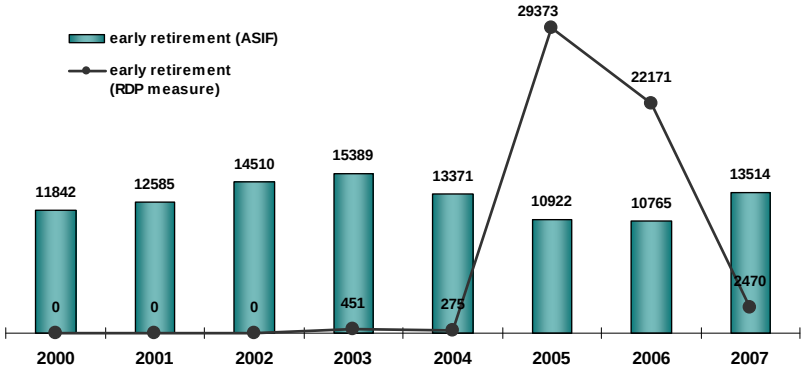
per year and the payments would amount up to PLN 36.4 million per year (approximately EUR 9.2 million at 2003 prices). Taking into account the expenses and the assumed range of operation, the objective stipulated by the legislation – improving the agrarian structure of farms – was not possible to achieve. For five years the system operated in this manner and over 700 retirement benefits were granted, an average of 514 per year. It is estimated that 0.03 % of all farmers benefitted from the system, and the same figure of farms with (at least) 3 ha was transferred to younger farmers who thus created farms with at least 15 ha (HALAMSKA, 2006). As a result, the group of farmers who benefited – those leaving agriculture and young farmers extending their holdings – constituted a mere 9 % of the estimated number of beneficiaries. The abovementioned data show that the impact of the early retirement scheme (from 2002-2003) was not as significant as initially expected.

Along with the Polish EU integration and CAP involvement, the early retirement scheme underwent significant modifications. Although the new solutions were based on the same Council Regulation (EC), the changes covered all the areas of the discussed instrument's functioning, from the conditions of eligibility, the amount support and rules for making payments, to procedures, to the source of financing. Above all, the act which regulated the early retirement scheme was changed. Also, a new regulation was issued regulating the functioning of the scheme in detail, and the mechanism was included in the national Polish Rural Development Programme 2004-2006, financed mainly by EU funds under the second pillar of the CAP. Thus, early retirement had more funds than previously – EUR 534.88 million (which constituted 15 % of the total RDP budget). Responsibility for accepting and examining applications, as well as for issuing decisions and making benefit payments was taken from ASIF and transferred to ARMA.

The liberalisation of conditions for early retirement and improving the system's functioning from the very beginning were reflected in this measure's popularity among farmers and its increased availability (PASZKOWSKI, 2004). The majority of potential beneficiaries were well-informed of the programme's existence and its mechanisms (FEDYSZAK-RADZIEJOWSKA, 2006).

During the application period, ARMA received over 56,000 applications for early retirement (Figure 1). The vast majority was reviewed positively (96 %), meaning that the applications were well-prepared and submitted by persons eligible for support (PIĘTA, 2006). The number of agreements concluded with beneficiaries exceeded 54,000. This means that 54,000, i.e., 3 % of the total number of farms operating in Poland changed ownership. More than a half of transferred farms (53 %) increased the size of other units, and 47 % of the land was given to successors. The total transferred area covered 536,000 ha of agricultural land, which constituted 4 % of the total area of agricultural land owned by individual farms in Poland.

Figure 1: The number of decisions granting a given type of early retirement



Source: Author's calculations based on data provided by the ASIF and ARMA.

The greatest amount of land was transferred for the increase in area of other farms – 294,000 ha of agricultural land (55 % of the total transferred area) and for successors – 242,000 ha of agricultural land (45 % of the total transferred area). Less than 1 % of agricultural land was transferred for other programme objectives, i.e., protection of the environment, afforestation and for the benefit of the State. The total payments of this scheme amounted to PLN 2,084 million, which constituted 100 % of the funds reserved for this measure's implementation from 2004-2006.

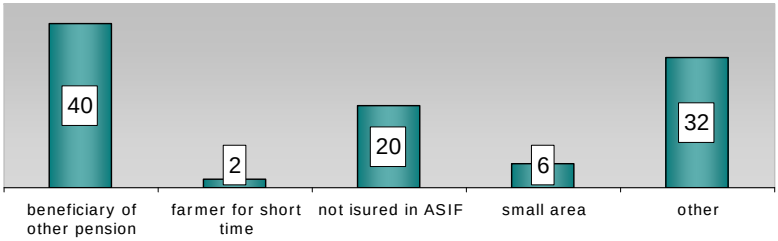
The research results by IAFE-NRI indicate that a significant number of farm owners did not meet the programme's requirements or did not desire to benefit from the scheme. However, among the farmers aged 55-64 (which constitutes 8 % of the total research sample), 54 % were granted early retirement or at least intended to apply in the near future (Figure 2).

The most common reason given for not participating in the programme was the entitlement to other pension benefits (40 %) under the agricultural or non-agricultural insurance system – mainly disability pensions, as well as early retirement benefits, which are relatively available in Poland.

Over 20 % of farmers from the group containing both those not interested and ineligible persons could not benefit from the scheme because they were not insured in ASIF. The exclusion of farmers from the programme is considered unjustified because this restriction does not consider off-farm activities to be a distinctive feature of the Polish agricultural. This group seems to be more adequately covered by structural policy instruments, as they usually own farms with no development perspectives (PASZKOWSKI, 2004). The research by IAFE-NRI indicates that almost half of surveyed farmers aged 55-64 who were insured in non-agricultural systems and thus ineligible for early retirement, were not active in agricultural production. If

these farmers ceased production, it would affect neither national production nor the incomes of families living on these farms. A lack of interest in early retirement in 2004-2006 also resulted from other factors. Presumably, the benefits were not attractive financially for a major share of farmers. According to the research results by IAFE-NRI, this could apply to almost one out of seven farmers of entitlement age who manage relatively well-equipped, comparably large sized (14 ha) farms.

Figure 2: Reasons for farmers' lack of interest in early retirement (%)



Source: Survey by IAFE-NRI, 2005.

The extent of participation in the early retirement programme depends on numerous factors connected with the socio-economic character of the individual regions. In this context the following characteristics are enumerated as most significant: Population density, demographic situation, the tradition of land trade, urbanisation level and the level of agriculture development (BIKA, 2007). The data analysis conducted by ARMA indicates that from 2004-2006, willingness to benefit from the programme was spatially diversified. The south-western and north-eastern regions showed the highest utilisation of early retirement benefits, while the southern and south-eastern parts of the country showed comparably low utilisation. In the south-west and north-east of Poland, the highest number of farm owners met the criteria for programme participation with regard to their age and insurance type. Additionally, these regions are confronted with massive structural changes in the agricultural sector. This is particularly related to the polarisation processes of agricultural holdings (SIKORSKA, 2006). Therefore, the assumption can be confirmed that better conditions exist for structural change in agriculture in regions with a relatively more polarised agrarian structure and thus greater interest in early retirement by farmer-owned small agriculture holdings (PASZKOWSKI, 2004). On the other hand, in southern and south-eastern Poland, early retirement was relatively less popular because these regions are characterised by a relatively high amount of farmers involved in off-farm activities who are also not insured in ASIF.

When evaluating the operation of the early retirement scheme from 2004-2006, it should be stressed that the programme covered over seventy times more farmers than the previous programme (2002-2003). In a relatively short amount of time, the process of transferring farms to other farmers and successors intensified. The

significant increase in the interest in early retirement was accompanied by a decrease in popularity of early retirement benefits (Figure 1). This means that after 2004, farmers who wanted to use the opportunity to discontinue agricultural activities more often decided to benefit from early retirement schemes other than that from ASIF. The reason was easier access to early retirement benefits and the difference in the amount of the two programme's benefits, of which the former was higher. In such cases, early retirement more often had social rather than structural functions. Nationwide, the estimated share of beneficiaries from the number of eligible persons amounted to 32 %. This means that almost one out of three eligible farmers benefited from early retirement and withdrew from farming. However, in almost half of the cases the beneficiaries decided to transfer farms to their successors, i.e., most often family members. In such cases, the discussed instrument contributed to rejuvenating the farming population and sometimes it could, in the long-term perspective, improve the production results of farms. In many cases the income situation of farming families also improved. However, an immediate effect, i.e., the improvement of the area's structure did not take place (ROWIŃSKI, 2008). Moreover, in many cases the transfer of farms to a successor entailed only ownership rights and not managerial functions, which were still held by the farmer receiving benefits (MICHNA, 2007). Land concentration occurred when land was transferred for the extension of other farms. In 2004-2006, such a situation applied to slightly more than half of the farms and agricultural lands covered by the programme.

4 CONCLUSION

Assessing the implementation of the early retirement system's objectives is not very straightforward. The number of farmers who benefited from this instrument from 2002-2007, particularly after Poland's accession to the EU, is significant. Covering such a large group with the programme was possible only due to the support of EU funds, improvements to administrative procedures and relaxing eligibility criteria. Setting aside the first three years of its functioning, the early retirement system was a tool for stimulating farm succession and improving the beneficiaries' income situation (PASZKOWSKI, 2007). It seems that policies for agriculture and rural areas should contribute to increased land concentration of the scattered agrarian structure. The demographics of the Polish farmers indicate that they are relatively young, and persons willing to exit farming may derive income from early retirement benefits under agricultural social insurance. Hence, the implementation of demographic and social objectives should follow. The utilisation of early retirement benefits differed among the individual regions, which might confirm that there are differences in the development of agriculture and rural areas throughout Poland. This fact was taken into consideration in the new edition of the programme for 2007-2013.

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FOOD MARKETS AND AGRICULTURAL MARKETING

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G/LOCAL BRAND CHALLENGES IN THE AUSTRIAN AGRICULTURAL FOOD MARKET

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ABSTRACT

This paper presents findings of a study that identified factors influencing Austrian consumer preferences in purchasing local food brands. Many empirical studies have analysed various factors that may influence brand preference among consumers, but little or no empirical research has been directed towards identifying and testing the major factors in Austria. The quantitative research findings conducted among 318 participants revealed that Austrian respondents have an overall preference for local brands, with special affinity for local food products.

Keywords: Local branding, brand preferences, Austrian consumer market.

1 INTRODUCTION

One key question a company faces when it crosses borders with its existing brands or when it introduces new brands into a new market is whether it should follow a standardised brand strategy with global brands or a localised brand strategy with local brands (CZINKOTA and RONKAINEN, 2007; SCHIFFMAN and KANUK, 2004). Without a well-conceived strategy, the company faces competitive disadvantages stemming from inconsistencies in brand identity across national markets and the inability to maximise the value of brands across national boundaries (ALASHBAN et. al., 2002; BATRA et. al., 2000; BALABANIS and DIAMANTOPOULOS, 2004). Particularly in the Austrian food business, where the concentration of the Austrian retail trade is the highest within Europe, producers may ponder whether they should enter the Austrian market with an identical product or whether they should make modifications to account for local differences. As consumer demand rises, there is a greater challenge for local products to meet the rather exacting requirements. Perceptions of higher quality, prestige, and social responsibility are key factors to enhanced consumer value for local or global brands. These consumer perceptions depend on the category of product assessed. Therefore, the current paper presents findings of a

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survey study that identified three product category factors (product durability, technology, and culture-sensitiveness) and three brand characteristic factors (quality, prestige, and social responsibility) that influence Austrian consumer preferences in purchasing global and local brands. In the next section the relevant literature is outlined and the hypotheses are developed. The research methodology is then introduced and the results are discussed. Finally, conclusions are drawn and practical implications for European agricultural food markets are provided.

2 THEORETICAL BACKGROUND

Among consumer goods it is important to distinguish between different categories of products, i.e., durable goods from non-durable goods, high-technology from low-technology, and culture-bound from non-culture-bound products. Furthermore, characteristics of a brand (i.e., quality, prestige, social responsibility) relate to local or global brand preferences. In the following paragraphs, the impact of product category and product characteristic factors on local and global brand preference are discussed and hypotheses are presented.

2.1 Product durability

Durable consumer goods lend themselves more to standardisation than non-durable consumer goods, which tend to reflect local tastes unique to each country (RAMARAPU et. al., 1999). In non-durable product categories, consumer preferences vary from country to country. This is especially true for consumer packaged goods, where preferences are still localised. But within durable product categories, such as consumer electronics, consumers tend to prefer the global brand over the local brand.

Hypothesis 1: Durable products are positively related to consumer preferences for global brands.

2.2 Technology

High-tech products have a short technological life and are more conducive to standardisation. PETERSON, ALBAUM and BELTRAMINI (1985) provide evidence that high-technology products are the most appropriate for global strategies, whereas confectionary, food, and household cleaners are considered less appropriate. Low-tech products are generally more stable, exhibit slower technological change, and face higher competition. This leads to greater concentration on product and brand differentiation (RAMARAPU et. al., 1999).

Hypothesis 2: High-technology products are positively related to consumer preferences for global brands.

2.3 Culture sensitiveness

Consumers tend to invest more meaning in products that are culturally sensitive (USUNIER, 2000). Thus, high culture-bound products are difficult to market globally, especially products that relate to old consumption patterns in a society. The role of culture strongly influences consumers' attitudes towards non-durable products like food, drinks, pharmaceuticals, and cosmetics. Furthermore, products that are consumed at home, such as milk, are more culture-bound than products used outside the home (RAMARAPU et. al., 1999).

Hypothesis 3: Low-culture-bound products are positively related to consumer preferences for global brands.

2.4 Perceived quality

Consumers often judge the quality of a brand based on a variety of informational cues associated with the product (SCHIFFMAN and KANUK, 2004). Literature on global brands has provided some indications that a global brand name can contribute to perceptions of higher quality (LAGACE, 2003, p. 1). The worldwide availability of global brands and the fact that consumers in other countries also purchase and accept them is a strong quality signal for consumers. Results by STEENKAMP et al., (2003) and HOLT et al., (2004a, 2004b) strengthen the assertion that perceived brand globalness (PBG) is positively associated with quality, and therefore an important factor to consider. KAPFERER and SCHUILING (2003) tested whether local brands benefit from a significantly higher quality image than international brands. Perceived brand quality for local brands can result from the strength of relationship which is built up with consumers over years. However, results indicated that local brands did not benefit from a significantly better quality image. Hence, empirical evidence indicated that global brands seem to have a better quality image than local brands.

Hypothesis 4: Perceived brand globalness is positively related to consumer perceptions of brand quality.

2.5 Perceived prestige

Authors have suggested that consumers may prefer global brands because of associations of higher prestige (SCHUILING and KAPFERER, 2004; SHOCKER, SRIVASTAVA and RUECKERT, 1994; STEENKAMP et. al., 2003). Global brands may be held in higher prestige than local brands due to their relative scarcity and higher price. Furthermore, global brands may also stand for cosmopolitanism. Some consumers prefer global brands because they enhance their self-image as being cosmopolitan, sophisticated, and modern. Conversely, according to GER (1999), local brands tend to be targeted and positioned based on a deep cultural understanding, and therefore create "a sustainable, unique value and offer the symbolism

of authenticity and prestige." Still, consumers have been found to have no intrinsic preference for local brands (DE MOOIJ, 1998).

Hypothesis 5: Perceived brand globalness is positively associated with the brand's perceived prestige.

2.6 Social responsibility

Global brands have often sparked anti-globalisation protest because they have become visible symbols of the negative effects of globalisation, such as pollution, cultural imperialism, and exploitative wages. Today, global brands are seen as "powerful institutions – capable of doing great good and causing considerable harm" (HOLT et. al., 2004b). Consumers are aware that global companies exert considerable influence, both positive and negative, on a society's well-being. They expect global players to act socially responsible, i.e., to act "as stewards of public health, worker's rights, and the environment" (HOLT et. al., 2004a). Since multinationals have not always behaved ethically in the past, some consumers might refuse to buy global brands. Conversely, consumers do not expect local companies to behave ethically correct.

Hypothesis 6: Perceived brand globalness is negatively related to consumer perceptions of the social responsibility of the company behind the brand.

3 METHODOLOGY

A descriptive survey was implemented in order to test the study's hypotheses. Four nearly identifical questionnaire versions were developed: Two versions for adults and two versions for teenagers. On each questionnaire version, respondents were asked to evaluate two out of four product categories in order to avoid response fatigue. Regarding the measures for product categories, respondents of questionnaire version one evaluated two brands of cheese, Schärdinger (local brand) and Philadelphia (global brand), and two refrigerator brands, Elektra Bregenz (local brand) and Siemens (global brand). Respondents from questionnaire version two evaluated Vöslauer (local brand) and Evian (global brand), two mineral water brands, and two functional sportswear brands, Löffler (local brand) and Nike (global brand). A total of 372 questionnaires were collected from parents and pupils of a high school in Graz, Austria. The number of usable questionnaires was 318, for a response rate of 85 %.

4 RESULTS

Hypotheses 1, 2 and 3 suggested that durable, high-tech and low culture-bound products (refrigerators and functional sportswear) are positively related to consumer preferences for global brands. Therefore, these three hypotheses are discussed

together. The hypotheses were initially examined by using the mode as a measure of central tendency, which is an appropriate measure of central tendency for nominal variables (e.g. COLADARCI et al., 2004). The nominal scale for measuring the preference for either the local brand or the global brand among the 10 brand pairs that were rated had the value of 1 (preference for the local brand) or 2 (preference for the global brand). The mode for both durable, high-technology and low-culture-bound products (i.e., refrigerators and sportswear) was 2, thus indicating a preference for global brands. This finding can be further supported by the frequency distribution for each product category, which indicated that, in the case of refrigerators, 83.3 % of respondents preferred Siemens over Elektra Bregenz, while in the case of sportswear, 88.7 % of respondents preferred Nike over Löffler. In addition, a cross--tabulation with the general brand preference rating for refrigerators against the general global brand preference rating for sportswear was computed. Since both ratings concern durable goods (durable, high-tech, low culture-bound end of the continuum), they are expected to be associated (i.e., a joint frequency distribution table should show a greater number of people preferring Nike and also Siemens, which are both global brands). The results showed that the global brand was preferred over the local brand in both product categories. Also, the majority of respondents (240 people, or approximately 75 % of the sample) preferred both global brands (Nike and Siemens). Furthermore, the Chi-square was found to be significant at 0.018, thus indicating that respondents who preferred global brand 1 also tended to prefer global brand 2. The strength of association was found to be small, as indicated by the Phi coefficient of 0.133.

Additionally, the authors tested whether nondurable goods showed weak global brand preference ratings (or higher local brand preference). For this, the mode for the two product categories on the non-durable, low-technology and high culture-bound end of the continuum (cheese and mineral water) was again investigated. In this case, the mode showed that respondents preferred the global cheese brand Philadelphia (mode=2) and the local mineral water brand Vöslauer (mode = 1). Nonetheless, the frequency distribution for each product category indicated only a small preference for Philadelphia (50.9 % of respondents, versus 49.1 who preferred the local brand Schärdinger), while the local brand preference for mineral water was very strong (91.5 % of respondents preferred Vöslauer over Evian). Similarly, a cross-tabulation between global/local brand preference rating for cheese and a global/local brand preference rating for mineral water was used. Since cheese and mineral water are both at the non-durable, low-technology, and high culture-bound products end of the continuum, the ratings of brand preference should also be associated (i.e., a joint frequency distribution table should show a greater number of people prefer Vöslauer and also Schärdinger, which are both local brands). In the product category mineral water, the local brand was clearly preferred over the global brand (291 versus 27 respondents), while in the product category cheese, the local brand was slightly less preferred (156 versus 162 respondents). But it can

also be seen that almost half of the respondents (147, or 46 %) preferred both local brands (while only 18 people, or 5.6 % of respondents, preferred both global brands).The Chi-square test was close, but not significant (0.088) and therefore the strength of association should not be analysed. Ratings for a local brand preference of mineral water and cheese did not always go together, but nonetheless, there is a slight tendency towards local brand preference for non-durable, low-technology and high culture-bound products. In conclusion, hypotheses 1 through 3 were supported.

Results from Hypotheses 4, 5 and 6 were tested in a series of three separate, paired-sample t-tests. All findings are presented in Table 1. To test hypothesis 4, a paired-sample t-test was used to analyse whether brand globalness/localness was positively related to consumer perceptions of brand quality. To investigate this, respondents' answer to each brand pair comparison was assessed (i.e., local versus global brand of refrigerators, local versus global brand of cheese, etc.) and then the mean differences were calculated. As can be seen in the first t-test table, the lower means for all respondents are highlighted (indicating higher brand quality ratings), as are the significant t-tests. Interestingly, the results showed that for durable goods (refrigerators, sportswear), perceived brand globalness was positively related to consumer perceptions of brand quality as expected in hypothesis 4. Nonetheless, when non-durable goods were evaluated, it can also be seen that the lower means (or higher quality ratings) were from the local brands (even though only one of these two t-tests was found to be significant, i.e., for mineral water). Therefore, we can conclude that hypothesis 4 was partially supported, i.e., global brands are perceived as having higher quality in the case of durable goods. In the case of non-durable goods though, i.e., food and soft drinks, local brands tended to be better evaluated from a quality standpoint compared to global brands.

Regarding hypothesis 5, the relationship between global/local brand preference and consumer perceptions of brand prestige was examined. The results are shown in the second paired-sample t-test in Table 1. As can be seen for durable goods, the lower means (or higher brand prestige ratings) were from the global brands. The t-tests were significant for both refrigerators and sportswear, thus confirming the expectation that global brands should have higher prestige ratings. However, for non-durable goods (cheese and mineral water), the two local brands had higher prestige ratings even though only one of the pair comparisons was statistically significant. Therefore, it is possible to conclude that the hypothesis was partially supported, i.e., in the case of durable goods. Similar to hypothesis 4, there was also evidence indicating that for food and soft drinks, local brands tended to be evaluated more positively in terms of prestige, as compared to global brands.

Finally, concerning hypothesis 6, the negative relationship between global brands and social responsibility was supported in 3 out of the 4 pair comparisons (see the last t-test from Table 1). For cheese, mineral water and sportswear, the local brands were rated significantly better in terms of social responsibility compared

to the global brands. The one exception was the pair comparison of refrigerators, since the mean ratings of social responsibility were the same for both the local and global brands. Therefore, there is sufficient evidence to conclude that local brands of food and soft drinks tended to be evaluated more positively, in terms of social responsibility, as compared to global brands.

Table 1: Paired sample t-tests for global/local consumer preference regarding brand quality, prestige and social responsibility

	Brand social responsibility (S.r.) rating	Mean	Mean differrence	t	Sig. (2-tailed)
Pair: Cheese	S.r. rating Schärdinger	1.62	-.391	-5.768	.000
	S.r. rating Philadelphia	2.01			
Pair: Refrigerators	S.r. rating Elektra Bregenz	2.05	.000	.000	1.000
	S.r. rating Siemens	2.05			
Pair: Mineral water	S.r. rating Vöslauer	1.59	-.880	-12.146	.000
	S.r. rating Evian	2.47			
Pair: Sportswear	S.r. rating Löffler	2.18	-.311	-2.319	.002
	S.r. rating Nike	2.49			

	Brand quality rating	Mean	Mean difference	t	Sig. (2-tailed)
Pair: Cheese	Quality rating Schärdinger	1.56	-.086	-1.259	.210
	Quality rating Philadelphia	1.65			
Pair: Refrigerators	Quality rating Elektra Bregenz	2.21	.543	5.816	.000
	Quality rating Siemens	1.67			
Pair: Mineral water	Quality rating Vöslauer	1.57	-.940	-11.256	.000
	Quality rating Evian	2.51			
Pair: Sportswear	Quality rating Löffler	2.33	.861	9.446	.000
	Quality rating Nike	1.46			

	Brand quality rating	Mean	Mean difference	t	Sig. (2-tailed)
Pair: Cheese	Prestige rating Schärdinger	1.52	-.126	-1.947	.053
	Prestige rating Philadelphia	1.65			
Pair: Refrigerators	Prestige rating Elektra Bregenz	2.21	.662	7.312	.000
	Prestige rating Siemens	1.54			
Pair: Mineral water	Prestige rating Vöslauer	1.54	-.731	-8.075	.000
	Prestige rating Evian	2.28			
Pair: Sportswear	Prestige rating Löffler	2.49	1.180	13.105	.000
	Prestige rating Nike	1.31			

Source: Authors' calculations.

5 CONCLUSION AND PRACTICAL IMPLICATIONS

This paper sought to examine the different factors that influence consumer preferences when considering global and local brands in Austria, in order to provide decisive guidance to those companies that seek to enter the Austrian food market. Study findings indicated that consumer preferences for global and local brands varied according to product category. Among consumer goods, durable, high-tech, and low culture-bound products lend themselves more to standardisation than non-durable, low-tech, and high culture-bound products. The findings for the Austrian consumer market confirmed that in the case of non-durable, low-technology, and high culture-bound consumer goods such as food and drinks, the various tastes, habits, and customs imparted by their culture may prevent consumers from universally endorsing or preferring the same product attributes, advertising messages, packaging, and presentation. Concerning brand characteristics, the study showed that global brands are perceived as having higher quality, in the case of durable goods (i.e., refrigerators and clothing). However, for non-durable goods, i.e., food and soft drinks, local brands tended to be better evaluated from a quality standpoint, as compared to global brands. There was also evidence indicating that for food and soft drinks, local brands tended to be evaluated more positively in terms of prestige and social responsibility as compared to global brands. Since perceived quality and prestige cannot be readily copied, it provides a more sustainable strategy (SCHOCKER et al., 1994). Thus, marketers should consider emphasising perceived quality and prestige. Finally, marketers should take the social responsibility factor more seriously. Especially local brands have a high potential to be preferred over global brands due to a higher perception of social responsibility. In light of the fact that ethical shopping is continuously increasing, companies can view the promotion of ethical behaviour as a new way of distinguishing themselves from the competition.

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WILLINGNESS OF FOOD INDUSTRY COMPANIES TO CO-FINANCE COLLECTIVE AGRICULTURAL MARKETING ACTIONS

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ABSTRACT

Research was undertaken in Hungary that asked commercial food companies, new-type co-operations and associations about their trust levels towards their partners in collective actions and the development of collective agricultural marketing (CAM). Information sought concerned their willingness to cooperate, their propensity of investing their own money and their involvement in activities of collective actions. Findings show that agents are ready to take part in developing CAM, are willing to co-finance collective actions and be involved in their decision-making processes. Amending the law in order to have an increased CAM budget backed by a collective marketing strategy would effectively improve the competitiveness of food products.

Keywords: Collective action, collective agricultural marketing, social capital.

1 INTRODUCTION

In Central and Eastern European Countries (CEEC), a dual farm structure has developed since political reforms. In addition to large farms, a number of small farms, at various levels in different countries, now produce a significant part of total agricultural output. Small producer involvement in food chain businesses is of great importance (FORGÁCS, 2006). Concerning the efficiency of coordinating food chains with special respect to small producers, it depends very much on how well producers' organisations and collective actions are functioning on one side, and on the other side, on the role of intermedieries (modern, traditional and processors) and their capacities to respond to modern food system requirements. Trust between economic agents is the basis of social capital's strong pillar of cooperation between partners in the vertical chain. CHLOUPKOVA et al. (2003) have made a comparison on social capital development between cooperatives in Denmark and Poland. They concluded that the level of social capital was higher in Denmark than in Poland

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after radical reforms, but in both countries was at levels similar to those prior to World War II. For the emerging CEE food markets the question can be raised how producers' organisations are able to unite producers in order to defend their interests and increase bargaining power against the big market players. However, double-specialised agents in the vertical line better understand both ends of the value chain (VORLEY and PROCTOR, 2007) and can contribute to increasing the level of cooperation by offering more advantages for consumers, agricultural producers and processors, while profits of modern retailers will not decrease. However, conflicts of interest between agents in the same food chain are inevitable. The balance level depends on the degree that players at different stages of the chain can organise themselves and are willing to use their own financial resources to support collective marketing. Considering the micro-economic changes agents in the food industries have to deal with the consolidation of retail trade and changes in the suppliers' requirements (category management, trade marks, quality and logistic requirements) ask for changes in CAM activity.

The roots of collective agricultural marketing in Hungary go back to 1984, when the common program (named "Gutes aus Ungarn") was initiated by the Agricultural and Food Ministry and Foreign Trade Ministry. Since then, parallel collective marketing programs under the competencies of different ministries were initiated until 1996 when, with German support, the Hungarian Collective Agricultural Marketing Centre was established.

According to a survey of MEDIÁN (a market research institute in Hungary), people voted for a further extension of public services but demanded a "cheaper" state at the same time. Interviewees stated that they expect a wide range of public services whilst they are distrustful of the government and do not want to invest more money in its operation. Forty three per cent of the interviewees gave a fair mark for the operating efficiency of the state, 40 % assessed public operating efficiency as bad, and only 14 % indicated their satisfaction with the efficiency of state services. Still, growing state intervention is perceived as one of the key instruments for increasing efficiency. The more unsatisfied the interviewees are with public services, the more they expect solutions to come from the state. Conversely, many managers – in addition to the people questioned by MEDIÁN – made it clear that private capital should play a bigger role in economic governance.

The results of this survey motivated us to compare them with our research findings related to CAM, which can be interpreted as one type of marketing cooperation. In a cooperation, companies undertake certain tasks collectively (exhibitions, trade promotion actions, etc.); they carry out such tasks separate from their own corporate marketing, but still supplementing it. CAM can be defined in one of two ways: Firstly, as a form of support (non-refundable support), and secondly, as an activity. CAM activity helps products get on the market by providing opportunity – within its statutory framework – for participation in programmes (it boosts this

by mandatory self contributions), while also advancing cooperation and development between participants.

This research focused on evaluating Hungarian CAM activities, the industrial food companies' relation to these collective actions and their willingness to participate in further improvments. According to their satisfaction with CAM activities, we examined whether the food industries would undertake a larger amount of financing and a deeper involvement in decision-making. It is worth taking the example of the Hungarian case, because, contrary to other EU countries' practice, this activity is financed solely by the government.

Generally, in almost all EU countries the first temporary periods of CAM actions were primarily subsidised by the state, with the private sector later taking over an active financing role. In Austria, a fixed amount has to be paid by actors under the name of "agrarmarketing-contribution". Usually, state support is complemented with paid services provided by the collective agricultural marketing company. The budget for these organisations includes state support, income from payable services and the food companies' contributions. In Great Britain, public funding for CAM actions is nearly 70 %, whereas in France it amounts to only 20 % of the whole budget. In Australia, only companies are involved in the program, e.g. the wine producers organise and finance the collective wine marketing; this way it is completely private sector driven. Looking at the examples of different countries national collective agricultural marketing, the companies basically have the same goals, but their ownership structure and financing practices differ from country to country.

2 Methodology

Data has been collected from questionnaires examining three areas: Food industrial companies, new-type cooperatives, and institutions representing producers' interests. The aim was to survey the opinions of companies affected directly and indirectly by CAM actions. The food industry companies have the advantage of taking collective agricultural marketing subsidies directly. And as they attend exhibitions, sales-promotion actions, etc., they can best judge the efficiency of collective marketing actions. They also know how to profitably use collective marketing and understand which areas are to be developed. Knowing the new-type cooperatives' opinion is of great importance because in their work, cooperation is a real situation where the aim is to develop marketing conditions and their competitiveness. The members of the cooperatives act together, represent their interests commonly, and have recognised the opportunities that joint actions represent. The third group – producers' associations and product councils – mediate the producers' concept of how to develop collective agricultural marketing. These non-profit associations are affected by CAM only indirectly because they do not have a financial interest in increasing profit, but one can see how much the producers are content to contribute to collective actions.

Altogether, 427 questionnaires were sent out to the three target groups: 300 questionnaires were mailed to industrial food companies, 40 to new-type co-operatives, and 87 to producers' associations and product councils. The analysis is based on the feedback of 108 questionnaires. Seventy per cent of the 108 questionnaires were completed by the first group (food industrial companies), 19 % by the second (TÉSZ), and 11 % by the third group (producers' associations and product councils).

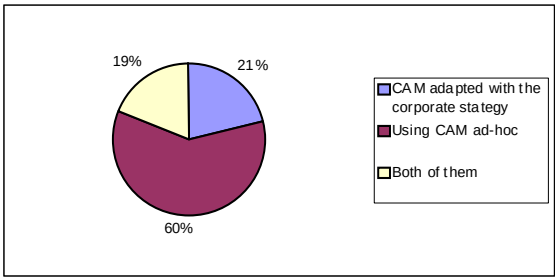
In addition to questions on the willingness to cooperate, we tried to figure out how the agents could use the CAM actions during their marketing activities, and how much they could establish new marketing chains. We wanted to obtain evidence about the "strategic thinking" of institutions and agents regarding their use of CAM in developing marketing channels. One novelty can be stated in connection with the research: No research was executed in Hungary that focussed on trust, collective actions and willingness to contribute to the development of collective agricultural marketing among these groups.

3 Results

3.1 Participation in CAM actions

More than two-thirds of the food industry agents have already participated in CAM programs. From their answers it turns out that agents mostly claimed CAM support only occasionally, and only one in every 5 companies uses the CAM as part of its corporate strategy (Figure 1).

Figure 1: Participation in CAM actions



Source: Authors.

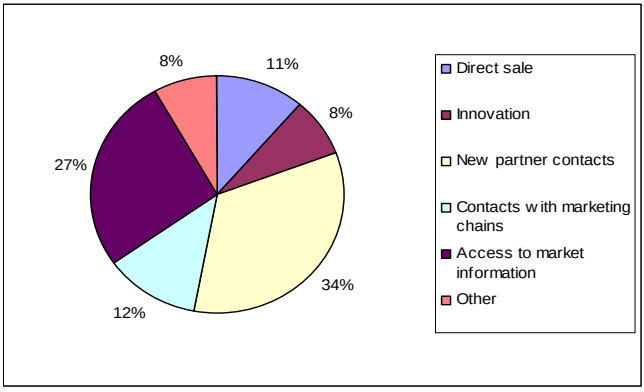
Thus, there is a need to teach the companies to incorporate support, adjusted to their own strategy, into their long-term plans. Furthermore, an important task is to mobilise and activate those companies that had not yet participated in any of the CAM programs. In connection with CAM measures, it can be stated that most of the programmes cover exhibitions, sales promotion actions and business meetings

held at home and abroad. Usually these promotions are followed by various PR advertising actions, publications, and trademark-related events and marketing actions.

3.2 Satisfaction with CAM

In the survey, several questions focused on measuring the agents' satisfaction with the programs. One question dealt with financial contentment and one focused on professional support. We also asked companies about their total contentment. It has to be mentioned that the answers to these questions are quite different. About half of the companies were ambivalent (partly satisfied and partly not), 21 % were mostly satisfied and 27 % mostly dissatisfied with CAM services. Thus, 70 % of the responses were content to some extent. It has to be stressed that the CAM actions are judged as most beneficial in connection with establishing new contacts and obtaining useful market information. As shown in Figure 2, thanks to the program 11 % of the participants acquired a direct marketing possibility, so they succeeded in establishing new business contacts that brought them an increasing marketing outcome. Twelve per cent of the companies came into contact with a market chain with new sales opportunities, and 34 % of them found contacts with new partners.

Figure 2: Advantages arising from CAM programmes



Source: Authors.

Companies that were not satisfied with the CAM programs mostly complained about their lack of professional utility, i.e., they could not find trading contacts or obtain proper market information. It should be emphasised that attendance itself does not produce a direct, immediately measurable effect. So the aim of participating in an exhibition is introducing the company and the products to the costumers, or establishing business contacts in sales promotion actions. Improving the competitiveness and development of product images requires long-term efforts.

Almost 40 % of the unsatisfied participants indicated imperfections in the organisation field and/or in implementing the programs.

In this research, defining factors influencing the contentment (professional or financial) of businesses was analysed by partial regression. We found that during the evaluation of CAM actions, the professional factor determines the level of satisfaction of a company, while according to the press, the cause of low satisfaction with the CAM actions deals with low budgets. The supported companies are obviously directly interested in increasing the CAM budget. Nevertheless, it has already been recognised that the problem cannot only be solved by increasing financial means, but also by trust and participation.

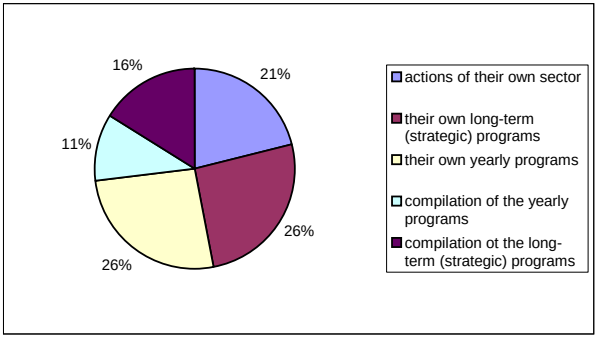
3.3 Willingness to co-finance CAM

Collective agricultural marketing in Hungary began in 1996. During the last 10 years, the country's market conditions and expectations have changed significantly. With the appearance of new marketing tools, increased domestic and export sales of Hungarian food products can be supported. Available state support for the latter is very tight. Referring to financial, organisational and operational reforms is of great importance. The available financial means are sufficient for organising traditional, well-known actions (such as taking part in domestic and foreign exhibitions), but focussing on long-term strategic sales promotion activities would be more expedient. Based on European countries' practice, it is important to involve food industry companies in financing the CAM, its decision-making and organising collective actions. With their own direct market knowledge, these companies could manage the collective actions according to their needs. Thus, the use of CAM support could be ensured according to their real expectations.

It was worth testing whether the companies would be in favour of having a mixed CAM funding (state plus food industrial companies' contribution). Seventy four per cent of the respondents supported the idea of having a mixed fund, 25 % did not answer the question and only 1 % voted to establish a fund from only companies' contributions. Fifty five per cent of the companies are in favour of establishing a mixed fund and would be willing to pay 0.5 %, while 39 % would pay 1 % and about 6 % would contribute between 1.5-2 % of their yearly turnover to a mixed CAM fund. Many companies are willing to take part in financing collective agricultural marketing to further increase the food chain's efficiency. To estimate the amount of contribution, we present an example. According to the Food Industry Magazine, the food, liquid and tobacco industries in Hungary had an average turnover of HUF 1837 Billion between 2000-2005. Calculating a 0.5 % contribution from this amount, we get HUF 9,185 billion. Adding this amount to the yearly average CAM budget would amount to between HUF 11-12 Billion. This figure is many times the available average CAM budget that was financed by the state in recent years. With such a budget expansion it would be possible to determine and

realise long-term, strategic, coherent CAM actions in addition to the organisation's routine short-term practices. Clearly defined coherent actions give companies the opportunity to plan and thus help them develop their strategic thinking. Taking part in the decision-making process and realising CAM actions could ensure carrying the industries' viewpoints through while state contributions would help achieve agricultural policy goals.The food industry companies, in return for their financial contributions, expect to have a more active representation in the decision-making process. They not only claim for representing their interest, but they would handle the CAM actions in a different way. This means they would regard the actions as their "own" ones and would use the collective marketing services more consciously. A remarkable part of those surveyed would accept the representation of company interests taking part in the decision-making process. The companies would like to take part in their own sector's CAM decisions, including the short-term, middle-term and long-term programs.

Figure 3: Expected level of participation in CAM decision-making process



Source: Authors.

4 Conclusions and recommendations

The majority of the interviewed companies in the food industry have already participated in CAM programs, though their participation is not permanent and only 20 % of them regard CAM actions as part of their corporate strategy. Three-quarters of the agents are in favour of a system that is financed partly by the state and partly by the food industry. However, their financial contribution to CAM budgets has to be accompanied by their participation in the decision-making process as well.

With regard to future perspectives, development activities should aim to work out a medium-term CAM strategy with priorities suiting the New Hungary Rural Development Strategy Program for the period 2007-2013. Professional alliances and sector organisations have to be involved in the strategy discussion. Within this

strategy it should be decided which role the state intends to give to the CAM program, and the tasks of the involved corporations should be definded. A reorganisation of CAM practices cannot be avoided because improving competitiveness and the marketing-expansion of the Hungarian food businesses is a common interest of agricultural producers and food industry companies. Moreover, a new program protocol could be elaborated to help the yearly CAM programs (for products) be organised along the middle-term CAM strategy. The collective agricultural product marketing (CAPM) programs could build the yearly complex of the CAM program.

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MULTIFUNCTIONAL AGRICULTURE

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THE ROLE OF MULTIFUNCTIONAL AGRICULTURE FOR RURAL DEVELOPMENT IN BULGARIA

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ABSTRACT

The aim of this paper is to present how multifunctional agriculture works in Bulgaria and to illustrate its impact on rural development. To achieve this purpose, the legal status of multifunctional agriculture will first be discussed. Following this, existing multifunctional activities in Bulgarian farms will be shortly analysed. Finally, two case studies that demonstrate the role of multifunctionality in rural areas will be presented.

Keywords: Multifunctional agricultural, rural development, farms, Bulgaria.

1 INTRODUCTION

Multifunctional agriculture is a relatively new concept for countries in Central and Eastern Europe (CEE). Especially in Bulgaria there is not much research conducted on issues like the influence of different farm structures on multifunctionnality, the current implementation level of multifunctional activities, or the contribution of rural policies towards a sustainable rural development perspective. The aim of the paper is to present how multifunctional agriculture works in Bulgaria and to analyse its role for rural development. To reach this aim, the legal status of multifunctional agriculture will be discussed, then the existing multifunctional activities of Bulgarian farms will be shortly analyzed. Finally, two case studies that demonstrate the role of multifunctionality on rural life will be presented.

Empirical findings of the presented research show that the notion of multifunctionality is rarely used in Bulgaria. The government does not implement the concept of multifunctionality in the national rural development plan, but uses relative concepts such as alternative economic activities, agricultural diversification, and non-agricultural production. Environmental and social issues, which are other aspects of multifunctionality, are implemented separately. The case study shows that farm size plays an important role for the implementation of different multifunctional activities. In Bulgaria, large commercial farms are involved in several agricultural activities such as growing traditional crops and/or livestock production

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and agro-tourism. This multifunctional model of agriculture is accepted by a larger number of commercial farmers and supported by the administration. The small farms in the region implement different models of multifunctionality. Some small farmers often divide their time between on- and off-farm activities due to lacking financial resources, while others implement different off- and on-farm activities. Often, farmers' multifunctional farm activities strongly depend on the machinery and labour power of large commercial farmers. In addition, small farmers in the region are more interested in farm activities linked to environmental conservation than large farmers. The role of implementing multifunctional activities in Bulgarian agriculture contributes to sustainable development of rural areas. It also creates opportunities for a more stable rural development by reducing poverty and providing nutrition for the population. Additionally, agricultural multifunctionality can stabilise the country's social life and protect the environment.

2 THEORETICAL AND METHODOLOGICAL APPROACH

Agriculture has played a primary role in rural development and in shaping rural landscapes. Though agriculture remains for many rural areas an important economic sector for creating wealth and employment, its dominant role in the rural area is declining. At the same time, rural areas are also subject to a rapid globalisation process. Modern lifestyles – infrastructure and communication technologies – put pressure on rural society and negatively impacts rural customs and traditions. The role of agriculture for the future of rural areas is under discussion in the EU and is included into changes to the Common Agricultural Policy (CAP).

Multifunctionality, therefore, might be a new paradigm to prepare modern agriculture for new social and environmental demands. It is stressed that in addition to the production of commodity goods, agriculture produces a range of non-commodity goods and services, affect social and culture systems and contributes to economic growth (HUYLENBROECK et al., 2007).

The debate over introducing multifunctional agriculture as a process for changing agricultural policy began in the mid-1980s. The term "multifunctionality" emerged in 1992 at the Rio and Portugal Earth Summits as a response to a wide range of concerns about worldwide changes in agriculture and rural areas. The OECD Declaration of Agricultural Ministers Committee defines multifunctionality of agriculture as follows: "Beyond its primary function of producing food and fibre, agricultural activities also shape the landscape, provide environmental benefits such as land conservation, the sustainable management of renewable natural resources and the preservation of biodiversity, and contribute to socio-economic viability of many rural areas. Agriculture is multifunctional when it has one or several functions in addition to its primary role of producing food and fibre" (2001).

In the literature, there are two main approaches regarding multifunctionality (AUMAND et al., 2006): The positive approach that focuses on the supply side, and the normative approach, on the demand side. First, a descriptive/positive conception of multifunctionality is used in terms of technological jointness of production (functions) of landscape that actions impinge upon. Translated to social theory, this positive conception describes the fact that human actions have indirect implications for the physical environment. Second, authors introduce a normative definition of how multifunctional landscapes perform (WIGGERING et al., 2003; THIEL, 2005). Normative multifunctionality, furthermore, is conceptualised as, "…an attempt… at carrying out and implementing the concept of sustainable development in the specific case of land use and landscape development" (WIGGERING et al., 2003: 9).

A third approach that has a more holistic interpretation of the multifunctionality concept is based mainly on rural area and rural geography. This approach refers to farming systems that are more territorially embedded, make use of local resources, and try to build new links between consumers and farm producers (WILSON, 2001).

As an analytical concept, multifunctionality differs from diversification and pluriactivity, and refers to the fact that one activity can have many functions and different outputs. It is related to a single economic activity (i.e., wheat production, or a group of activities like food production), while diversification means that different economic activities (i.e., food production and tourism) are combined in one farm unit. Pluri-activity refers to the fact that one farmer(s) is/are involved in different activities (i.e., farming and non-farming). Although these terms differ, they bring together various activities with mono-functions, which benefit rural society and support economic growth.

The first key element of multifunctionality is multiple commodity (food and fibre) and non-commodity outputs (food security and safety, rural landscape, biodiversity, soil conservation, etc.) that are jointly produced by agriculture. The second key element describes non-commodity outputs that have characteristics of externalities or public goods, with a result being that markets for these goods do not exist (OECD, 2001). Therefore, multifunctionality has direct and indirect impacts on agriculture.

Multifunctionality is a comparably new concept for Bulgarian agriculture. Thus the opportunity for agricultural producers to develop such diversified activities might be a starting point for improved resource usage, both for the diversification of economic activities in rural regions and for sustainable agricultural development.

Some research (DOICHINOVA, 2008; YOVCHEVSKA, 2003) has been done on the multifunctional activities of Bulgarian farms, but a complete investigation on their social, economic and ecological functions and their impact on rural development has thus far not been carried out. Some Bulgarian authors consider, e.g. methodological

questions which examine farm styles in multifunctional agriculture and multi-functionalities, such as a strategy for Bulgarian producers to adapt to the Common Agricultural Policy (CAP) (DOICHINOVA, 2008). Other authors are considering the effect of multifunctional agriculture on biofuels' production from animal products (YOVCHEVSKA, 2003).

The role of multifunctionality on rural development will be examined by using multiple sources of information. Documentation and statistical data will be used to explain the present situation of multifunctionality in Bulgarian agriculture and its impact on rural development. A descriptive approach will be used to analyse cases that attempt to implement the concept of multifunctional agriculture in Bulgaria.

3 DISCUSSION AND RESULTS

After Bulgaria's EU accession, the CAP and the concept of multifunctionality were considered important to be understood and adapted in rural areas. Although this concept was not well known by Bulgarian farmers and very rarely used by political, academic and non-governmental organisations, alternative concepts such as "economic diversification", "rural development", "sustainable development" or "alternative activities" were often used. In the countryside, however, several sub-concepts were found to be in practice, for instance, farms that combine various agricultural and non-agricultural activities such as agri-tourism, food-processing, direct sales, renewable energy production, aquaculture, handicraft, and others (Table 1).

Non-agricultural income plays a very important role for Bulgarian farms. In practice, most of the farmers have other income sources, mostly from off-farm activities and different social transfers. Farmers often have broader activities rather than deeper, for instance, contractual work (providing services with their machinery and equipment), transportation activities and construction work (south central, north central and south-west) as well as various handicrafts (north-west and north-east). Processing farm products and wood processing are other activities that have great importance for some farms in north central and south-west Bulgaria. Moreover, other activities such as creating and distributing renewable energy also provides income for some farms. Deepening activities are rather new in Bulgaria. On the other hand, Bulgarian farms do have long traditions in quality production and directly selling products such as wine, vegetables and fresh fruits.

Table 1: Number of farms by type of other non-agricultural activities, 2003

Planning regions in Bulgaria	Number of farms by type of other non-agricultural activities							
	Contractual work, using equipment of the farm	Processing of farm products	Wood processing	Agro-tourism	Handi craft	Aqua-culture	Renewable energy production	Other activities
North-West	856	1032	15	11	99	277	2	438
North Central	1274	2726	23	49	47	120	5	491
North-East	2116	2830	15	53	53	113	5	743
South-East	852	1937	5	110	26	83	7	315
South-Central	2768	2417	25	58	41	194	35	1122
South-West	1818	2723	32	57	24	277	12	538
Bulgaria	9684	13665	115	338	290	1064	66	3647

Source: MAF, 2005.

A wide range of multifunctional activities exist in the different planning regions. In some regions, agro-tourism, handicrafts and aquaculture is more common, whereas in other regions it is renewable energy production and wood processing. In all regions, however, farmers providing contractual work are common. Consequently, we can state that almost every farm in Bulgaria is multifunctional, because they usually carry out some other activities than only conventional food and fibre production.

Given this situation, it is difficult to implement the general definition of multifunctional agriculture at the farm level. This concept needs to be more operationalised; the definition of a multifunctional farm must be specified and its characteristics defined. Multifunctionality represents much more than economic aspects and income opportunities; it also has strong socio-cultural aspects. The problem of defining multifunctionality or types of multifunctional activities in agriculture can be illustrated by two cases. The first case presents a typical conventional farm, while the second case presents the working programme for alternative agriculture in the Rodopi region. Both cases present alternative concepts of multifunctionality. The first case can be characterised as "economical diversification", while the second one focuses on "sustainable development".

The first case study is a typical Bulgarian farm. This farm type includes animal and plant production and often such farms provide machinery services to other farms. The farmer also earns income from off-farm activities. So the question is whether this farm type fulfils the characteristics of multifunctionality. In fact, the farm example has diversified its income sources. This kind of economic diversification, however, is not specific to agriculture. Instead, it is a characteristic of various on- and off-farm activities. The economic analysis of the diversified activities should be complemented with a "normative" approach. The question remains, what makes a diversified economic activity a multifunctional activity? Referring to the aforementioned example, there is a potential "risk" that every farm would

be classified as multifunctional. This might even be true, because farmers undertake diversified activities because they need to support, to some extent, their livelihood.

The second case is related to a programme for alternative agriculture in Rodopi. The Rodopi region is a typical mountain region, with weakly developed agricultural activities, infertile soil and many poor rural areas. The programme for alternative agriculture was introduced in 2003 by the Ministry of Agriculture and Foods. The motives for creating this programme were: (1) high regional unemployment levels due to depressions in the mining sector and other industrial and agricultural activities; (2) the high level of land fragmentation in the region; (3) the unfavourable production base for two major crops: Tobacco and potatoes; (4) low yields from main agricultural production; (5) undeveloped marketing for the main crops; (6) weakly developed livestock breeding farms; (7) poor pasture and grass plots; and (8) inefficient forage production. The proposed programme aimed to develop effective agricultural production in the Rodopi region and to support sustainable development in the region by revitalising traditional production methods and fostering alternative agriculture. The aims of alternative agriculture were to increase the regional employment and income levels; to introduce appropriate forms of agriculture for pasture and grass plots; to initiate suitable mechanisms for crop rotation; to motivate farmers to cultivate alternative crops (i.e., herbs) on the erosive and steeped areas to help soil conservation; to support ecological farming; to inform farmers about various credit and EU programmes. The main problems faced by participating farmers were related to unclear land titles, unclear markets for agricultural production, land fragmentation, etc. Although the programme had implementation problems in the Rodopi area, many farmers now benefit from it. They received financial support for their alternative agriculture and increased their economic and social status in the region. Furthermore, the programme has some positive impacts for the farmers in the area, i.e., it aided environmental conservation, provided sustainability and diversification of agricultural products, and built better lives for the rural population in the Rodopi area. From this briefly introduced case, again the question arises whether the programme for sustainable development could contribute to the model of multifunctional agriculture. The answer is positive, because such agriculture minimises risk through varies farm activities, improves farm incomes, and provides better social lives for the rural population.

4 CONCLUSION

The analysis of both examples shows that the notion of multifunctional agriculture is rarely used in Bulgaria. Indeed, the Bulgarian government does not implement the concept of multifunctionality in the national rural development plan, but uses relative concepts such as "alternative economical activities", "agricultural diversification", and "non-agricultural production". Environmental and social

concerns, which are important aspects within the concept of multifunctional agriculture, are rather implemented separately. The first case study showed that farm size can play an important role for the implementation of different multifunctional activities. In some regions, large commercial farms are involved in several diversified activities such as growing traditional crops and/or livestock production and providing machinery services. This multifunctional model of agriculture is accepted by a large number of commercial farmers and supported by government. Small farms often show a higher amount of off-farm activities. The second case study shows that the implementation of alternative agriculture schemes can support sustainable development in rural regions and can contribute to improved social and economical living conditions for the rural population.

Multifunctional activities in Bulgarian agriculture have great potential for sustainable rural development. It will provide opportunities for more stable rural development by reducing poverty and increasing farm incomes. In addition, agricultural multifunctionality may stabilise the social and economic life in rural areas and protect the environment in Bulgaria.

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A METHODOLOGICAL REVIEW OF MULTIFUNCTIONAL AGRICULTURE

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ABSTRACT

The purpose of the paper is to analyse instruments that assess multiple functions of agriculture and to classify them into thematic areas. Although there exists a great deal of literature addressing the multifunctionality of agriculture from a theoretical or analytical point of view, fewer studies exist that analyse this topic from a methodological perspective, especially when the assessment of different functions is addressed. Through literature review, this paper attempts to provide a first analytical framework and an overview of different evaluation methods. The final section suggests possible directions for future research.

Keywords: Multifunctional agriculture, assessment instruments, non-market valuation.

1 INTRODUCTION

This paper regards the multifunctionality of agriculture as a concept that combines the productive role of agriculture and its role in biodiversity conservation, landscape preservation and contribution to the socio-economic viability of rural areas. The socio-environmental role of agriculture is recognised as a major agent in sustaining rural economies and cultures and under this perspective we agree with MARSDEN (2003), who highlights the task that multifunctional agriculture has in contributing to the construction of a new agricultural sector that corresponds to the needs of the wider society. Going more in depth regarding the question of evaluation, we look at multifunctional agriculture as a concept for understanding and analysing the role of agriculture in society (ROSSING et al., 2007).

Much literature exists on multifunctional agriculture assessment, with examples of evaluation studies that vary in methods used and the scope of analysis undertaken. In this paper we attempt to provide an overview of what can be found in this literature with regard to instruments, methods and practices used for the assessment of the multiple functions of agriculture, and classify them from three different perspectives: 1) what kind of tools are available for the consumer in order to

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evaluate a farmer's supply; 2) which instruments do farmers possess to evaluate the demand of multifunctionality and to evaluate their own activities; and 3) how can institutions assess farmers performances? This review is not meant to be comprehensive or exhaustive, but rather aims to illustrate the diversity and scope of various assessment methods. The paper is organised as follows: It commences with a brief overview on multifunctional agriculture assessment. The second section describes the analytical framework developed to analyse and compare the various methods. This is followed by a discussion which assesses the methods' contribution towards the analysis of the multifunctional agriculture concept. Finally, some suggestions for further research are proposed.

2 PROBLEM FORMULATION

When we deal with the evaluation of multifunctional agriculture, we are facing a wide issue which can be approached from various viewpoints and at different levels of aggregation by using different instruments and aiming at different objectives. The complexity of this theme is increased by substitution and complementarity relationships linking its components (RANDALL, 2007).

The reasons for carrying out evaluations on multifunctional agriculture can be multifold. Some studies have been undertaken as a support to agricultural policy to provide incentives for non-commodity production; this is most commonly done by attempting to calculate the total value of agriculture's non-commodity outputs on a regional or even national scale (RANDALL, 2002). Other evaluations have been carried out to find a way to internalise public goods and services into commodity network given the problem of market distortion (DI IACOVO et al., 2006). Furthermore, some efforts have been undertaken in order to evaluate the degree of multifunctionality of farming systems accepting its normative view (WIGGERING et al., 2006).

Although a rich body of literature discusses multifunctional agriculture assessments, some constraints exist, mainly connected to the spatial and temporal relativity of this issue and with the specificity and applicability of the methods implemented. One aspect that deserves particular attention in this sense is related to the question of how this concept enters in the household strategy. Agriculture performs and has always performed multiple functions (PAMPANINI, 2006), but sometimes farms provide benefits implicitly. The family farming model of Italian agriculture is a good example, since it has always played a key role in the social organisation of rural communities, particularly in taking care of people with special needs without any explicit remuneration (SENNI, 2005).

In this framework, the present contribution aims to classify the literature in order to provide support to future research that regards multifunctionality as an asset for regional development and seeks to bridge the gap between demand for and supply of multifunctionality.

3 METHODOLOGY

The system developed in order to assess existing methodologies in the context of evaluating the multiple functions of agriculture consists of four steps and is presented in Table 1.

Table 1: Methodology

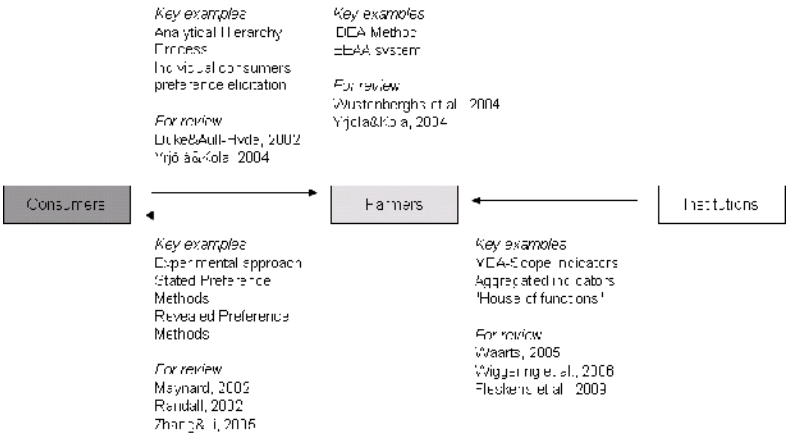
PHASE	STEPS	MORE
Review	1: Collecting existing literature on valuation of multifunctional agriculture	SOURCES Peer-reviewed journals European research projects Websites of conference and research institutes
Identification	2: (input): Identification of methods and techniques described or used	
	3: (output): Sifting of methods and techniques found through a structured grid	GRID CRITERIA Type of tool Main objectives Data Phase of evaluation Function evaluated Aspect evaluated Type of methodology Spatial scale User groups Type of result
Evaluation	4: Discussion of results	Perspectives (Figure 1 below) Functions

Source: Authors.

First, literature research was carried out, mainly via reference chaining. Literature sources included peer-reviewed journals, European research projects in the field and websites of conferences and research institutes. The next two steps constitute the identification phase. In the second step, the literature is analysed in order to identify the methods or techniques described or used. The results of this step become the inputs of the third step (output), where the methods or techniques found run through a list of criteria identifying key elements. Ten criteria are distinguished. "Type of tool" refers to the assessment instruments: Indicators, models, and surveys. "Phase of evaluation" describes in which phase of the evaluation process we are, and distinguishes among process, performance and impact evaluation. "Main objective" specifies the core aim of the method analysed. "Function valued" distinguishes among the all relevant functions of agriculture: Productive, economic, ecological, social and cultural. "Type of methodology" specifies whether the

method is demand or supply oriented, and to which category of evaluation methodology belongs. "Aspect evaluated" indicates from which viewpoint the functions are valuated: Economic, environmental and social aspects. "Spatial scale" is given in terms of level of aggregation addressed: Farm or a broader level. "User groups" indicates which users are involved in the study as subjects or objects of the evaluation: Public institutions, farmers, citizens and consumers. "Type of result" reveals how the final outputs are presented. Thus, an analytical framework arises, allowing us to compare the tools and support a comprehensive analysis. In the fourth step, the results are discussed, focussing on the following questions: (1) How can consumer/citizen behaviour be assessed when making a purchase decision? (2) How can farmer behaviour be assessed from the perspective of the consumers? (3) How can farmer behaviour be assessed from the perspective of public institutions? (4) How can farmers evaluate their own performances?

Figure 1: Overview of analysis along with representative assessment methods and key references for reviews



Source: Authors.

Figure 1 identifies subjects and objects of the evaluation, along with representative assessment methods and key references for reviews. Three subjects are involved: Consumer, farmers and institutions, and four are the perspectives for the evaluations: Consumer towards farmers and vice versa, institutions towards farmers, and farmers' self-evaluation. When classifying the literature by means of the scheme presented above, special attention is dedicated to the analysis of the various functions addressed.

4 DISCUSSION

Analysing the selected literature, we can distinguish between studies that aim to compare different methods (RANDALL, 2002; VAN KLEEF et al., 2005; ZHANG and LI, 2005; MultAgri project), and studies that describe new methodologies. Some new methodologies are the combination of existing ones (HALL et al., 2004; PARRA-LÓPEZ et al., 2008; RANDALL, 2002; MEA-Scope project), while others are newly developed (MAYNARD et al., 2002; WIGGERING et al., 2006; FLESKENS et al., 2009).

The MultAgri project offers the widest review in the body of non-market valuation literature related to multifunctional agriculture, focussing on France, Germany, the Netherlands and Portugal. The Journal on Agriculture, Ecosystems and Environment (120, 2007), dedicated a special issue to tools and methods that examine the multiple functions of agriculture. This issue complements the main results of this study, providing a comprehensive overview of the current state of the art of assessment methods in this field. An interesting methodological aspect that emerged from this review is that most indicators of multifunctionality have been identified as impact indicators, which are closely linked to sustainability indicators. These indicators are very useful for following the state of resources, but this is done without any connection with production practices. Developing indicators linked to farm activities could allow better monitoring of the system.

Examining selected literature from our four perspectives, we can find some remarkable aspects: Studies related to instruments for policy-makers to evaluate farmers' performance and the tools to evaluate consumer behaviour and need are prevalent. Somewhat less developed are the instruments for consumers to assess farmers' contributions to multiple functions of agriculture and instruments that farmers can use for self-evaluation.

To support policy decision-making, monitoring and evaluation methods have been developed particularly for economic, environmental and landscape aspects. As an example, economic and environmental accounts for agriculture presented by WUSTENBERGHS et al., (2004) aim to provide policy-makers with a comprehensive assessment system of agriculture's multifunctionality by comparing economic data with social and environmental data.

Demand is mainly measured by examining individuals' preferences for non-commodity goods (Contingent Valuation Method) or individuals' purchases of those goods necessary to enjoy associated non-commodity goods (Travel Cost Methods, Hedonic Price Analysis). These measures generate evidence of the willingness to pay (WTP) for benefits and the willingness to accept (WTA) costs required for welfare change measurement (RANDALL, 2002). However, these factors are only able to isolate one effect on others. An interesting alternative to the more used stated and revealed valuation methods is suggested by MAYNARD et al., (2003). An experimental store was created to evaluate initial demand for local products.

This methodology may also be applied to the evaluation of non-products from agriculture.

Recognising the importance of wider consumer and citizen participation when designing a new agricultural sector corresponding to the needs of society, we note the scarcity of instruments they could use to assess farmers' performances. In addition, the need for consumers to have an instrument to assess the impact of their own choices, especially when ethically motivated, emerges. In this context, the demand for synthetic and complete indicators arises.

Also of great importance are the tools that allow farmers to assess their own activities, but few examples exist in this sense. The IDEA method (Indicateurs de Durabilité des Exploitations Agricoles or Farm Sustainability Indicators) is an interesting example in this perspective. This method is conceived of as a self-assessment grid for farmers to evaluate the sustainability of their own farm, but also offers instruments to improve dialogue among farmers, institutions and local citizens. Monitoring and assessing their production system is of prior interest for farmers to gather information supporting decision-making. Such instruments might allow us to evaluate the feasibility of certain practices; or to develop possible ways of modifying farm management; or to conduct farm audits prior to committing to some funding measure.

Studies related to the environmental and economic aspects of multifunctional agriculture far outnumber those focussing on social and cultural dimensions. This is mainly due to the fact that the two aspects continue to dominate multifunctional agriculture and that they are more easily evaluated.

We can add that a general consensus exists that where applied, the definition of multifunctionality should be firmly area-based (FLESKENS et al., 2009). Different stakeholders may value functions differently and the importance of functions varies across scales of analysis (HEIN et al., 2006). In this respect, a meta-evaluation should be organised that attempts to evaluate the general improvement provided by multifunctional agriculture at local levels in order to better compare diverse situations.

5 CONCLUSION

Multifunctional agriculture is highly demanding with regards to multidimensional evaluation methods and has stimulated a large amount of research activities around each specific function. But there is still a high expectation for more handy and exhaustive methods that are able to assess the concept in a multidimensional way and to cover the demand from different subjects and perspectives. To date, environmental and economic aspects of multifunctional agriculture have mainly been explored. This evidence is connected to a larger societal comprehension of these two functions and also to more simple relations between actions and results.

At the same time, an increasing demand to better understand other societal (health/ care/educational) effects of multifunctional agriculture has emerged.

There is great interest among researchers to identify methods and tools that are able to assess the outcomes of multifunctional agriculture, but it is still a wide field to explore. From our analysis, three grey zones emerge that could be further analysed: The development of comprehensive methods that are able to evaluate all agricultural functions simultaneously; the definition of practical tools involving local stakeholders (producers, users, local institutions) in the evaluation process to drive the evolution of multifunctional agriculture inside the local system; the development of area-based methods that, encompassing territorial (environmental, societal, cultural) specificity, allow us to compare the results of multifunctional practices established in different geographical areas.

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A SPATIALLY EXPLICIT DECISION-MAKING SUPPORT TOOL FOR INTEGRAL RURAL DEVELOPMENT

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ABSTRACT

Recently, rural development is facing the challenge of dealing with a whole range of landscape functions including, e.g. recreation and nature conservation. Whereas agricultural production formerly could be dealt with as the sum of individual farmers' productions, these new functions pose an interesting methodological question, as the final landscape function is determined by their spatial distribution. By diversifying and adopting new activities aside from their traditional production activities farmers contribute to the landscape functions. As a result, landscape functions can only be properly modelled if the farm level and the spatial heterogeneity of the region are included in the analysis.

This paper presents a spatially explicit simulation framework to assess the spatial patterns of farm diversification, namely for recreation (e.g., bed and breakfast, on farm café), short supply chains (e.g., on-farm shop, home delivery) and green services (take up of agri-environmental schemes). Farmer's decision making is simulated in a spatially explicit manner based on micro-econometric models. Variation between model runs allows us to identify the uncertainty due to individual heterogeneity. Moreover, scenarios can be implemented and changes can be analyzed in a spatially explicit way. The simulation framework is implemented in the Gelderse Vallei, located in the centre of the Netherlands in the provinces of Utrecht and Gelderland. Based on stakeholders interview, a scenario has been developed and implemented. Rather than looking for an optimal outcome, this approach points out the potential "windows of opportunities" where changes can take place.

Keywords: Farm diversification, multifunctional land use, decision support tool, stakeholder.

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1 INTRODUCTION

Traditionally, agricultural policies focused on agricultural production (FISCHLER, 2008). More recently, rural development has emerged as a new policy target for which the challenge of dealing with a whole range of landscape functions including, e.g. recreation and nature conservation must be addressed (DALGAARD et al., 2007). Whereas agricultural production could be dealt with as the sum of the production of individual farmers, these new functions pose an interesting methodological question, as the spatial distribution of the activities determines the final landscape function.

Despite the fact that landscape functions can only be evaluated at the regional level, they often depend on decisions made by individual farmers in the region to take up new activities in addition to their traditional production activities (PFEIFER et al., 2009). As a result, landscape functions can only be properly modelled if the farm level and the spatial heterogeneity of the region are included in the analysis.

Econometrics describes human decision-making empirically with models usually based on cross-sectional data. Although human decision-making under the assumption of rationality is investigated by micro-economics, these models often exhibit a rather low explanatory power (pseudo R^2 of 0.2-0.5). This indicates that the relative importance of the driving factors is rather low. In other words, individually-observed variation is unexplained and mainly due to white noise, i.e., complexities of human behaviour, for which many driving forces are difficult to measure. Nevertheless, empirical economists predict policy changes based on the marginal effect of these driving factors, rarely mentioning that the major part of the prediction is mainly the sample average. Predicting human behaviour based on micro-econometric models therefore does not take into account uncertainty linked to individual heterogeneity, nor the low explanatory power of the model. Furthermore, micro-econometric models rarely address spatial heterogeneity in the empirical models. This not only leads to an omitted variable bias for the estimation of the coefficient, but also renders it impossible to assess the impact of a policy in a spatially explicit manner. This is particularly problematic when policies aim at spatially-explicit objectives, e.g. the emergence of multifunctional landscapes.

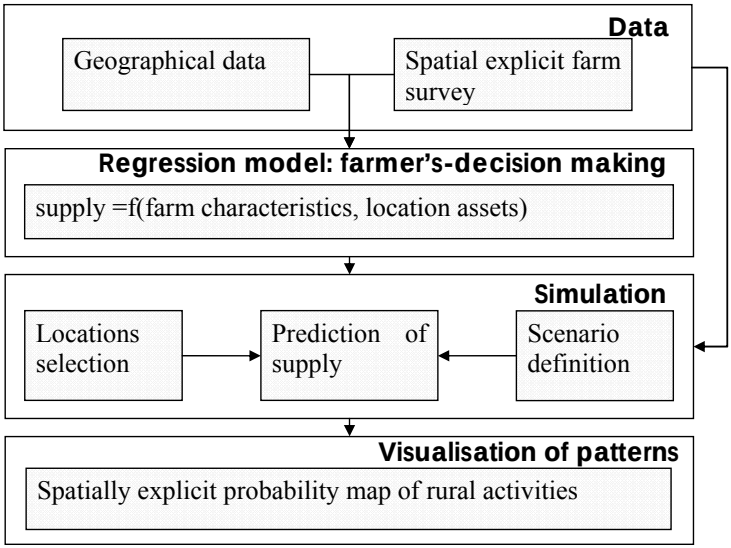
The objective of this paper is to present a simulation framework based on micro-econometric models that allows us to visualise in a spatially-explicit way the uncertainty connected with individual heterogeneity. Human behaviour is simulated in a spatially explicit manner based on micro-econometric models. Variation between runs allows us to identify how individual heterogeneity impacts spatially-explicit outcomes corresponding to the uncertainty connected to individual heterogeneity. Spatially-explicit visualisation of this uncertainty identifies "windows of opportunities" where changes can take place in a landscape.

The simulation framework is implemented in the Gelderse Vallei, located in the centre of the Netherlands in the provinces of Utrecht and Gelderland. Despite the low explanatory power of the original models describing the adoption of rural activities like nature conservation and recreation, certain areas present low uncertainty in the predicted outcomes. Other locations present a high uncertainty, and the outcome might be difficult to predict. An inventory of the views of various stakeholders from the region resulted in a number of alternative scenarios. The potential effects of the scenario, plus the associated uncertainty connected with these changes can be visualised. Rather than looking for an optimal outcome, this approach points out where changes are most likely to take place.

2 A SPATIALLY EXPLICIT SIMULATION FRAMEWORK FOR THE VISUALISATION OF LANDSCAPE FUNCTIONS

To address changes in landscape functions based on farm household dynamics, a simulation framework has been developed (Figure 1). The framework consists of four parts: Data, individual decision-making based on regression models, simulation and visualisation.

Figure 1: Simulation framework



Source: Authors.

The framework requires spatial geographical data, for example topographic or soil maps, as well as an extensive farm census. This farm census must contain the location of each farm, as well all the information that allows us to estimate an

individual supply function. In its simplest form, agricultural supply can be derived from profit maximisation problem $\max\pi = PY(K,L,H,I|A,S) - C(r,w,g,v) - F$, where P is a vector of output prices and Y a vector of output. The output is a function of capital (K), labour (L) human capital (H) and other inputs (I) defines the production function given the farmers' attitude (A) and location (L) (VANSLEMBROUCK et al., 2002); C is the vector of production cost depending on the input price r, return on capital, w is wage in return of labour, g is return on human capital, and v is the cost of all other input. F corresponds to fixed costs.

This maximisation problem can then be transferred into a micro-econometric estimation that allows us to define farmers' decision-making: The supply can be explained with farm labour and structure characteristics, farmer attitude, location characteristics, as well as a constant term and a residual that pick up the unexplained individual variation.

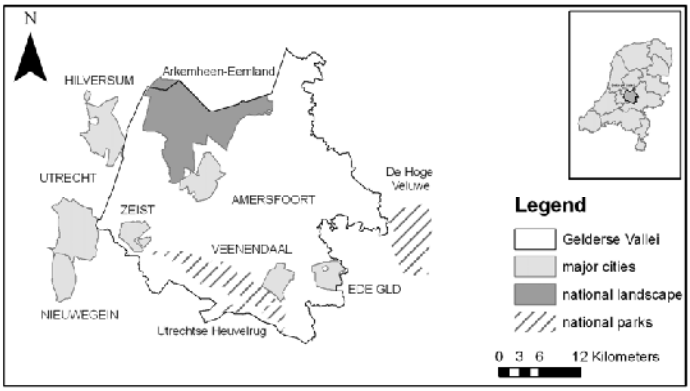
In order to run the simulation, farm location must be selected, for example by random distribution over the plane. These farm locations are linked to geographical maps, as well as to farm census data aggregated to a given spatial unit (i.e., grids or administrative borders). In order to take farmers' heterogeneity into account, farm data is simulated. Continuous variables are drawn from a normal distribution, with the average and variance observed within the spatial unit and the binary variable are drawn from a uniform distribution. In this manner, each location has unique farm and location specific characteristics. The probability of adoption is predicted by the regression model for each farm. Scenarios can be introduced in the framework by changing farm and location characteristics. These changes can be imposed on all locations, but also only for a specific group of farmers within a given area or with specific characteristics given the policy to evaluate. In order to define relevant scenarios for the given area, stakeholder's claims and wishes must be identified with, for example, interviews, and then translated into changes of variables included in the micro-econometric models.

3 CASE STUDY

3.1 Study area

The simulation framework was applied to the Gelderse Vallei, in the centre of the Netherlands, shown in Figure 2. The Gelderse Vallei is a diverse region with high pressure for both urban and rural development. Big cities such as Utrecht and Amersfoort grow towards rural areas, and their residents create a demand for recreation, care and nature. As a result, urbanisation not only represents a threat to agricultural areas, it also creates opportunities for diversification. Agricultural systems in the region are diverse; the northern part, with poorly drained peat soils is mainly used for dairy farming, while in the eastern part, intensive livestock (mainly pig and chicken) farming prevails. In the rest of the region, mixed arable farming can be found.

Figure 2: Study area the Gelderse Vallei, with major cities and National Landscape Arkemheen Eemland



Source: Authors.

The region borders two national parks that are mainly used for outdoor recreation. In the north is the National Landscape Arkemheen-Eemland, where policy-makers agreed to maintain three main qualities: An open landscape, traces of the past water management system, and the inherent character of a peat landscape. Special agri-environmental schemes are available here for meadow birds' habitat creation.

3.2 Data

The data used for this model are from the Geographical Information System for Agricultural Businesses (GIAB) dataset (NAEFF, 2006) in combination with digital maps of topographic, land cover, spatial policies, soil and ground water. The GIAB dataset includes farm characteristics (size, amount of animals, number of persons in the household, age structure of the household) as well as information about the adoption of rural activities (diversification) in 2005. The data set contains the coordinates of each farm, which can be located and linked to geographical maps. Furthermore, this dataset has been aggregated to the postal code level, which allows us to map farm characteristics in a spatially explicit way: For each postal code area, an overall average, as well as the standard variation of each farm characteristic can be computed for each variable.

3.3 Farmers' decision-making

Farm diversification, i.e., the adoption of activities other than food production, has been investigated using an econometric approach. Attention has been paid to four rural activities: Green services (agri-environmental schemes aiming at landscape preservation and nature conservation), on farm recreation, short supply chain, and care farms (offering activities to persons with special needs). For each activity,

decision rules have been based on probit estimations shown in Table 1. For probit models, only the sign of the coefficients can be interpreted, as well as the ratio of coefficients. The effect of one explanatory variable can be interpreted as change in the probability of taking up a given activity.

Table 1: Probit model for each rural activity taken up (all coefficients are at least significant at the 5 % significance level)

Probit regressions	Green services	Recreation	Care services	Short supply chains
Average age	0.0560 (0.026)*	0.0579 (0.032)	0.3050 (0.089)**	-0.0026 (0.025)***
Average age squared	-0.0006 (0.0002)*	-0.0006 (-0.0003)	-0.0031 (0.009)**	-0.0001 (0.0002)***
Maximum education	0.0690 (0.0211)**	0.0486 (0.0289)*	0.0866 (0.046)	0.0680 (0.025)**
Participation in environmental co-operatives		0.9260 (0.19)**		0.4744 (0.179)**
Number of person in the household with main occupation being off-farm				-0.6350 (0.154)**
Number of head of farms		0.1453 (0.07)*		0.2563 (0.0686)**
Intensity (based on lsu)	-0.0001 (0.0006)*			
Size	0.0261 (0.0025)**		0.0093 (0.004)*	
Size squared	0.0000 (0.00)**		0.0000 (0.00)	
Organic	0.5498 (0.165)**	0.8199 (0.17)**	1.0801 (0.179)**	0.8848 (0.151)**
Binary for arable farm	-0.0015 (0.0068)*			
Binary for fruit farm				0.0002 (0.0011)*
Binary for dairy farm				-0.0006 (0.002)*
Binary for mixed farm		-0.0009 (0.0003)**		
Ground water level	-0.0682 (0.0175)**			
Distance to habitations			-0.0849 (0.0351)*	-0.0675 (0.024)*
Distance to biggest 50 cities (Utrecht, Amesfoort)		0.0577 (0.0137)**		
Distance to major roads	-0.0915 (0.0317)*			-0.0903 (0.045)*
Distance to national park	0.0456 (0.051)**	-0.0533 (0.015)**		
Distance to national landscape		-0.0336 (0.014)*		
Distance to attractive landscape (national park or national landscape)				-0.0271 (0.014)*
Constant	-3.4588 (0.6657)**	-3.3025 (0.844)**	-10.0500 (2.256)**	-1.8190 (0.703)*
Pseudo R-squared	0.24	0.13	0.20	0.14

Source: Authors.

3.4 Simulations

Ten different runs are computed per activity. For each run, 4000 different random points representing virtual farmers were created in the agricultural area of the region (excluding cities and forests). For each point, location characteristics that are included in the probit models have been retrieved from topographic and soil maps. The other explanatory farm household and characteristic data variables in the probit model have been drawn for each point based on GIAB information at the postal code level. Continuous characteristics (such as age) have been drawn from normal distributions for the postal code areas using the average and standard deviation observed within the area within which the point is located. For binary data, a uniform distribution has been used, where the threshold defining value 1 is the probability of the characteristic observed within the postal code area of a given location.

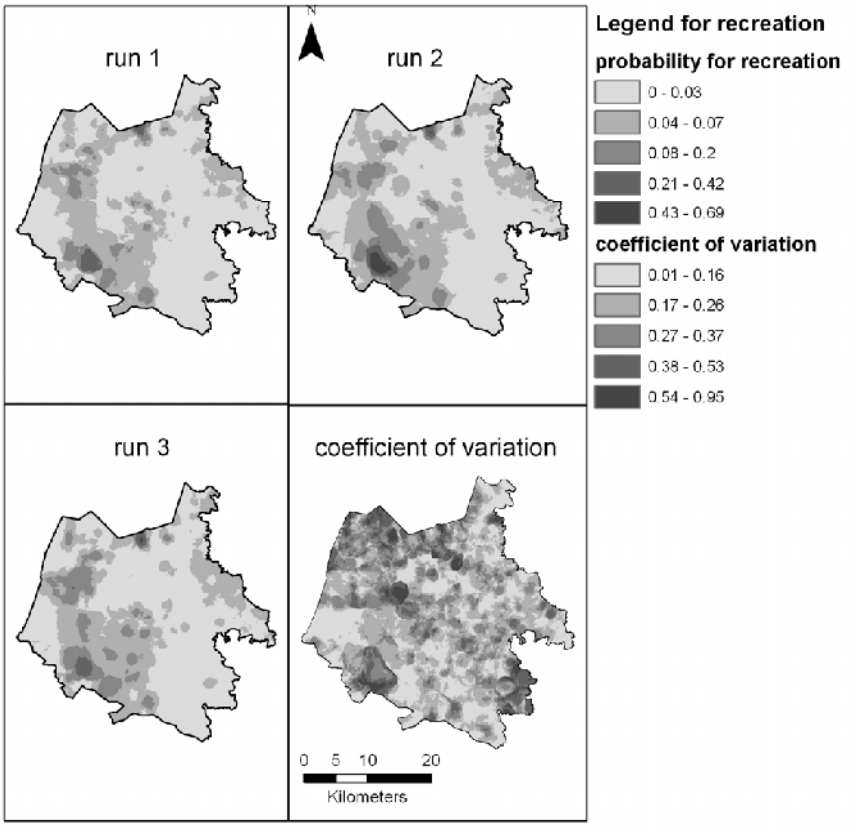
This procedure has been carried out for each simulation run, which results in 10 datasets of virtual farms containing the same variable that was used for the probit models. For each dataset, the probability of a virtual farmer taking up a given activity can be computed based on the prediction of the probit estimation.

3.5 Visualisation of the emergence of rural activities

In order to create maps indicating the probability of a given activity emerging for each location, the prediction for each virtual farmer has been interpolated with an ordinary kriging procedure (12 nearest neighbours). The first 3 pictures in Figure 3 show 3 of the 10 simulation runs for the take-up of recreation, while the fourth picture illustrates the coefficient of variation for the 10 simulation runs. The coefficient of variation is the ratio of the standard deviation of the average, leading to an index value that is comparable across different models. Thus, it can be interpreted as a normalised standard deviation that captures uncertainty linked to individual heterogeneity.

Firstly, patterns of the emergence of recreation look similar in all runs: Namely, within the national landscape Arkemheen-Eemland, south of the National Park, as well as some spots in between the two. Indeed, proximity to the National Landscape and National Park seems to be the main driver for explaining the observed pattern. The fourth map shows the coefficient of variation for the 10 runs. The areas with a very low probability of recreation also have a rather low coefficient of variation: Uncertainty connected to individual heterogeneity in areas with low probability for recreation is low, suggesting that the error likelihood for the prediction of having no recreation is rather low. While the emergence of recreation in areas with a high probability for recreation is probable, uncertainty linked with these developments is higher than for the area with no adoption. It can therefore be concluded that there is a window of opportunity for those areas to develop recreation.

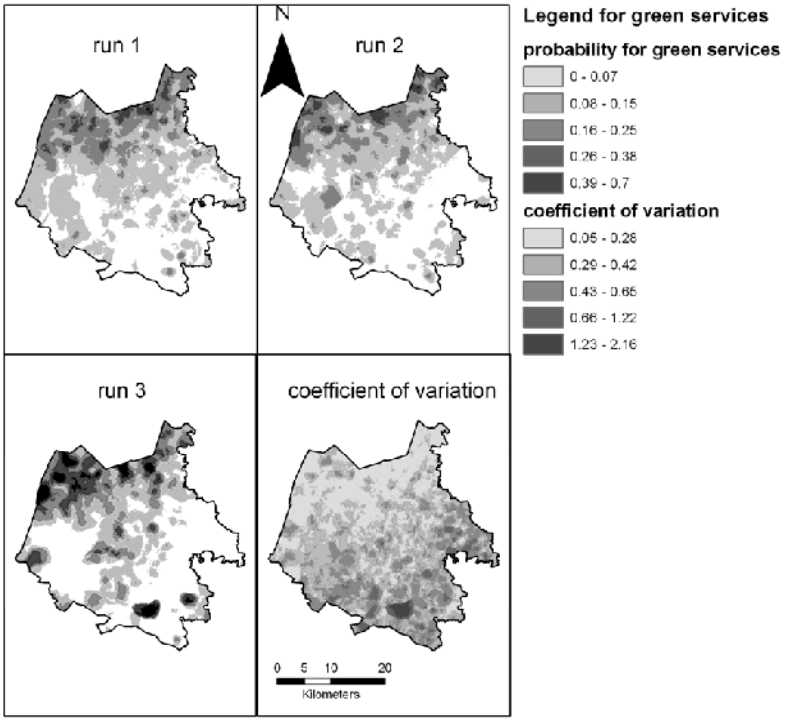
Figure 3: Three different simulation runs predicting the probability of taking up recreation and coefficient of variation for the 10 runs



Source: Authors.

Figure 4 shows similar results for green services. Also in this case, the landscape patterns look similar across the runs: The northern part of the region, mainly the National Landscape Arkemheen Eemland, has a high probability of taking up green services, as well as some spots in the southern part of the region. These locations have wet soils, which is an important driver for the take up of agri-environmental schemes. The coefficient of variance is much more important than for recreation. This implies that predicting the take up of agri-environmental schemes is less precise within the area due to individual heterogeneity. Nevertheless, similarly to the take up of recreation, location with a high probability are predicted less precisely than location where no change is expected.

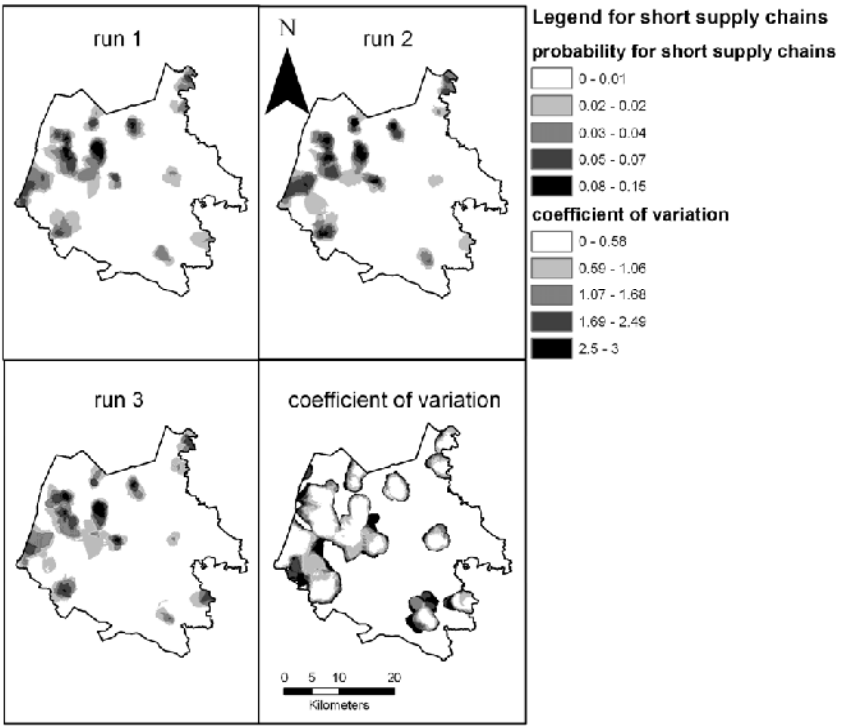
Figure 4: Three different simulation runs predicting the probability of taking up green services and the coefficient of variation for 10 runs



Source: Authors.

Figure 5 shows the results for the adoption of short supply chains. Again, the spatial pattern looks similar across all simulations. The western part of the area has the biggest opportunity to see these types of activities emerge. The coefficient of variation is higher than zero in areas where change takes place and is at its highest at the border of areas where change takes place. This implies that the location of prediction with a high probability of short supply chains is rather good with rather low uncertainty connected to individual heterogeneity. Lower but positive probabilities for short supply chains are predicted less precisely and individual heterogeneity plays an important role in the emergence of these activities.

Figure 5: Three different simulation runs predicting the probability of taking up recreation and the coefficient of variation for 10 runs



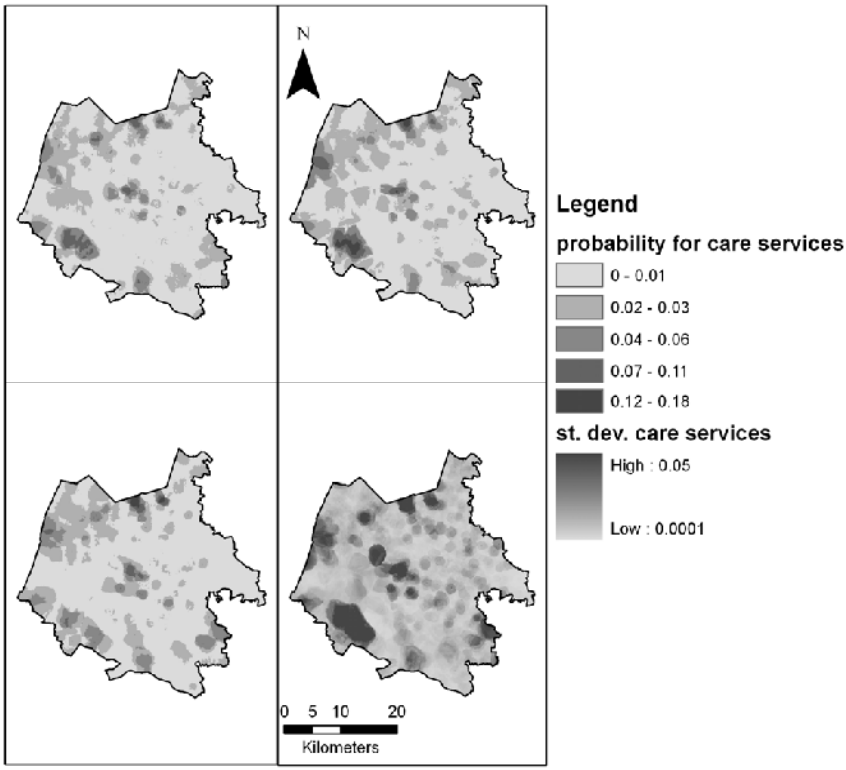
Source: Authors.

Figure 6 also shows 3 simulation runs for the emergence of on-farm care services that offer day activities for persons with special needs. Again, the spatial patterns look similar across all simulations. The western part of the area has the biggest opportunity to see these types of activities emerge. In this case, uncertainty linked to individual heterogeneity, measured with the coefficient of variation, is quite high. Locations with a high or a low probability for care services have a low coefficient of variation, indicating that predictions in those areas are rather good.

4 IMPLEMENTING SCENARIOS

To illustrate the implementation of scenarios we focus on the National Landscape Arkemheen Eemland, a region for which policy-makers are currently working on a rural development strategy. In order to have meaningful scenarios, 9 key stakeholders representing the major actors in the region were interviewed. A similarity between all the scenarios is city growth, especially the extension of Amersfoort.

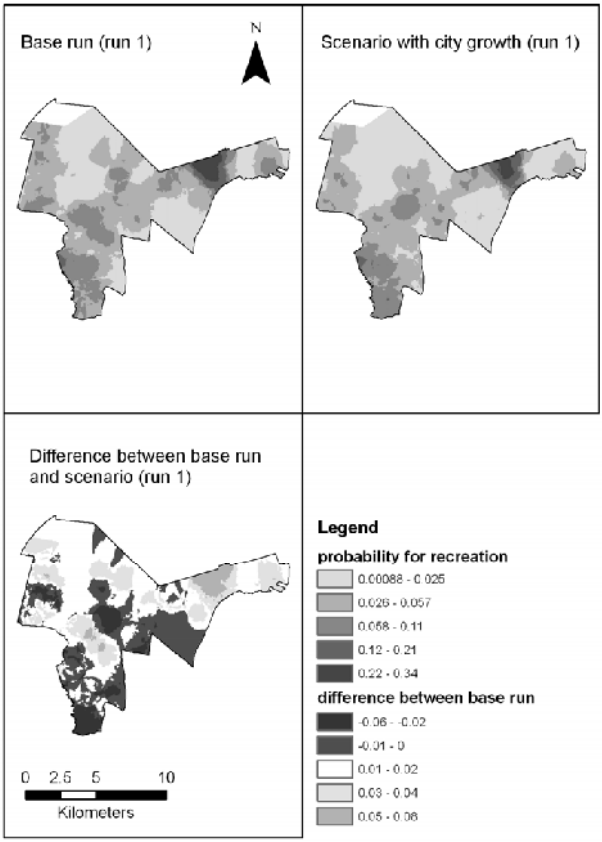
Figure 6: Three different simulation runs predicting the probability of taking up care services and the coefficient of variation for the 10 runs



Source: Authors.

This feature was used in order to illustrate the implementation of scenarios within the simulation framework. The implementation of this scenario consists of modifying topographic maps: The major cities grow according to the zoning plan of the province of Utrecht and Gelderland. In other words, distances to major cities are modified compared to the base runs. Figure 7 shows the base run for recreation, the scenario of growing cities and the differences between the two. Because proximity of the cities has a negative impact on the emergence of recreation, the probability for recreation reduces around the cities when the city of Amersfoort grows.

Figure 7: Comparison of the base run 1 and the city growth scenario



Source: Authors.

5 DISCUSSION

Ex ante policy analysis is usually based on econometric models. These generally do not cope with location specificity and base their predictions on average behaviours. These issues are quite limiting when it comes to defining new policies for rural development. Indeed, these policies usually target heterogeneous individual behaviour in order to reach spatially-explicit goals at the regional level, as for example a coherent network of functions. The presented framework overcomes these limitations by simulating the behaviour of heterogeneous virtual farms and predicting their supply of rural activities based on econometric production models with location assets. Econometric models cannot explain the whole phenomenon

because individual heterogeneity is never fully captured. This implies that predictions based on these models predict mainly the average behaviour and do not take uncertainty linked to individual heterogeneity into account. On the contrary, different simulation runs may capture this uncertainty: Variation between various simulations runs identifies spatial windows of opportunity for the emergence of rural activities.

Finally, various policy scenarios can be built into the model. Instead of predicting a given change based on average behaviour, the extension of the windows of opportunity can be visualised in a spatially-explicit way. The proposed approach might become an interesting tool for stakeholder participation in rural development decision-making processes: Stakeholders will be able to visualise, deliberate and learn about opportunities and dynamics in their area.

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AGRICULTURAL EXTENSION AND NETWORKS IN RURAL AREAS

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FEASIBILITY AND IMPLEMENTATION STRATEGIES OF DAIRY EXTENSION IN ULAANBAATAR/MONGOLIA

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ABSTRACT

The consumption of dairy products in the city of Ulaanbaatar was equivalent to 64 million litres of liquid milk in 2005 and is expected to reach 79 million litres by 2015, with local dairy farms supplying 12 million litres. The growth of the dairy market may also involve opportunities for extension work. This study analyses the current situation in the dairy sector and suggests extension strategies. Findings show that if a commercial extension service is financed with a business loan at the usual interest of 24 % p.a., it requires initial subsidising to a net current value of $71,126 for ten years.

Keywords: Dairy farming, commodity-specific extension, user financing, farmer organisation.

1 INTRODUCTION

Privatisation and commercialisation are on the agenda of many extension services (HOFFMANN et al., 2000, RIVERA, 2001). Some governments try to compromise between public and private interests by combining the private delivery of agricultural extension with public funding (KIDD et al., 2000, KATZ, 2002). It has been frequently reported that both governments and farmers tend to prefer the private delivery of extension (ALEX et al., 2002; LOOLAID, 2002; PROOST and DUIJSINGS, 2003; SULAIMAN, 2003). Most publications, however, focus on changes to existing systems rather than on the establishment of new extension systems, whereas the latter case might be more relevant for transition countries.

In Mongolia, agriculture contributes 21 % of the Gross Domestic Product (GDP) (NATIONAL STATISTICAL OFFICE, 2006). Having almost passed the transition to a market economy and attained a GDP-growth between six and eleven per cent in recent years, the country is a suitable place for investigating the possibility of

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establishing private extension in emerging economies. On the contrary to traditionnally established pastoral animal husbandry, semi-intensive dairy farming around Ulaanbaatar promises both more demand for and a better ability to afford extension.

This paper analyses the current conditions in the Mongolian dairy sector, characterrises the management of dairy farms and quantifies their economic performance. This knowledge is then used to elaborate strategies for dairy extension work and examine the profitability of both the farms and extension services. It was assumed that, even if service fees cannot fully cover the costs of extension work, there are possibilities to finance extension activities.

2 MATERIAL AND METHODS

Ulaanbaatar is the capital of Mongolia and has a population of one million, which is 40 % of the country's entire population. The city stands 1,350 meters above sea level and covers an area of 4,704 km². The mean air temperature fluctuates between -21.8°C in January and 16.9°C in July. The amount of precipitation is between 180 and 260 mm per year. In 2005, GDP per capita was $1,271, while the national average was $746 (NATIONAL STATISTICAL OFFICE, 2006).

A field survey was carried out between March and June 2006, and analysis of secondary material, key informant interviews and farm visits were conducted in order i) to study the recent history of the dairy sector, ii) to quantify dairy farms in the area, iii) to characterise the business environment of dairy farming, and iv) to collect the ideas of various stakeholders. The key informant interviews involved 26 persons including farmers, researchers, policy-makers, local authorities and NGO-representatives. Questionnaires were used for expert interviews, and interview guidelines for farmer interviews. The sector analysis was completed by a detailed survey of 30 dairy farms, which represent eight per cent of the total number of dairy farms in the study area. The selection aimed to represent the actual structure of dairy farms in the area: The sample consisted of 14 small farms with less than 15 cows, 15 medium farms with 15 to 30 cows and one large farm with 73 cows. Two questionnaires were used for data collection: One for quantitative farm data and the other for qualitative information on farm management, perception of problems and outlooks for farm development.

Data evaluation involved descriptive statistics as the main approach. The profitability of dairy farming was investigated with gross margin calculations. The farm economy was characterised by total gross margin, farm income, and management income as profitability measures, and the cash surplus as a measure of liquidity. The influence of farm size on profitability was examined with a linear regression. The results of the sector analysis were used for elaborating extension strategies. A multi-period

investment appraisal was conducted to find out to what extent a commercial firm could finance extension activities.

3 RESULTS OF THE SITUATION ANALYSIS

The dairy sector in Ulaanbaatar seems to have recovered from the post-privatisation crisis in the early 1990s and the stagnancy that followed. This is indicated by the increase of dairy farms and the high level of contentment that the farmers have with their businesses. Some 420 dairy farms had been established by 2005. While 52 % of the farms have up to 10 cows, 33 % have 10 to 20 cows, and the remaining farms have more than 20 but usually less than 50 cows. Industrial milk production increased from 1.5 million litres in 2000 to 7.1 million litres in 2005 (NATIONAL STATISTICAL OFFICE, 2006), and there is market potential for further growth in the sector. The increase of Ulaanbaatar's population boosts the dairy market. The total effective demand of milk and dairy products is expected to increase – expressed in raw milk amounts – from 64 million litres in 2005 to 79 million litres in 2015. If the current structure of milk suppliers persists, the farms can increase their production by three million litres until 2015 (Tab. 1).

Table 1: Current structure of milk suppliers in Ulaanbaatar and the expected structure for 2015 at constant market shares and consumption level of 66 l of raw milk per person

Suppliers	2005		2015	
	Market share	Supply, million litres of raw milk	Market share	Supply, million litres of raw milk
Farmers	19 %	12	19 %	15
Herders	53 %	34	53 %	42
Imports	28 %	18 (equivalent)	28 %	22 (equivalent)
Total	100 %	64	100 %	79

Source: NATIONAL STATISTICAL OFFICE, 2006.

In a better scenario, the farms could also increase their market share. While imports are justified by the lack of domestic capacity, the farmers could share the herders' market share. By taking over half of the herders' share, farmers could be supplying 36 million litres in 2015. The additional volume of 24 million litres allows 800 new farms with 15 cows to enter the market. Alternatively, the currently existing farms could double their production, and there would be still a market capacity for 400 new farms with 15 cows.

The sampled farms were family-run commercial farms specialising in dairy production. The semi-intensive farming system was characterised by a grazing season of 176 days per year. Grazing is free of charge. The average daily feed ration over the grazing season consisted of 11 kg dry matter (DM) of pasture grass and 1.2 kg DM of bran, while the average ration during the stall period consisted of eight kg DM of hay and 2.3 kg DM of bran. The dairy herds were dominated by the "Black

and White" and "Alatau" breeds. In 2005, twenty per cent of the farmers inseminated their cows artificially, while the remaining farmers applied natural insemination in 2005. Most cows delivered between March and May.

Table 2: Dairy farm characteristics in the Ulaanbaatar area (N=30)

Parameters	Unit	Mean	Min.	Max.
Farm parameters				
Number of cows	N	16	3	73
Capital intensity per cow	$/year	479	364	907
Labour input per cow	man hour/year	357	179	1,497
Duration of the grazing season	days/year	176	139	244
Dry matter supply	Kg/year	4,063	3,667	4,753
Energy supply	MJ NEL/year	19,991	17,938	23,290
Protein supply	Kg nXP/year	443	395	518
Lactation yield per cow	Liter/year	2,460	1,845	3,090
Total milk production	Liter/year	37,213	5,895	173,950
Profitability				
Gross margin per cow	$/year	383	196	644
Total gross margin	$/year	6,438	738	21,797
Farm income	$/year	4,658	613	15,166
Return to unpaid family labour forces	$/man hour	0.9	-0.4	2.6
Return to equity capital	%	40	-84 %	240 %
Management income	$/year	1,997	-1,569	10,418
Liquidity				
Consumable income	$/year	5,176	1,230	16,534
Cash surplus	$/year	2,582	-810	13,500

Source: Authors.

Major parameters characterising the farms are summarised in Table 2 and reveal their competitiveness. Converted to a month's salary of $180, the return on unpaid labour is 114 % higher than the average salary in Mongolia. The return on equity capital is 40 %, which is 22 % higher than the average interest of saving accounts. However, there are substantial differences between the farms in functional parameters, as well as in their economic performance. More intensified farms are more productive and profitable. Simple quantitative indicators of intensification are the duration of the grazing season and feed rations. Qualitative indicators include breed, barn comfort, properness of insemination, and quality of inputs. Larger farms tend to be more intensified and thus more profitable than smaller farms. Further, they not only have better possibilities of optimising their production systems and bearing risks, but also better intellectual capacities and higher motivation.

The following linear regression applies to the dependence of management income on farm size: $y = 144x - 338^*$, where,

y = Management income, $ per year,

x = Number of cows, n, and

* = Significant at the 0.01 level.

The following major problems were identified: i) lack of credit opportunities, ii) lack of feedstuff, iii) overgrazing, and iv) deterioration of the cattle breeds. Farmers' development plans included fodder cropping, expansion of the dairy herd and on-farm milk processing. Individual plans also included moving to a less intensively grazed area, fattening male calves and mechanisation.

4 DISCUSSION OF STRATEGIES FOR DAIRY EXTENSION WORK

Dairy extension should help farmers make better decisions by informing and motivating them, with farm consultancy measures being aimed at breeding, feeding, barn comfort, on-farm milk processing, and farm management. Correct solutions will always depend on the size, the level of intensification, the capacity to bear risks and the entrepreneurship skills of the respective farmers. Emphasis should be laid on intensification, e.g. through the intensive use of AI, and on supporting the farmers in attempting new approaches such as fodder cropping, cattle breeding or fattening male calves.

Farm consultancy should employ a mix of extension methods. Mass extension methods are appropriate for informing various groups, while group discussions are more useful for elaborating development proposals and projects. Trainings will be preferred to individual consultancy due to lower costs. Even if it is only affordable for larger farmers, individual extension is necessary for some services, e.g consulting on farm economy and business plan service.

Advising/training measures, however, will yield limited results if the farms' business environment do not improve. Thus, dairy extension has to extend its view of target groups: These include not only farmers but also other stakeholders, especially service providers. As a facilitator, the dairy extension service will primarily focus on promoting AI services and facilitating financial services. Two approaches to improve the availability of credits can be raised for discussion: Accepting future milk production as collateral, and promoting supplier and buyer credits.

The extension tasks and activities described above require funding. Full cost-recovery may only be possible for individual services targeted at large farms. In addition, as long as extension impacts are limited by the unfavourable business environment, the farmers would not accept full cost-recovery. Thus, a dairy extension service should generate income otherwise and invest a portion of this income into its core extension activities. The most feasible income-generating activities include establishing a financial service and trade of feedstuffs. A sale-and-lease scheme seems to be an appropriate form of financial service. In this scheme, the farmers sell cows to the extension service and lease them back, i.e., the cows remain at their farms. The farmers bear the risk of cow losses, and compensate in kind if a leased cow dies. Feed trade requires investment into local storehouses,

but the investment is justified since considerable amounts of cash will flow to the extension service, and no longer to feed traders.

A further essential function of dairy extension is organisational development. An effective way to get farmers organised may be to set a single target that should meet the interests of many farmers, promise high returns for their financial participation, and, ideally, suit the interests of other stakeholders. Establishing milk collection centres near dairy farmers may fulfill these requirements; it would enable the dairies to contract a single partner and thus reduce their transaction costs. The incentive for the farmers is to reduce transport costs and the risk of milk spoilage. Since the milk collection centres would be equipped with milk cooling tanks, the farmers would no longer require coolers or freezers. The idea may also attract farmers because the co-operative milk collection can become a first step towards realising their plan to set up co-operative milk processing plants.

In its pilot phase, the dairy extension service is assumed to serve 50 % of the potential clientele, i.e., 207 farms with 2,615 cows. The organisation should consist of a head office in the city and local branches in the villages of "Gachuurt" and "Jargalant", and employ five advisors in addition to a manager and a secretary. If we assume that the client farmers purchase 50 % of their total hay provision and all the bran they need, three storehouses (one in each location) with a total volume of 1,650 t hay and 800 t bran will be required. Investment into the storehouses was estimated at $16,000 and the total budget for facilities and equipment is $29,000. Operational costs of the service without extension activities are $209,206, and include the initial financing of the loan service and the feed trade, salaries, rents, overheads, variable costs of vehicles and costs of feed storage. Revenues will be generated by the leasing service and feed sales. The rate of the leasing was set at 30 % p.a., which is 6 % lower than the average interest of smaller bank loans. In this case, the farmers' payments include the loan repayment of $69,200 and a total of $20,760 for the interest. The revenue from feed trade is $135,408 per year. The investment appraisal reveals that the leasing service and feed trade are profitable. Even when financed by a business loan with the usual interest rate of 24 % p.a., the project is able to yield surpluses to a net current value of $40,152 (Table 3).

Table 3: Results of the multi-period investment appraisal of the suggested pilot project at different rates of interest for credit financing (without extension activities)

Positions	Unit	Interest rate of the loan		
		12 % p.a.	18 % p.a.	24 % p.a.
Credit volume	$	238,206	238,206	238,206
Term	year	10	10	10
Assumed inflation	%	5	5	5
Outcomes:				
Benefit-Cost Ratio	$	1.05	1.04	1.03
Net current value of the investment	$	82,574	57,311	40,152

Source: Authors.

In order to conduct extension activities, the project requires three more cars, and $20,700 per year (at approximately $100 per client farmer) for financing extension activities. If we assume that service fees cover 25 % of the costs, the current value of the extension costs over ten years is $111,277. This is more than the amount the project could afford, which is $82,574 if the project is financed with a soft loan, and $40,152 if the project is financed with a business loan. The proposed project will, if it is financed with a business loan, require a subsidy of $71,126 in order to sustain the extension service at the annual budget of $100 per farmer for ten years. More would be needed if the suggested budget would be insufficient.

5 CONCLUSION

A commercial dairy extension service should primarily focus on income-generating activities. Leasing services and feed trading are feasible and profitable options for the extension service, and they have also been mentioned as necessary by the farmers. One might wonder if extension activities are necessary at all if a commercial organisation already earns profits with these services. This is a short-sighted view: Only if the farmers are able to use the inputs best will they increase their income and pay more. The integrated concept of extension and input supply is based on a fair relationship of give and take. Unfortunately, even a combination of multiple income sources does not enable a dairy extension service to finance its core activities without external funding. Thus, initial subsidising is necessary. But that does not mean that the subsidy is not paid back, nor does that indicate long-term dependence on subsidies. The future development of the sector will lead to increased competition for the farms, in which those with knowledge-based management will survive. When the value of knowledge attains a level where dairy extension is financially self-sustaining, the extension service will be able to release itself from other tasks and to focus on non-material forms of assistance. The delivery of agribusiness services, but also that of the core extension activities should be gradually shifted to farmer organisations. Eventually, the extension service itself can be owned by a farmer organisation or dissolved.

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THE RELEVANCE OF SOCIAL NETWORKS FOR THE IMPLEMENTATION OF THE LEADER PROGRAMME IN ROMANIA

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ABSTRACT

This paper assesses the relevance of social networks for the implementation of the EU-funding instrument LEADER for rural development in Romania. Key approaches of LEADER are partnerships, a bottom-up notion, and EU-wide networking. To analyse the relations between stakeholders involved in the implementation process of LEADER in Romania, surveys among (potential) Romanian, German and Hungarian beneficiaries and agencies were conducted. Data were analysed using the software UCINET. The results show that the Romanian actors (1) have problems establishing formal partnerships, (2) do not easily comprehend the concept of LEADER, and (3) consider foreign actors to be important sources of information.

Keywords: LEADER, Romania, social networks.

1 INTRODUCTION

Romania is introducing the European Union (EU) funding instrument LEADER[1] as part of its rural development policy for the first time in the running period 2007-2013. The objective of this instrument, which was created in 1991, is to advance the development of rural regions. So-called local action groups (LAGs) elaborate strategies for developing a self-defined region. LAGs usually consist of public-private partnerships. LEADER co-finances competitively selected regional development concepts of LAGs, as well as LAGs collaboration projects located in one or more countries. LEADER combines multiple notions: A territorial and a bottom-up approach, as well as the approaches of integrated regional development and innovation. Furthermore, LEADER is implemented in a decentralised way. This

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[1] LEADER means "Liaison entre actions de développement de l´économie rurale". The English translation is "Links between the rural economy and development actions".

implies that the LAGs have to deal with implementing agencies at the regional level. During Romania's socialist era, regional policy measures and local institutions were virtually non-existent (HEIMPOLDT, 2002). In the course of preparing for EU accession, institutional decentralisation became part of the political agenda (BACHTLER & DOWNES, 2000). From 2000-2006, when Romania was still an accession candidate, legally registered microregion-associations[2] were formed in many counties (MARD, 2008), pp.). The purpose of these associations was to gain access to EU structural funds. During this period, Romania also gained experience with rural development policies when the country implemented the SAPARD[3] pre-accession instrument (Ibid., p. 89). Preparations for implementing LEADER began at the end of 2006, when 121 regions were selected. Representatives (LEADER-animators) from these regions could take part in LEADER seminars. Applications for participation in LEADER were planned to be submitted until the beginning of 2009. Networking in the form of partnerships and collaboration is deemed crucial for rural development. The additional benefit of networking – often described as social capital – is well-known and is addressed by several recent studies in the context of LEADER (cp. MOSELEY, 2003). However, the implementation process of the programme, i.e., the social networks of potential LAGs, as well as the position of the programme agencies and their influence on the network genesis, have not yet been sufficiently addressed.

This paper contributes to a better understanding of the role of social networks in the LEADER implementation process by analysing the impact of specific properties, structures and dynamics of social networks on LEADER in Romania. Unlike other studies, this one does not focus on success stories about partnerships, but analyses the social networks of LEADER initiatives quantitatively. Further, it identifies key-stakeholders, potential beneficiaries, and the factors associated with success (or failure).

2 MATERIAL STUDIED, AREA DESCRIPTION, METHODS

This paper draws on results of a 2008 survey among potential Romanian LAGs and the responsible agencies, as well as among German and Hungarian LAGs. A total of 104 (potential) LAGs, 33 Directorates for Agriculture and Rural Development (DARD) – in the following addressed as Romanian programme agencies – and 13 experts from, for instance, the Romanian Ministry of Agriculture and Rural Development (MARD) have completed structured questionnaires via e-mail. The core of the research was a detailed case study on the specific relations between

[2] Microregion associations are inter-community associations – these communes develop and co-finance projects together.

[3] SAPARD stands for "Special Accession Programme for Agriculture and Rural Development".

single actors of two potential Romanian LAGs and on relevant institutions. Both LAGs are situated in Harghita County, where 85 % of the population are Hungarians (INS, 2006); 72 % of the potential Romanian LAGs emerge from a microregion association. This also applies to one of the two potential LAGs in this study (LAG_MA), the second of which developed bottom-up (LAG_BU). For both potential LAGs, the same programme agency is responsible. The data collected in the case study were analysed with the UCINET[4] software, which facilitates the statistical evaluation of specific network structures. The results of this network analysis are seen, interpreted and discussed against a background of descriptive results of the other surveys. The population of the actors in the networks was not predefined. Instead, the networks were seen as open, and a so-called snowball sampling method was applied (cp. SCOTT, 1991), which aimed to indentify all important actors starting from selected key-actors (origins). Actor relations have been analysed in terms of communication, formal and informal contact, trust, experience, the process of institutionalisation, flows of information, collaboration and support. A contact matrix was used for collecting relational data.

3 RESULTS

The results of the Social Network Analysis are divided into two parts: Section 3.1 analyses the transfer of information about LEADER, and is followed by an analysis of the development of potential LAGs in Section 3.2.

3.1 Flows of information about LEADER

Information flux is important to ensure that attendant processes are triggered, for instance, the bottom-up creation of LAGs. To analyse the flow of information about LEADER, all consulted actors from both LAGs and institutions have been considered. Further sources of information such as media or other actors than have been mentioned in the survey have been incorporated into the analysis. The analysis differentiated between the transfer of initial information and current information. Surprisingly, the analysis of the flows of initial information pointed to foreign actors as important sources for awakening the interest in LEADER. The out-degree-centrality[5] value of foreign actors is much higher than that of the programme agencies (Table 1 and Figure 1).

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[4] BORGATTI, S.P., EVERETT, M.G., FREEMAN, L.C. 2000: Ucinet for Windows: Software for Social Network Analysis. Harvard, MA: Analytic Technologies.

[5] The "degree" of an actor is the total number of actors to which it is connected. The "out-degree" is the total number of lines to which the focussed actor directs lines. The "in-degree" is the total number of actors which have lines directed towards the focussed actor.

Table 1: The out-degree-centrality of sources of initial information about LEADER

	Actors of both potential LAGs and selected institutions[1]		Actors of both LAGs[2]	
Number of consulted actors	59		52	
Network size	77		79	
	Actor	Out Degree (%)	Actor	Out Degree (%)
Ranking	LEADER-animator (LAG_BU)	7.90	LEADER-animator (LAG_BU)	11,76
	Microregion-Association (LAG_MA)	7.90	Microregion-Association (LAG_MA)	11,76
	MARD[1]	6.58	German students	9.80
	German students	6.58	County Council	7.84
	County Council	5.26	Internet, non-specific[1]	7.84
	Internet, non-specific[3]	5.26	Other media	5.88
Foreign actors (total)		22.39		33.15
Programme agencies	MARD	6.58 (vide supra)	MARD	1.96
	DARD	0.00	DARD	0.00
Distribution				
Min.		0.00		0.00
Max.		7.90		11.76
Mean		0.99		1.49

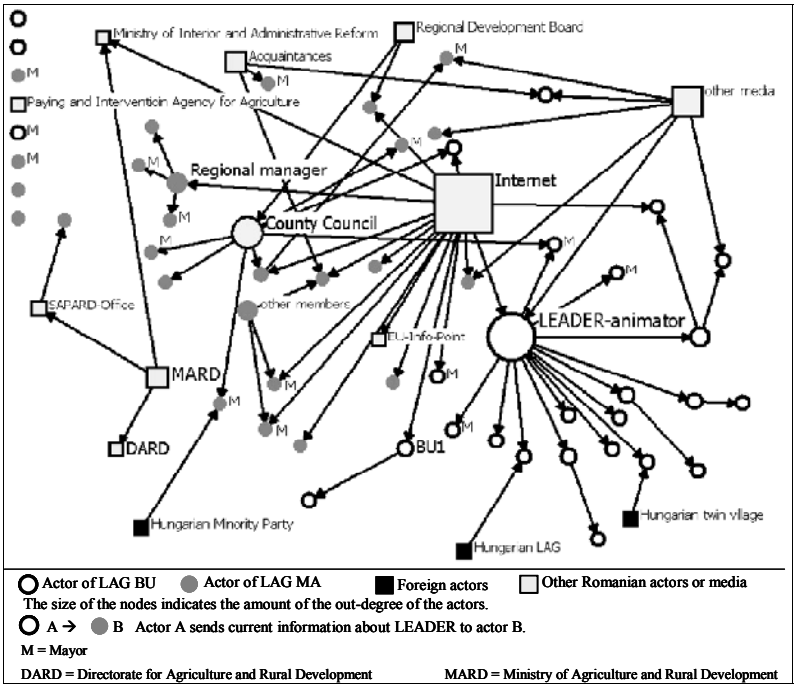
Notes: [1] Data in this column exactly equates to Figure 1.
[2] Sources of information mentioned by institutions are neglected.
[3] This category was used when the respondents could not name a specific webpage.

Actors with far-reaching relations for gathering and distributing information are key persons for the development of potential LAGs. These people are identified by comparing the in- and out-degree of the information networks. The results of the surveys show that people generally do not know much about how to take advantage of LEADER. The information chain features some main characteristics: (1) the programme agencies and their means play a surprisingly minor role in the network of transferring information about LEADER[6], (2) the programme

[6] The higher value of *out-degree* of the MARD bases on the entries of other agencies, but not of the entries of local actors. (Cp. column 2 and 3 in).

agency at the national level has a higher significance than the programme agencies at the regional level. This also applies to the transfer of current information about LEADER.

Figure 1: Social network: Flows of initial information about LEADER



Source: Authors.

In this network (Table 2 (column 2) and Figure 2), the leading persons of the two potential LAGs (the LEADER-animator of LAG_BU and the regional manager of LAG_MA) have a high *out-degree*. (3) The County Council[7] features a central position in the network and seems to be an important source of information. Remarkably, the analysis of the communication network shows that the "normal" contact of the local actors to the programme agencies (e.g. consultation because of agricultural concerns) is nearly as high as their contact to the County Council (Table 4 and Figure 4). Local actors consider their relation to the programme agency more favourably than that with the County Council. A major problem is that local actors (especially the mayors) wrongly consider the traditionally influential County Council and not the programme agencies responsible for LEADER.

[7] The County Councils which stand next to the traditional prefecture have been established with the transformation and consist of elected representatives of the communes.

To a small degree, other institutions, for instance Regional Development Boards, are present in the information network (Figure 2) and in the communication network (Figure 4), meaning that employees of public utilities can catch information about LEADER (incidentally) if they have nothing to do with "agricultural concerns". Generally, most actors are rather uninformed about LEADER[8], and the actors mostly obtain their information passively.

Table 2: The out-degree-centrality of sources of current information about LEADER

	Real network		**Virtual network** including the MARD-Homepage	
Consulted actors	Actors of both potential LAGs and selected institutions			
Network size	68		69	
	Actor	Out Degree (%)	Actor	Out Degree (%)
Ranking	Internet. non-specific	26.87	MARD-Homepage	54.41
	LEADER-animator (LAG_BU)	19.40	Internet. non-specific[1]	26.47
	County Council	10.45	LEADER-animator (LAG_BU)	19.12
	Other media	8.96	County Council	10.29
Programme agencies	MARD	5.97	MARD	7.35
	DARD	0.00	DARD	0.00
Selected actors	Regional manager (LAG_MA)	4.48	Regional manager (LAG_MA)	4.41
Distribution				
Min.	0.00		0.00	
Max.	26.87		54.41	
Mean	1.54		2.30	

Source: Authors.

Note: [1] This category is used when the respondents could not name a specific webpage.

[8] In both networks there are isolated actors that have not yet received any information about LEADER.

The position of the County Council as a political institution has been identified as crucial. Thus, looking at the values of betweenness[9] in the network of current information (Table 5), the County Council is pivotal. The flows of information run from the agencies through the County Council to other actors. In LAG_BU, the LEADER-animator who transfers information to the other actors has a high betweeness. This network constellation offers the possibility re-editing and then spreading information in a way that other actors can easily understand.

Table 3: The betweenness-centrality of sources of current information about LEADER

	Real network		**Virtual network** including the MARD-Homepage	
Consulted actors	Actors of both potential LAGs and selected institutions			
Network size	68		69	
	Actor	Between-ness (%)	Actor	Between-ness (%)
Ranking	LEADER-animator (LAG_BU)	0.77	LEADER-animator (LAG_BU)	1.19
	County Council	0.18	MARD-Homepage	0.98
	Employee of commune BU2 (LAG_BU)	0.09	County Council	0.18
			Employee of commune BU2 (LAG_BU)	0.13
Programme agencies	MARD	0.00	MARD	0.00
	DARD	0.00	DARD	0.00
Selected actors	Regional man-ager (LAG_MA)	0.02	Regional manager (LAG_MA)	0.07
Distribution				
Min.	0.00		0.00	
Max.	0.77		1.19	
Mean	0.02		0.04	

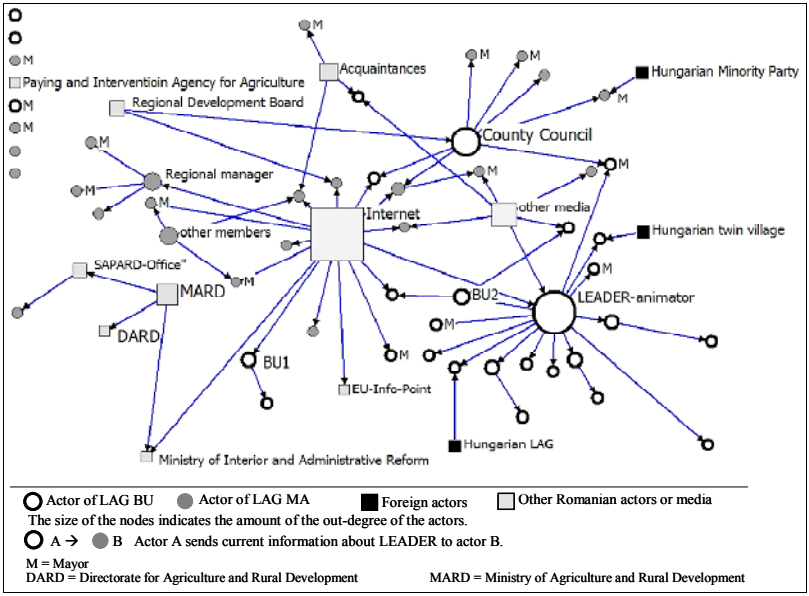
Source: Authors.

In addition to personal communication, the MARD homepage, which was not mentioned as a source of information in the surveys, could be a central instrument

[9] *Betweenness* is the proportion of the entire flow between two actors; for each actor then, the measure adds up how involved that actor is in all of the flows between all other pairs of actors in the analysed network.

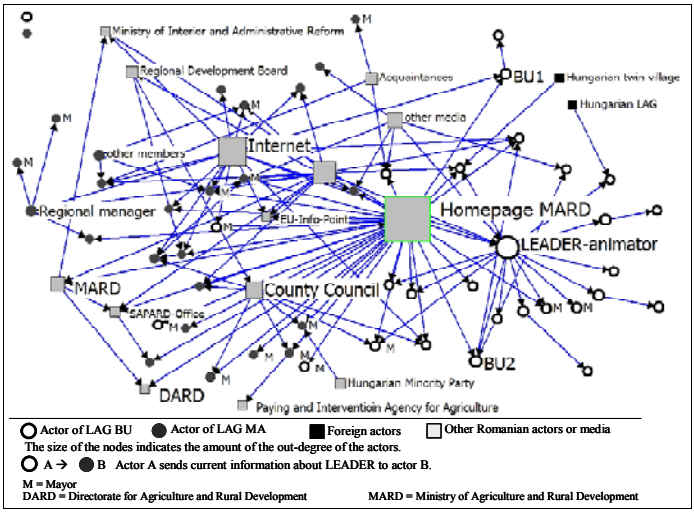
for spreading up-to-date information about LEADER. According to a closed question asked at the end of the interviews, more than half of the actors know the MARD homepage and a relatively high share of the actors, 85 %, have access to the Internet. Thus, the homepage has a high potential to be the primary source of information. Hence, the homepage was integrated in the network as a virtual network node, assuming that actors who know the homepage obtain current information about LEADER from it. The results show that in this virtual network, the homepage would have the highest *out-degree* (Table 2 and Figure 2) and the relative *betweenness* of the County Council would decrease drastically (Table 3). The LEADER-animator and an active employee of a commune (BU2) have a high *betweenness* in the network further on because they cross-link the members of the LAG_BU. It should be considered that a homepage can address many actors directly. However, for cross-linking, for integrating actors without access to the Internet, and for ensuring that the idea of LEADER is understood, the actors' activity is necessary.

Figure 2: Social network: Flows of current information about LEADER



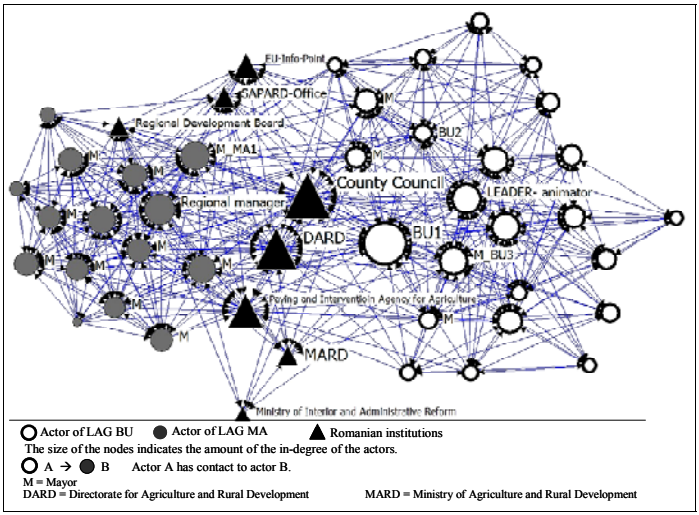
Source: Authors.

Figure 3: Virtual network: The potential of the MARD-Homepage as a source of current information about LEADER



Source: Authors.

Figure 4: The indegree centrality in the communication network between the actors of both potential LAGs and selected institutions



Source: Authors.

Table 4: The in-degree-centrality in the communication-network

Consulted actors	Actors of both potential LAGs and selected institutions	
Network size	48	
	Actor	InDegree (%)
Ranking	County Council	74.47
	Private actor BU1	68.09
	DARD	65.96
	PIAA[1]	53.19
	Regional manager (LAG_MA)	44.68
	Mayor MA1	42.55
	LEADER-animator (LAG_BU)	42.55
Programme agencies	MARD	42.55
	DARD	65.96 (vide supra)
Distribution		
Min.		4.26
Max.		74.47
Mean		28.73

Source: Authors.

Note: [1] PIAA: Paying and Intervention Agency for Agriculture.

3.2 Development of potential LAGs

The development of the LAGs, from the first initiatives to their status at the point of the case study, is reviewed in this section. Some of the actors of potential Romanian LAGs heard about LEADER long before it was promoted in Romania. Potential LAGs with such early information have an advantage in building capacities and establishing formal public-private partnerships sooner. Although activities in the field of regional development started early in both potential LAGs in the case study, they had problems complying with the criteria for participation in LEADER.

The initiatives of LAG_MA began eight years ago with the foundation of a microregion association (Footnote 14) in 2000. Activities regarding LEADER started in 2006. The microregion association features a closed network consisting of ten mayors and a regional manager with multiplex relations; the *density* of the network[10] has a high value for formal and informal relations. For the foundation of an LAG, the microregion association has to find commercial and social partners. The analysis shows that there were no flows of information about the potential LAG to outsiders, with the exception of public utilities employees and a few businessmen. These businessmen expect a procedure similar to that which drove pre-accession programmes[11]. The integration of those actors seems to be difficult: The "invited"

[10] The "*density*" is the number of lines in a graph, expressed as a proportion of the maximum possible number of lines, which is: (n(n-1)) /2, if n = number of actors.

[11] Unlike other EU programmes, LEADER does not follow a single-project approach, but aims at integrated regional development, which requires the cooperation of different stakeholders.

actors take an outsider position in the LAG_MA and in fact have a low degree in all sorts of social networks.

LAG_BU was initiated by private actors six years ago and had grown slowly in a loose, outgoing network with a mixture of informal and formal relations. The leading persons collaborate because of common interests in regional development (e.g. expansion of tourism). Poorer active people who cannot pay a contribution are accepted in the group due to social pressure in the rural milieu. In order to convince mayors to get involved in LEADER affairs, private actors possessing high supra-regional reputations were needed. These persons have a high in-degree in the contact network of a broader area: E.g. the private actor BU_1 is well known by actors and institutions in the whole county (and Figure 4). Additionally, to reach the requested "critical mass" as stipulated in the Romanian LEADER programme by 2009, a fast expansion of the region and increase in number of formal members in LAG_BU would have been necessary. But the attempt to meet this criterion – which was mostly stimulated by an external LEADER animator of a supra-regional organisation – failed. The extension of a social network in which the members trust each other – adequate for the foundation of a formal partnership – requires time and readiness for action. In this case the extension of the network was hampered by a lack of social and geographical propinquity. In the network analysis this is highlighted by clusters that are bridged by the LEADER animator. Despite transitional assistance offered by the LEADER animator, the actors of the potential LAG_BU were not proactive enough to establish new social relations; ultimately, this led to a collapse of the LAG, which has dissolved. The actors of the original core of the initiative – the slowly grown network – continue to collaborate.

The Romania-wide surveys revealed that a lack of initiative is a severe constraint to LEADER: (1) the local actors have problems with elaborating strategies: In fact they would prefer pre-defined measures; (2) The local actors have difficulties establishing organisational structures not just due to a lack of experience, but because of difficulties assuming responsibility in formal affairs. Indeed, the analysis of the flows of information concerning the LAGs themselves shows that in both potential LAGs, these networks have nearly no reciprocal relations and no crosslinks. In the LAG_MA, a paid regional manager has the highest out-degree; the network has a very high centralisation (i.e., a very tight organisation of the graph around its most central point(s)) and short directed paths from transferring information to the mayors. In the LAG_BU, the honorary LEADER animator has the highest out-degree, but the network is not as highly centralised because mouth-to-mouth propaganda (longer paths) and isolators, which obtain and receive no information, are found.

4 DISCUSSION AND CONCLUSION

The analyses revealed many difficulties with the preparation and implementation of LEADER in Romania. We show that social networks are a key element, and are decisive for the success or failure of LEADER initiatives.

Within the networks, the collaboration of the communes is essential for the success of LEADER in Romania: Not only are they potential partners in LAGs, but normally have the necessary contacts to relevant institutions and access to LEADER-related information. Depending on their interest in LEADER, they can become a main information carrier and promoter for the programme if they accept its bottom-up and participatory approach. Administrative capacities – which bottom-up initiatives do not initially possess – and human capital are essential for fulfilling the formalities stipulated in the programme. Communes possessing these assets will be strong in the competition of potential LAGs. Especially microregion associations can build on their experience with EU-programmes (see footnote 2) and existing organisational and cohesion structures. Their main challenge with regard to LEADER is the integration of at least individual private and social actors in the formal network. The communes prefer public utilities with their skilled personnel to local organisations as social partners. Public utility actions which underlie social control can be assessed by the communes in a better way than the actions of local organisations. However, according to LEADER guidelines, the proportion of public partners in an LAG is restricted. The involvement of multiple organisations could stimulate democracy. Thus, supra-regional organisations have a key function for the realisation of LEADER in Romania: The network analysis has shown that external actors such as the LEADER animator in LAG_BU are accepted as neutral mediators by the various stakeholders.

In Romania, County Councils still have a high influence on regional development policy. Local actors (and communes) often do not understand that LEADER is more a functional than a political issue. Therefore, old political networks are still strong and power remains with the County Councils.

Bottom-up networks possess social capital, especially if they are also maintained without the possibility of accessing financial resources from LEADER. However, these networks show difficulties adapting to specific requests spontaneously. Therefore, their competitiveness lies rather in the long-term than in the short-term perspective. Potential LAGs get stronger with the number of actors with different widths of network-radius. In the best case scenario, strong local ties that allow social control are combined with far-reaching relations as a source of information. Nonetheless, we find that external support will be only long-term success if it relies on reciprocal ties or if it stimulates networking in the region. This aspect should be considered in the selection process of potential LAGs, if external support was given to comply with the programme criteria. Further burdens for the realisation of a bottom-up approach are: (1) a lack of initiative by the locals; (2)

the complexity of the LEADER guidelines[12]; and (3) the effort needed to start bottom-up initiatives, i.e., to overcome the aversion to formal affairs and to break the powerful status of the communes. To overcome these obstacles, LEADER has to be promoted in a way that the people understand the bottom-up approach and become able and willing to implement it.

Building social capital is particularly important in the relations between potential beneficiaries and programme agencies. The necessary personal trust depends on "facework" (GIDDENS, 1991, 80). Currently, such "facework" cannot be accomplished by the programme agencies because of a lack of personnel. The programme implementation procedure is unclear and thus hampers attempts to build confidence.

To conclude, the analysis has shown that (1) you seldom find social networks among Romanian actors that are structured in such a way as to follow a real LEADER-like bottom-up and participatory approach; (2) the networks among the agencies and their relations to the people are not strong enough for effective implementation of the programme; and (3) successful steps in the implementation process are often based on far ties to experienced foreign actors.

Keeping in mind that the process of implementing LEADER in Romania is still not running as planned and changes in its steering are necessary, the relevance of this study is obvious. Actively establishing social networks – "networking" – supports the implementation process of LEADER in Romania. On the one hand this has to be done by the potential beneficiaries themselves, but it can also be externally stimulated. Hence, we would like to draw the attention of policy-makers to the following: (1) more money should be directed to agency staff instead of printed media for information brokering; (2) a re-design of the MARD homepage should be considered to make use of and effectively inform visitors; (3) satisfaction with the participatory approach should be verified by the selection of the LAGs; and (4) EU-wide networking (not only within LEADER) is a key element of successful LEADER implementation.

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[12] As seen in the case study, the programme's bureaucracy leads wealthy actors, who would be preferable partners, to turn away from LEADER even if they understand the guidelines.

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QUALITY ASSESSMENT PROBLEMS OF AGRICULTURAL ADVISORY CENTRES' SERVICES

GUNTA GRINBERGA *

ABSTRACT

Implementation of the EU common agricultural policy in Latvia has resulted in both positive tendencies – modernisation of farmsteads, optimisation of agricultural production and landscaping of the countryside – as well as ambiguity, since farmers have to rearrange the former farm management styles according to EU standards and requirements, thereby exposing their farms to increasing bureaucratic burden, which discourages almost every farmer regardless of one's scale of production. The Latvian Rural Advisory and Training Centre is the main provider of advisory services, facilitating rural development by improving the professional and economic knowledge of rural entrepreneurs. This article presents an analysis on the quality assessment problems of rural advisory services in Latvia.

Keywords: Rural advisory centre, advisory services, quality expectations.

1 INTRODUCTION

Accession to the European Union (EU) in 2004 was an important turning point for Latvia, which resulted in adopting EU normative acts, inter alia requirements regulating agricultural activities. At the same time and along with establishing single area payments', structural measure support mechanisms changed. One of the often-claimed basic benefits before and after EU accession was the prospect of increasing support to Latvian farmers and following growth of economics and prosperity.

The priorities of Latvian agriculture's first programming period after EU accession (2004-2006) were to uptake and administer the EU support tools. The received support was used to enable farmers to restructure their farms according to the EU common agriculture policy (CAP) guidelines.

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The second programming period requires the continuing facilitation of rural development according to the country's rural development strategy. Therefore, the Ministry of Agriculture has prepared a middle term political planning document titled "Latvia Rural Development National Strategy Plan 2007-2013". While from 2004-2006 Latvia's main strategic purpose was to acquire EU financial support, in the second programming period (2007-2013) rural development itself takes the central role in the Rural Development Strategy. However, the development of agriculture as an industry of the national economy that provides production of agricultural products and the provision of its related services, has become less important and less of a priority.

The most hindering factors for Latvian agriculture today are ineffective information exchange among rural entrepreneurs and state institutions, the lack of knowledge about the latest production methods and technologies, poor management skills and limited access to capital. Consequently, a lack of access to technical expertise hinders Latvian entrepreneurs from becoming equivalent and respectable partners in producers' coalitions. Access and availability are crucial factors in the agricultural industry, just as they are in any other of today's industries. In the new post-industrial economy, which is often called as access economy, entrepreneurs admit that it is more efficient to form clusters with industry associates and share skills, knowledge and information than to remain a single independent market player. In today's world it is common for suppliers and consumers to establish contacts that facilitate the exchange of both their material and intangible resources, i.e., information and expert opinions. Modern marketing professionals recognise that joining forces will ensure greater opportunities for their enterprises to achieve their targets (RIFKIN, 2004). The sociologist MANUEL CASTELL from the University of California, Berkeley posits that there will be five main networks in the future for entrepreneurship:

- Suppliers' networks, where entrepreneurs will agree on a particular order or delivery of raw materials;
- Manufacturers' networks, where companies will unify their production capacities, financial resources and human resources in order to offer a wider range of products and services, expand their geographical markets and reduce possible risks;
- Consumers' networks, which will connect manufacturers and distributors of goods with marketing channels;
- Standard coalitions, which will amalgamate as many one-sphere enterprises as possible;
- Technological cooperation networks, which will provide enterprises with the possibility of exchanging valuable knowledge and becoming acquainted

with expert opinions in order to analyse product lines and promote their development (CASTELLS, 1996).

The exchange of information and expertise is still a serious drawback for the sustainable development of Latvian agriculture, as is regularly mentioned by various farmers' associations and headlined in Latvian mass media. A lack of contemporary knowledge in business, agriculture, production engineering and legislation has encouraged rural entrepreneurs to begin studies at the Latvia University of Agriculture, become customers of the Latvian Rural Advisory and Training Centre, attend various courses and studies available in their parishes, become members of associations representing the interests of rural entrepreneurs, as well as look for other opportunities where they could acquire knowledge on topical issues.

Regulation No.1783/2003 of The Council of Europe states that all EU member states must establish a household advisory services system. This is necessary to help the farmers meet modern and high quality agricultural standards related to the environment and animal protection, plant protection and food safety, animal well-being and good agricultural and environment conditions (Regulation No.1783/2003 of The Council of Europe). Consequently, on 9th May 2005, the European Agriculture Guidance and Guarantee Fund approved the national program titled "Establishment of rural advisory and farms' extension service" and its project, "Establishment of rural farms advisory system" (Project). In Latvia, the recipient of the Project's financing was the Latvian Rural Advisory and Training Centre (LLKC). The total amount of the Project was more than 3 million EUR (Latvia Rural Development Plan for Implementation of Rural Development program 2004-2006).

With its 26 regional offices, LLKC is the largest provider of rural advisory services in the Latvian countryside. Of course this organisation was chosen for the implementation of the Project due to its permanence, accumulated experience and network of regional offices. There, rural entrepreneurs can receive help with problems connected with agricultural and non-agricultural entrepreneurship, including project development for receiving support from EU structural funds, applications for bank loans and the compilation of business plans. The direct purpose of the Project was to increase the LLKC's capacity in order to adjust agricultural activities to European Community standards related to environment protection, hygiene, animal well-being and good agricultural practice, as well as to implement computer software for the management of farms and agro-environment planning and to provide information for farmers in order to facilitate the development of economically viable farms. After the realisation of the Project, the trained advisors from rural advisory offices are expected to independently provide consultations for the farmers about the standards demanded by the Council of Europe. Another purpose of the project was to develop professional skills for those rural entrepreneurs who are involved in agricultural, forestry and other activities; this is required by the European

Parliament under its ongoing education memorandum. The significance of preparing farmers for the qualitative reorganisation of production was emphasised.

However, the consequences of the Project's financing has brought the LLKC to a more privileged position than other advisory services' providers, and farmers often express dissatisfaction with the LLKC's passive reactions to market demands. Moreover, according to Article 66(3) of Council Regulation (EC) No 1698/2005 regarding the development of the National Rural Network and Latvia Rural Development Program 2007-2013, it is planned to involve organisations, administrative bodies, ministries and their sectoral institutions with information summarisation, evaluation, coordination and dissemination. The Latvian Ministry of Agriculture has chosen the LLKC as an administrative body for the National Rural Network. Other agricultural associations have already raised concerns about the lack of transparency in the development of the National Rural Network, and distrust leaving the establishment of the network to an organisation that is unable to provide competitive and market-driven advisory services.

Since information access and advisory services are of crucial importance, the author has performed an analysis of the present gaps in LLKC's service provision, focusing on LLKC recognition among farmers, farmers' access to services, the most demanded and disapproved of services, as well as LLKC employees' self-appraisal about the services they render to farmers.

2 METHODS

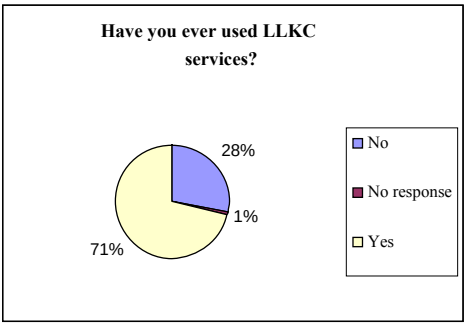
The descriptive method was applied to perform a detailed analysis of LLKC services. The analytical method was applied to divide LLKC services into separate groups and analyse each group. Methods for mathematic data processing were applied, i.e., the calculation of arithmetic mean and data graphic description. Expert survey methods were applied to obtain rural advisors' opinions regarding existing gaps in their customer service. A logical construction method was applied in the conclusion to present the author's conclusions about the results of the research.

In previous research, the author has mainly focused on the range of services provided by LLKC. Therefore, this research places more emphasis on the quality assessment problems of the services. The research comprises analysis of two different survey data. In the beginning of the article, the author analyses secondary data from a 2007 Marketing and Public Opinion Research Centre (SKDS) survey, which was organised by LLKC and the public opinion research centre SKDS. This survey comprised 307 respondents (quota sampling) of the target group – Latvian producers of agricultural production – using the survey method CATI. After secondary data analysis, the author analyses the data of LLKC regional offices' expert survey, which was organised by the author in 2008 to obtain LLKC employees' self-appraisal regarding their provided services.

3 RESULTS AND DISCUSSION

For the assessment of LLKC recognition among Latvian farmers, the author has referred to secondary sources, i.e., an SKDS survey, which at that time was tailored to evaluate public sentiments regarding Latvian agriculture prospects. In 2007, alongside many other issues about LLKC services, the question about identifying LLKC services was included in the opinion survey of Latvian farmers.

Figure 1: LLKC recognition among farmers



Source: SKDS, 2007.

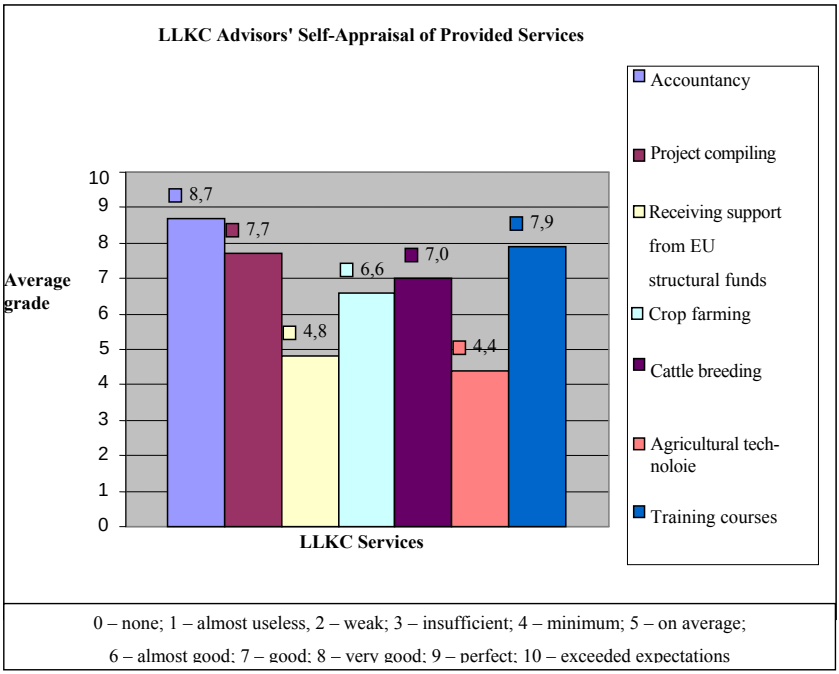
The survey results revealed that despite efforts made to promote the availability of LLKC services, as well as farmers' dissatisfaction with a lack of information, there are still a significant number of farmers who have not yet applied for advice in the nearest LLKC office. Moreover, despite the fact that Latvian farmers claim insufficient access to information regarding requirements defined by the EU normative acts, and since one of the most complicated problems has been identified as a lack of comprehension over how these requirements could be met, farmers are not yet actively applying for a service that is both heavily advertised and recently explained to them as "cross compliance". The purpose of this service is to help farmers evaluate their farms' present compliance with EU regulations regarding, e.g. hygiene factors on the farm, animal breeding, organic farming, etc., and in case of discrepancy, assist with elaborating a plan for eliminating these discrepancies on the farm. Supervising institutions will more and more demand that these requirements be met and a lack of knowledge does not release one from responsibility. The main reasons farmers' provided for having so little initiative to co-operate with LLKC were: Discouraging bureaucracy procedures or ambiguity about service fees and quality.

The same survey revealed that the top three most commonly used LLKC services mentioned by the survey respondents were: Training courses, accounting and preparing applications for EU support payments. The respondents are most dissatisfied

with LLKC assistance and advising in agricultural technology and horticulture issues.

Another survey designed to research the present availability and usefulness of LLKC services was organised involving regional LLKC advisors (specialists of different areas who have direct contact with customers). This survey asked respondents to provide a self-appraisal about rendered services in their workplaces to compare their points of view with those of their customers.

Figure 2: LLKC Advisors' Self-Appraisal of provided Services (grades 1-10)



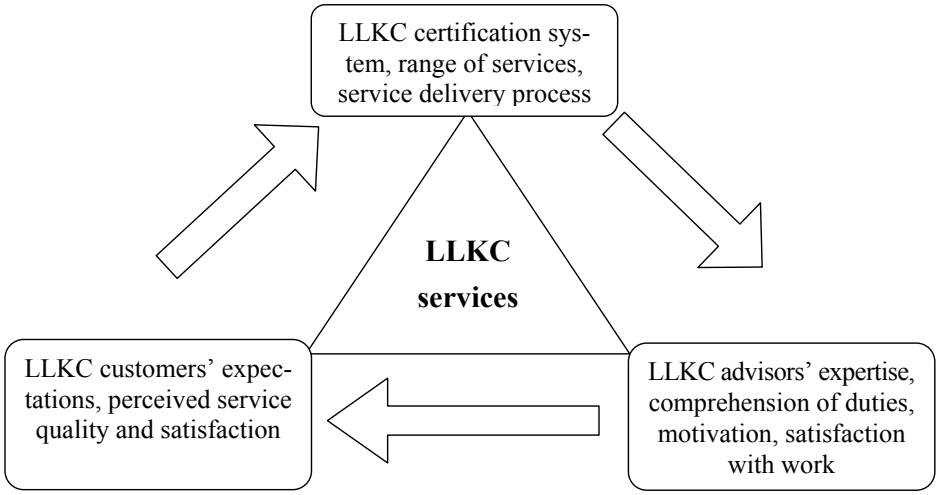
Source: Author.

The experts' survey revealed that advisors themselves are less confident about their services in agricultural technology issues and issues connected with receiving support from the EU structural funds. Along with their customers, advisors are most satisfied with training courses they organise in their regional offices. However, despite a high assessment, they still believe that there is room for improvement. Most advisors are critical about the present procedure regarding the provision of technical assistance services or advice services in agricultural technology issues. The most hindering factors mentioned by the rural advisors were little possibilities to improve their qualifications, a lack of initiative, as well as a lack of contemporary

expertise both in speciality and service management. Another interesting fact that the experts' survey revealed was that 90 % of respondents confirmed that the present order of service rendering must be substantially changed to a different one that places emphasis on the efficiency of customer service, the information system, materials and technical knowledge.

The present advisors' certification system adopted by LLKC provides internal certification for advisors at five qualification levels: Junior specialist, specialist, senior specialist, consultant and consultant-expert. In addition, skills and expertise are evaluated in the particular area the advisor is intended to work (horticulture, cattle breeding, project compiling, etc.). In addition to the speciality issues, an integral part of LLKC advisors' internal training program are courses in communication psychology, pedagogy, legal issues, public speaking and presentation, and information technologies. Moreover, the advisors receive regular training in seminars, demonstrations, etc. Consequently, the future and existent advisors are provided with a wide range of courses at their workplaces, which should have resulted in an increased quality of LLKC services. However, according to the latest research data, both LLKC customers and advisors still lack confidence in the present quality of services provided by LLKC. This suggests that the present way of service delivery and/or quality of services is not yet well valued. Despite the allocation and use of plentiful financing, there are still gaps in service provision which should be eliminated.

Figure 3: LLKC services' stakeholders and their interactions



Source: Author.

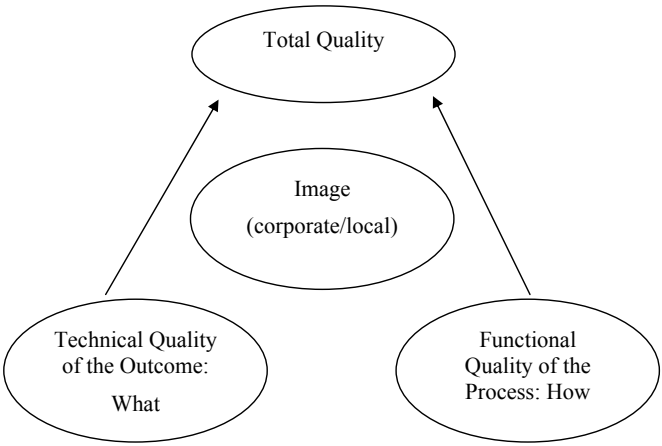
At present, LLKC initiates, designs and tailors services for rural entrepreneurs. However, probably due to LLKC's favourable position of being a recipient of

national rural development projects, its vigilance in keeping up with advanced technologies and service delivery improvement have been disregarded. On the one hand, there are 26 regional LLKC offices in Latvia, which is a positive point since every region has its own office located nearby. Besides, along with LLKC advisors, rural development specialists are also hired by local authorities and can receive customers there. From this point of view, farmers can regularly access advisory services close to their farm. But the question is whether the services provided in all these advisory centres comply with farmers' needs and requirements.

According to the service quality management guidelines, there is always a risk that when quality is defined too narrowly, quality programs become too narrow in scope. In the firm, one has to define quality in the same way customers do, otherwise, in quality programs wrong actions may be taken and money and time may be poorly invested. It should always be remembered that what counts is quality as it is perceived by customers (GRÖNROOS, 1990). Consequently, all training strategies and employee certification in LLKC should be customer-guided but not imposed by governing bodies, as is being practised at present. Moreover, since services are basically more or less intangible and quite subjectively experienced processes, the service's technical or outcome dimension and functional or process-related dimension can be distinguished. The technical (outcome) dimension is what customers receive in their interactions with the firm (what the customer is left with) and is clearly important to them and to their quality evaluation. Frequently, but not always, this dimension can be measured rather objectively by customers, e.g. the service "project compiling". The assessment of quality here will be whether the project is approved after its submission to a project evaluation board. However, technical quality does not count for the total quality that the customer perceives. The customer will obviously also be influenced by the way in which the technical quality, the outcome or end result of the process is transferred to him or her. The customer is also influenced by how he or she receives the service, the so-called functional quality of the process (GRÖNROOS, 1990). Regarding advisory centre services, functional quality could comprise employees' courtesy, communication and credibility.

The LLLK experts' survey organised by the author reflected that without regard to regularly received training programs, LLKC advisors still lack contemporary expertise, which results in little initiative to be more active and helpful in customer servicing, trying to be creative and offering best solutions for their customers' problems.

Figure 4: Two service quality dimensions

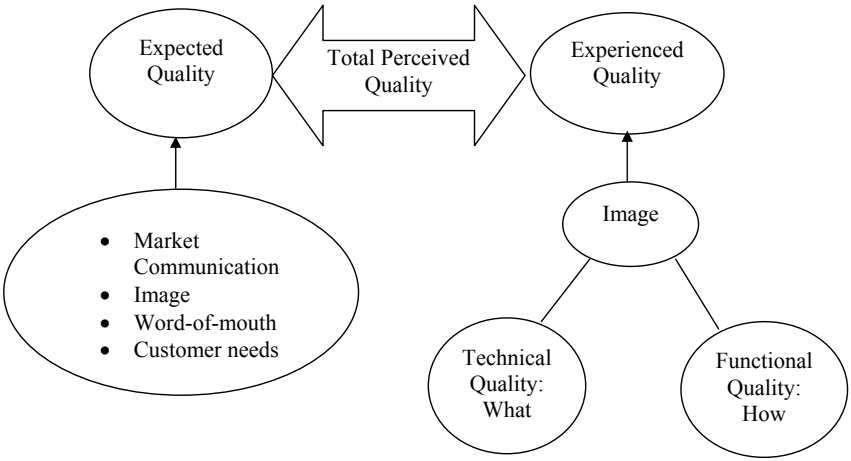


Source: GRÖNROOS, 1990.

According to GRÖNROOS, quality dimensions approach the service provider and cannot hide behind brand names. Corporate and/or local image is therefore of utmost importance to most services. Image can impact the perception of quality in various ways. For example, if the provider is positive in the minds of the customers, that is, if it has a favourable image, minor mistakes will probably be forgiven. And if the image is ambiguous, which is the case of LLKC, the impact of any mistake will often be considerably greater than it otherwise would be. Therefore, the present privileged and recognisable position of LLKC, due to extensive advertising of its products, imposes even higher responsibility to deliver its services better and better. Figure 5 illustrates how the quality experiences are connected to traditional marketing activities, resulting in a perceived Service Quality. Good perceived quality is obtained when experienced quality meets the expectations of the customer, that is, the expected quality.

As reflected in Figure 5, the expected quality is a function of a number of factors, namely market communication, word-of-mouth communication, corporate/local image, and customer needs. Market communication includes advertising, direct mail, public relations and sales campaigns that are directly controlled by the service provider. Finally, the needs of the customer also have an impact on his/her expectations (GRÖNROOS, 1990).

Figure 5: Total perceived quality



Source: GRÖNROOS, 1990.

Although LLKC is regularly and substantially advertised and recognisable among farmers, sufficiently established feedback from LLKC customers regarding their quality expectations does not yet exist. Consequently, regarding LLKC services provision, the LLKC marketing department should further take part in the improvement or reengineering of the existing service delivery processes.

4 CONCLUSIONS

Despite Latvian farmers' insufficient knowledge of the requirements defined in the EU normative acts, almost one-third of the surveyed farmers had not yet applied for LLKC advisory services. The main reasons for the unpopularity of services were claimed to be insufficient information and uncertainty of bureaucracy burden, as well as the inability to pay requested fees. Repeated informative seminars, where farmers can clarify all uncertainties with the representatives of LLKC and Ministry of Agriculture on site should be organised on regular basis.

At present, the LLKC internal certification system provides a complex program of testing, evaluation and training for the staff. The program provides a plentiful range of courses in psychology, pedagogy, legal issues, public speech and presentation, and IT. However, advisors self-appraisal revealed their lack of confidence in many areas, which could be explained with the present courses' inefficiency and their becoming out-of-date.

Due to the LLKC initial favourable position of being a recipient of national scale projects' financing, and a lack of competition in the advisory services market, LLKC vigilance in keeping up with its employees' expertise and improvement of service delivery have lately been disregarded. Due to the continuous development of quality standards and the unavoidable modernisation of farms, more sophisticated services will increasingly be demanded. Since it is still problematic to fill technical specialist vacancies in Latvia, present advisors occupying these positions should be regularly sent to qualitative and up-to-date training courses to master IT issues, agricultural technology novelties and foreign languages in order to follow the latest trends defined by their customers' demands.

The present LLKC quality management program is defined too narrowly. The quality aspects are defined by basically counting on the viewpoint of the administrative body but not other stakeholders – customers and advisors. In order to re-engineer and improve the existing LLKC quality management system, the marketing department should work more actively to detect the quality expectations of existing and potential customers.

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COMPETITION OR MARKET POWER IN THE UKRAINIAN MEAT SUPPLY CHAIN?

ANDRIY MATYUKHA[*]*, OLEKSANDR PEREKHOZHUK*[*]

ABSTRACT

The objective of this paper is to provide an analysis of potential market power in the Ukrainian meat supply chain. Many agricultural economists find evidence of oligopsony power in the meat packing industry. These studies are typically done for industries in developed market economies and have largely focused on the U.S. and European meat sectors. However, the meat sectors in transition countries, which are potentially different from the ones in developed economies, have been largely ignored by research. Yet the issue of imperfect competition seems to be especially relevant to the meat sector in transition countries. With reference to the contribution by NEIO studies, a market structure model was constructed that measured the degree of oligopsony power in the Ukrainian meat supply chain. The estimation results of the market structure models did not produce any evidence suggesting the exercise of oligopsony power at the national level in the investigation period from January 1996 to June 2003.

Keywords: Competition, market power, meat processing industry, new empirical industrial organisation (NEIO), Ukraine.

1 INTRODUCTION

Over the past 15 years, the meat supply chain in Ukraine, like many other sectors of the economy, has experienced drastic changes. During the transition from centrally-planned to a market-oriented economy, first and foremost there has been a liberalisation of prices of agricultural products and consumer goods. The liberalisation of prices put an end to a state regulation of production, establishment of administrative prices and the centralised logistics enterprises. The second step of transition to a market economy was the privatisation of state and collective enterprises, firstly in agriculture, and later the state processing enterprises of the agro-industrial complex, including the meat supply chain. Privatisation put an end to state

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monopolies and gave birth to the development of competitive relations in the agro-industrial complex.

The producers and processors of the meat supply chain hoped for positive developments in the sector: An increase in the production of meat and meat products, salaries and improved working conditions. However, from 1990 to 2007 there was a sharp decline in livestock and poultry. The number of cattle (including cows) decreased from 24.6 to 5.5 million, accounting for only 22.3 % of 1990 levels. The total number of pigs dropped from 19.4 to 7.0 million head; sheep and goats from 8.4 to 1.7 million head; poultry from 246.1 to 169.2 million head. Consequently, there was a reduction in the production of both cattle and poultry. Hence, during this period, the meat production of livestock and poultry dropped from 4.4 to 1.9 million tons, including beef and veal from 2.0 to 0.5 million tons, pork from 1.6 to 0.6 million tonnes, mutton and goat from 45.8 to 15.3 thousand tons, and rabbit from 30.2 to 12.4 thousand tons. Despite the fact that poultry production dramatically decreased during the 1990s and comprised only 193.2 thousand tons in 2000, in 2007 this figure increased to 689.4 tons, and nearly reached the level of 1990.

In response to the sharp decline in production there was a decline in sales of livestock and poultry for industrial processing. Thus, from 1990 to 2007 the sales of livestock and poultry (in live weight) decreased from 4.4 to 1.3 million tons, accounting for only 29.7 % of 1990 levels. It should be noted that the sales structure has undergone dramatic changes. Thus, in 1990 agricultural enterprises sold 94.8 % of the meat from produced from cattle and poultry to the meat processing enterprises, 1.8 % to the market, 3.3 % to the population (including salary) and 0.1 % to other sales channels. In 2007, only 34.6 % of cattle and poultry meat was sold to agricultural enterprises, 7.8 % to the market, 2.2 % to the population and 55.4 % to other sales channels.

As a result of the decrease in sales of livestock and poultry to industrial processing, the meat processing industry's production capacity has declined. While in 1990 the meat processing industry used 86.7 % of its production capacity, in 1997 this figure was only 21.7 %. As a result, the production of meat and meat products declined as well. From 1990 to 2007, the production of beef and veal decreased from 1,494.0 to 199.9 thousand tons and comprised only 13.4 % of 1990 levels. During the same period, pork production decreased from 724.0 to 155.4 thousand tons, just 21.5 % of its 1990 level. The production of sausage products decreased from 900.0 to 330.0 thousand tons. In 1990, meat processing enterprises produced 355.0 thousand tons of poultry. Since the 1990s, the production of poultry began to fall sharply and made up only 22.8 thousand tons in 1997, which is less than 6.4 % of 1990 levels. However, since 2001, the production of poultry started to gradually increase, and in 2007 it had already comprised 416.5 thousand tons, which is 17.3 % more than in 1990.

While the supply of livestock and poultry for the industrial processing and production of meat and meat products dropped sharply, the number of meat processing enterprises in Ukraine increased. According to the State Statistics Committee of Ukraine, there was an increase in the number of processors in the meat and milk industries, from 648 to 916 enterprises between 1993-2000[1]. According to the State Statistics Committee of Ukraine (2008), there were 1,178 enterprises that produced meat and meat products already registered in 2007, of which only 789 enterprises were active and offered their services. Out of 1,178 enterprises, there were 14 large-scale enterprises (1.2 % of total number), 335 medium-sized enterprises (28.4 %) and 829 small-scale enterprises (70.4 %), respectively.

In spite of the fact that the current number of enterprises in the Ukrainian meat processing industry is almost double that of the milk processing industry's, (there were 396 active enterprises in 2007), the concentration level of the meat processing industry is much higher. Considering total sales revenue of the meat processing industry in 2007, the concentration ration of 14 large-scale enterprises is 34.5 % (cf. STATE STATISTICS COMMITTEE OF UKRAINE, 2008); the concentration ration of the 30 largest enterprises of the meat processing industry is 46.1 %; the rest of market is shared by more than 700 enterprises.

According to the U.S. CENSUS BUREAU (2001), the concentration ratio in manufacturing for the four largest companies in 1997 was 35.0 % for animal slaughtering and processing. The eight largest companies in the animal slaughtering and processing industry controlled 50 % of the market. Most of the mainstream research conducted in the United States meat sector demonstrates a precipitous growth of the concentration and consolidation of meat processing industries (MORRISON, 2001). Since the 1980s, were numerous studies done in Western Europe and North America concerning the market power exerted in the meat processing (packing) industries. Some studies, such as that of AZZAM and SCHROETER (1990), which measured market power in multi-product oligopolies of the U.S. meat industry, and MORRISON (2001), which conducted a plant-level analysis for the U.S. beef packing industry market and cost structure, found the presence of market power. However, some studies, like that of MUTH and WOHLGENANT (1999), which measured the degree of oligopsony power in the beef packing industry, did not find the presence of market power.

The objective of this study is to provide an analysis of potential market power in the Ukrainian meat supply chain. The next section encompasses a structural model examining the market situation in the Ukrainian meat sector. The third section presents the econometric specification of the market structure model. Part four

[1] To the best of the authors' knowledge, the data concerning the number of enterprises is published in a general aggregate form of the meat and milk industry by the State Statistics Committee of Ukraine for 1993-2000.

reveals the estimation results and specification testing. The final section is comprised of the results, followed by concluding remarks.

2 MODELLING MEAT SUPPLY CHAIN

Besides beef and dairy cattle farms, households in agricultural areas raise pigs, sheep, poultry and other livestock for meat and supply them to slaughtering and meat processing plants. The market supply of slaughtered animals (A) can be represented by the following inverse function:

$$W_A = g(A, \mathbf{S}), \tag{1}$$

where W_A is the average price for slaughtered animals that the farms and households delivered to the slaughtering and meat processing industry, and $\mathbf{S}$ is a vector of the supply shifters.

The slaughtering and meat processing plants procure cattle, pigs, sheep and other livestock in order to slaughter and process them for various sorts of meat and meat products. With respect to the input and output of the meat packing industry, the production function can be written in general form of:

$$Y = f(A, \mathbf{N}), \tag{2}$$

where Y is an aggregate industrial output of the meat packing industry, including beef, pork, poultry and sausage goods, and $\mathbf{N}$ is a vector of non-agricultural inputs such as labour, capital and energy that are utilised and have a large share in the cost structure of the meat packing industry.

Given this representation of the inverse supply function (1) and the production function (2), the profit equation for the meat packing industry can be written as:

$$\pi = P \cdot f(A, \mathbf{N}) - W_A \cdot A - \mathbf{W_N} \cdot \mathbf{N}, \tag{3}$$

where P is the output price of the meat packing industry and $\mathbf{W_N}$ is a vector of prices of non-agricultural inputs.

We assume that the slaughtering and meat packing plants maximise their profit and set the price for slaughtered animals. The first-order condition for profit maximisation that allows for imperfect competition (oligopsony power) in the market for slaughtered animals is:

$$W_A\left(1 + \frac{\Theta}{\varepsilon}\right) = P \cdot f_A, \tag{4}$$

where Θ is the parameter indexing the degree of oligopsony power, f_A is the marginal product of slaughtered animals and $\varepsilon = (\partial A / \partial W_A)(W_A / A)$ is the market

price elasticity of supply for slaughtered animals. If $\Theta = 0$, then the market for slaughtered animals is perfectly competitive and the value of the marginal product of slaughtered animals equals the market price of the slaughtered animals. If $\Theta = 1$, then the market for the slaughtered animals is monopsonistic or the slaughtering and meat packing plants act like a monopsony (cartel) and the marginal factor cost is equated to the value of the marginal product for profit maximisation. Intermediate values of Θ imply the presence of an oligopsonistic market structure, where the interpretation of the first-order condition is that the "perceived" marginal factor cost equals the value of the marginal product of slaughtered animals.

3 ECONOMETRIC SPECIFICATION OF THE MARKET STRUCTURE MODEL

Concerning the econometric model design, we assume that the agricultural supply of slaughtered animals (1) can be written as a truncated second-order approximation to a general transcendental logarithmic function[2]:

$$\ln A = \beta_0 + \sum_i \beta_i \ln W_i + \phi_C \ln C + \delta_T T + \sum_{iT} \delta_{iT} \ln W_i T + \varphi_{CT} \ln C\, T, \tag{5}$$

where $W_i \; (i = A, D, M, F)$ is, respectively, the average price of slaughtered animals supplied to the slaughtering and meat packing industry (W_A), the direct marketing price for slaughtered animals[3] sold on urban markets directly to consumers (W_D), the average price of raw milk delivered to the milk processing industry (W_B) and the price of mixed feeds (W_F). The variable C is the livestock as a quasi-fixed factor, and T is a linear time trend accounting for an autonomous change (technical change and other unaccounted for factors affecting the short-run supply for slaughtered animals response over time; $T = 1,..., 96$).

Solving equation (5) for W_A and differentiating with respect to A, we obtain the following expression for the marginal effect of the input level on prices for slaughtered animals:

$$\frac{\partial g(\bullet)}{\partial A} = \frac{W_A}{(\beta_A + \delta_{AT} T)\, A}, \tag{6}$$

where $\beta_A + \delta_{AT} T = \varepsilon_{WA}$ is the price elasticity of animal products supply.

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[2] PEREKHOZHUK (2007) used a similar function form to model the agricultural supply for raw milk.

[3] The market share of animal meat products sold directly to consumers is relatively large; it averages 30 % from 1997 to 2002. This had a considerable influence on the supply of animal meat products delivered to the slaughtering and meat packing industry.

In terms of the cost structure of the meat packing industry, we focused on the most important factors of production and assumed that it uses only four factors, namely, animal products (A), labour (L), capital (K) and energy (E). The marginal product of slaughtered animals (A) is defined as the partial derivative of the translog production function[4] and is given by:

$$\frac{\partial Y}{\partial A} = \frac{Y}{A}\left(\alpha_A + \sum_{j=1}^{4}\alpha_{Aj}\ln A_j + \gamma_{AT}T\right), \tag{7}$$

where $X_j = A, L, K, E$. The variable T is a linear time trend to account for technical change in the meat packing industry for the time period of 90 months $(T = 1,..., 90)$. Using equations (6) and (7), equation (4) can now be re-written as:

$$W_A = P\frac{Y}{A}\left(\alpha_A + \sum_{j=1}^{4}\alpha_{Aj}\ln X_j + \gamma_{AT}T\right)\Big/\left(1 + \frac{\Theta}{\beta_A + \delta_{AT}T}\right). \tag{8}$$

The econometric model consists of equations (5) and (8), where, to allow for the existence of random shocks, an additive disturbance term is added, which is assumed to have a zero mean, constant variance, and be independently and normally distributed. In addition, to account for seasonality in our monthly time series data, eleven monthly dummy variables (cf. β_i and α_i, $i = 2,..., 12$, in Table 2) were added to equations (5) and (8), respectively.

The time series data used to test for the existence of oligopsony power in the meat supply chain was obtained from the State Committee of Statistics of Ukraine. The data set includes 90 monthly time-series from January 1996 to June 2003. The choice of the sample period was dictated by data availability. A detailed description of the data sources is available from the authors upon request.

4 ESTIMATION RESULTS AND SPECIFICATION TESTING

In the market structure model consisting of equations (5) and (8), the price of animal products (W_A) and the quantity of animal products (A) are endogenous. Since equation (8) is intrinsically nonlinear in its parameters, the market structure model represents a nonlinear simultaneous equation system. Therefore, the model was estimated using nonlinear three-stage least squares (cf. AMEMIYA, 1977). All the exogenous variables in the system were used as instruments. Estimation was carried out using the statistical software SAS (SAS, 2008: 925-1239).

[4] Cf. CHRISTENSEN, JORGENSON and LAU, 1973.

Table 1 lists the R-squares, Durbin-Watson statistics and objective values of the market structure model estimated at the national level for Ukraine.

Table 1: Statistical inference of NL3SLS estimation of the market structure model

Equation	DF	ADJ	SSE	MSE	R^2	$\overline{R^2}$	DW	Objective value
$\ln A$	22	1.4252	0.0210	0.1448	0.8346	0.7835	1.3697	0.501
W_A	18	7.6640	0.1079	0.3285	0.7707	0.7126	1.4256	

Source: Authors.

The fit of the estimated market structure model is quite good. While the values of the R-square and the adjusted R-square $\left(\overline{R^2}\right)$ obtained for the equations of the animal products supply function are 0.83 and 0.78, the equations of the first-order condition are a little less in value and amounted to 0.77 and 0.71, respectively.

The Durbin-Watson coefficient (DW) lies, for both equations, in the inconclusive range. In spite of a relatively large number of time-series observations, the range between the lower and upper critical values is rather large. The Durbin-Watson coefficient is greater than 1.34 and 1.43 for the supply function equation and the first order condition equation.

It is a common practice to use the minimised values of the objective function (residual sum of squares of the model, which is to be minimised) in the nonlinear three-stage least squares estimation (NL3SLS) as an additional criterion for comparing the estimated models. The NL3SLS estimation reveals a good performance of the market structure model. The estimation results of market structure model show that the objective value tends towards zero.

Table 2 shows the parameters of the market structure models as estimated by N3SLS, which can easily be interpreted because all variables were measured as deviations from their geometric mean.

Table 2: Parameters of N3SLS estimation of the market structure model

Supply of animal products					First-order condition				
Parameter	**Estimate**	**St. Error**	***t*-Ratio**	**Pr >|*t*|**	**Parameter**	**Estimate**	**St. Error**	***t*-Ratio**	**Pr >|*t*|**
β_A	0.3400	0.3700	0.92	0.3614	α_A	0.7838	0.1578	4.97	<.0001
β_D	-0.7936	0.4062	-1.95	0.0549	α_{AA}	0.7930	0.2728	2.91	0.0049
β_M	0.7733	0.2257	3.43	0.0010	α_{AL}	-0.6131	1.9814	-0.31	0.7579
β_F	-0.0283	0.3291	-0.09	0.9317	α_{AK}	0.6019	0.3365	1.79	0.0779
ϕ_C	2.5844	1.9463	1.33	0.1887	α_{AE}	-2.3599	0.5563	-4.24	<.0001
δ_T	0.0033	0.0109	0.30	0.7623	γ_{AT}	0.0270	0.0050	5.37	<.0001
δ_{AT}	-0.0102	0.0111	-0.92	0.3614	–	–	–	–	–
δ_{DT}	0.0264	0.0169	1.56	0.1229	–	–	–	–	–
δ_{MT}	-0.0148	0.0060	-2.46	0.0163	–	–	–	–	–
δ_{FT}	-0.0406	0.0139	-2.93	0.0046	–	–	–	–	–
φ_{CT}	-0.1155	0.0342	-3.38	0.0012	–	–	–	–	–
β_2	-0.3270	0.0809	-4.04	0.0001	α_2	0.5388	0.1956	2.76	0.0074
β_3	-0.4161	0.0776	-5.36	<.0001	α_3	0.3958	0.2030	1.95	0.0552
β_4	-0.4707	0.0774	-6.08	<.0001	α_4	0.3034	0.2364	1.28	0.2037
β_5	-0.4384	0.0824	-5.32	<.0001	α_5	0.2473	0.2472	1.00	0.3205
β_6	-0.3031	0.0998	-3.04	0.0034	α_6	0.2794	0.2431	1.15	0.2542
β_7	-0.1598	0.1151	-1.39	0.1695	α_7	0.0871	0.3059	0.28	0.7765
β_8	-0.0467	0.1211	-0.39	0.7012	α_8	0.4680	0.2230	2.10	0.0394
β_9	-0.0975	0.1094	-0.89	0.3759	α_9	0.4242	0.2194	1.93	0.0572
β_{10}	-0.0133	0.1057	-0.13	0.9001	α_{10}	0.3582	0.1915	1.87	0.0655
β_{11}	-0.0370	0.0917	-0.40	0.6880	α_{11}	0.3188	0.1741	1.83	0.0712
β_{12}	-0.1007	0.0812	-1.24	0.2189	α_{12}	0.3616	0.1632	2.22	0.0300
β_0	0.0973	0.1257	0.77	0.4417	Θ	-0.0051	0.0060	-0.84	0.4062

Source: Authors.

Thus, the parameters β_j $(j = A, D, M, F)$ of the estimated supply function represent the own and cross price supply elasticities. The estimated results indicate that the estimated own price elasticity of supply for slaughtered animals (β_A) is relatively inelastic, so the change in quantity is smaller than the change in price. The estimated parameters β_D (cross price elasticity for meat sold directly to consumers) and β_M (cross price elasticity for raw milk) are relatively high and statistically significant, at least at the 5 % level of significance. Moreover, the slaughtered animals, delivered to the slaughtering and meat packing industry, are a complement for raw milk and a substitute for the meat that was sold directly to consumers. Since the price of meat sold directly goes up 1 %, the quantity of slaughtered animals supplied to the slaughtering and meat packing industry decreases to 0.79 %. However, in response to an increase in the price of raw milk to 1 %, the supply for slaughtered animals will rise to 0.77 %. The estimated coefficient cross price

elasticity of supply for mixed feeds (β_F) is negative but statistically insignificant[5]. This result may in part be attributed to the fact that the share of mixed feeds is rather small and averages out at 12 % (cf. PEREKHOZHUK, 2007). Thus, it is evident that it is not only the mixed feeds but also green and coarse fodder that have a profound influence on the supply of slaughtered animals.

The estimated supply elasticity of quasi-fixed inputs (ϕ_C) represented by livestock as a quasi-fixed factor is very elastic and amounts to 2.5 at the sample mean. Initially, this seems to be very large. However, considering the construction of an aggregate livestock variable, the supply of slaughtered animals includes not only cattle, but also pigs, sheep and poultry. The supply elasticity of cattle for slaughter is the same in the United States (cf. SCHROETER, 1988).

From January 1996 to June 2003 the estimates of δ_T indicate a positive rate of autonomous change in the supply of slaughtered animals, and amounts to 0.33 % per month, or 4.03 % per year. This result confirms the theory, yet it is statistically insignificant. The estimated production elasticity of animal products (α_A) is 0.78, and highly statistically significant at any reasonable level of significance.

The main issue of this research are the estimates of the parameter that measure the degree of oligopsony power in the markets for animal products. The estimated parameter of oligopsony power at the national level Θ is -0.0051. The negative value of Θ is not theoretically possible, but it is close to zero and statistically insignificant. The estimated parameter Θ ranges from -0.0169 to 0.0068 in the 95 % confidence interval. With a Wald χ^2 statistic of 0.70, the hypothesis that the slaughtering and meat packing industry is a price-taker in the market of animal products for meat ($H_0 : \Theta = 0$) is not rejected even at the 10 % level of significance. The estimation results of the market structure models did not produce any evidence suggesting the exercise of oligopsony power in the market of animal products for meat by the slaughtering and meat packing industry.

5 SUMMARY AND CONCLUSIONS

The objective of this study is to provide an analysis of potential market power in the Ukrainian meat supply chain. With reference to the contribution by NEIO studies, we constructed a market structure model to measure the degree of oligopsony power, particularly in the market of slaughtered animals. The empirical model of market structure consists of two equations, first, the agricultural supply of slaughtered animals, and second, the demand relationships of the slaughtering and meat packing industry. Using the monthly time series data, the parameter of oligopsony

[5] SCHROETER (1988) also obtained similar results concerning insignificance of price elasticity of supply for feeds in the United States.

power, supply and production elasticities were estimated simultaneously. The estimation results of the supply function indicate that the own and cross price elasticities of animal products supply are less than one in absolute terms, have the expected signs and are compatible with an economic theory. The estimation results show that the rate of autonomous change in the animal products supply is positive and amounts to 4.03 % annually.

The estimation results of the market structure model provide no evidence for the existence of oligopsony power at the national level in the investigated period of January 1996 to June 2003. The estimated parameter indicating oligopsony power is approaching zero and is statistically insignificant. The hypothesis of perfect competition is not rejected even at the 10 % level of statistical significance. This empirical result is consistent with the low operating rate and relatively small concentration ratio of the meat processing industry at the national level. However, there is evidence for a higher concentration of the slaughtering and meat packing industry at the regional level. Hence, it may be desirable to conduct similar analyses on a regional level and to also apply the structural econometric model to regional data and measure the oligopsony power on a regional market level.

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INTEGRATION OF THE HUNGARIAN CEREAL MARKET INTO EU15 MARKETS

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ABSTRACT

Due to the collapse of Eastern European markets, as well as its accession to the European Union, the focus of markets, value and the product structure of the Hungarian cereal trade have decisively changed. Changes between 1995 and 2006 are examined in this paper through a competitiveness analysis, which employs the constant market shares (CMS) method. Results show that the competitiveness of the Hungarian cereal market was the main cause of average export growth in the EU-15 countries from 1995-1998 to 2003-2006. This implies that overall integration increased.

Keywords: Integration, competitiveness, cereals, CMS-method.

1 INTRODUCTION

The Hungarian cereal market, similar to the Hungarian national economy, has significantly changed during the last decade. Due to the collapse of Eastern European markets, as well as its accession to the European Union, the focus of markets, value and the product structure of the Hungarian cereal trade have also changed. Changes and trends between 1995 and 2006 are analysed and revealed in this paper through a competitiveness analysis which employs the constant market shares model. This method is used to analyse how a special market is integrated into international markets through competitiveness. The target market for analysis is that of the EU15 countries. Results show that the average competitiveness of the Hungarian cereal market changed for the better in the EU15 countries from 1995-1998 to 2003-2006, which indicates overall integration increased. Detailed results by country and product can answer the question, "Which countries are worth trading cereals with?" According to the second- and third-level analyses of the model, however, the Hungarian cereal export structure was not favoured by EU15 markets, which showed above-average market growth (thus, Hungary exported "bad" products to "bad" markets in these cases).

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2 METHOD USED

Trade theories highlight the constant market shares method (CMS) as a prominent tool for measuring competitiveness (particularly for analysing the causes of changes in exports). The CMS model – which was re-popularised at the end of the 20th century – was first used by TYSZINSKI in 1951 for trade in industrial products, while the works of Rigaux and Sprott involved analysing changes in the trade patterns of agricultural products (FERTŐ, 2004). The CMS model was used by DYRSDALE-LU (1996) to examine the export performance of Australia between 1984 and 1994, and BROWNIE-DALZIEL (1993) undertook similar analyses of New-Zealand from 1970-1984 (AHMADI-ESFAHANI, 2006).

The CMS method may be used to investigate trade trends and laws in order to determine those factors affecting a country's export performance (AHMADI-ESFAHANI, 2006). In the original model, price and non-price factors obviously affect competitiveness; nevertheless, export competitiveness can be examined without taking them into account. The basic presumption underlying the CMS model is that a country's export share in a given market remains constant at the same level of competitiveness (AHMADI-ESFAHANI, 1995). It follows that any change in a country's exports can be traced back to changes in the composition of competitors and competitiveness.

2.1 The basic model

The basic model determines a country's share in the reference market as follows:

(1) $S = q/Q$,

where S is the country's share in the reference market, q is the export to the reference market and Q is the overall export of a country. Transforming the formula by visualising time (Δ), product type (i = 1,….,I) and focus market (j = 1,….,J) changes in variables, we generate the following equation:

(2) $\Delta q_{ij} = S_{ij}\Delta Q_{ij} + Q_{ij}\Delta S_{ij}$.

The traditional CMS model explains changes in export through two effects: Scale effect (SΔQ) and competitive effect (QΔS), so that the second formula's first term explains presumed changes in export or scale-effect, while the second part explains the difference between actual and expected change or competitive-effect (FERTŐ, 2003). The second formula, however, is only true over the short term. If the CMS model is adopted at discrete intervals, the equation can be written in several ways, depending on the initial and final moments. The latest adaptations of the CMS model use the formula below:

(3) $\Delta q_{ij} = \underbrace{S^0_{ij}\Delta Q_{ij}}_{\text{scale effect}} + \underbrace{Q^0_{ij}\Delta S_{ij},}_{\text{competitive effect}} + \underbrace{\Delta Q_{ij}\Delta S_{ij}}_{\text{second-order effect.}}$

The scale effect analyses the average change in exports, supposing that individual market shares are permanent. Similarly, the competitive-effect shows the average change in export supposing that imports are fixed, while second-order effects refer to the relationship between export growth and market share growth.

2.2 Extensions of the basic model

In traditional economic models, the profit of a competition-winner is equal to the losses of other players. The basic model thus assumes that one party's profit is another party's loss (in the competition between exporter countries for given reference markets). In the case of more players, it is not so easy to tell who wins market share from whom; different extensions of the model deal with this question (FERTŐ and HUBBARD, 2001). The second level analysis of the model further decomposes scale and competitive effects in order to answer the question of whether changes occur because of export market growth or reference market growth. The following table shows the possibilities for second level decomposition.

Table 1: Second-level decomposition of the CMS-model

	Denomination	**Formula**
Scale effect	Scale-aggregate growth effect (SAGE)	$\Delta Q=\sum_{ij}\Delta Q_{ij}/\sum_{ij}\Delta Q^{0}_{ij}$
	Scale market effect (SME)	$\sum_{ij}(\Delta Q_{ij}-\Delta Q)$
Competitive effect	Competitive aggregate growth effect (CAGE)	$\Delta S=\sum_{ij}\Delta S_{ij}/\sum_{ij}\Delta S^{0}_{ij}$
	Competitive market effect (CME)	$\sum_{ij}(\Delta S_{ij}-\Delta S)$

Source: Author's composition based on AHMADI-ESFAHANI, 2006.

The scale aggregate growth effect supposes that scale effects are uniform across markets, while scale market effect analyses the average impact of different scale effects across markets. In the same way, competitive aggregate growth effect assumes that competitive effects are uniform across markets, while competitive market effect analyses the average impacts of different competitive effects across markets. "Market" effects thus examine whether a country's export-structure has something to do with export growth: For instance, a positive "market" effect suggests that a given country has been targeting the "right" markets. Third level decomposition of the CMS model goes even further and analyses competitiveness more deeply in order to answer the question of whether competitiveness changes due to changes in products and target markets or by accident, or rather a combination of the two. Possibilities for third level decomposition are shown in Table 2.

Table 2: Level three decomposition of the CMS-model

	Denomination	**Formula**
Scale market effect	Scale regional effect (SRE)	$\sum_{ij}(\Delta Q_{ij}-\Delta Q_i)$
	Scale product effect (SPE)	$\sum_{ij}(\Delta Q_{ij}-\Delta Q_j)$
	Scale interaction effect (SIE)	$\sum_{ij}(\Delta Q_{ij}-\Delta Q)- \sum_{ij}(\Delta Q_{ij}-\Delta Q_i)- \sum_{ij}(\Delta Q_{ij}-\Delta Q_j)$
Competitive market effect	Competitive regional effect (CRE)	$\sum_{ij}(\Delta S_{ij}-\Delta S_i)$
	Competitive product effect (CPE)	$\sum_{ij}(\Delta S_{ij}-\Delta S_j)$
	Competitive interaction effect (CIE)	$\sum_{ij}(\Delta S_{ij}-\Delta S)- \sum_{ij}(\Delta S_{ij}-\Delta S_i)- \sum_{ij}(\Delta S_{ij}-\Delta S_j)$

Source: Author's composition based on AHMADI-ESFAHANI, 2006.

Scale regional effect assumes that scale market effect differs across regions alone, independent of product effects, while scale product effect analyses just the opposite: How scale market affects change if product market changes are taken into consideration independent of region market change. In other words, "product effects" will be positive where the export structure favours those markets in which market growth is above average (scale product effect) or in which growth in market share is above average (competitive product effect). "Interaction effects" in turn examine what kind of relationship exists between markets of products and regions; that is, whether regional and product effects reinforce or offset each other. Third level competitive effects indicate exactly the same factors, but they decompose competitive effects instead of scale effects. In line with the above, the CMS model is applied to analyse the competitiveness of Hungarian cereal exports. The target market for analysis is that of the EU15 countries. The study covers from 1995-2006; a four years' average is chosen as reference points due to the base year sensitivity of the method (1995-1998, 2003-2006). UN trade data in the SITC3 format is used, four-digit decomposition, two decimal places, at three levels of analyses in the calculations. Data are based on shipments of trade by value given in USD (or percentages).

3 RESULTS

3.1 First level analysis

Aggregated results of the first level analysis on country-group level using the CMS model are shown in Table 3. The growth in value of Hungarian cereal exports to the EU15 was around 237 million USD from the average of 1995-1998 to the average of 2003-2006 (Table 3). This change is due to three effects, according to the basic CMS model. Firstly, the scale effect accounts for 29 million USD, equivalent to 12 % of total profit. Second, the competitive effect is equivalent to 152 million USD, or 64 % of export value growth.

Table 3: Results of the first level analysis on country-group level for cereals using the CMS model

Target market (EU15)	2003-2006	
	USD	%
Scale effect	29 160 286	12.30
Competitive effect	151 781 338	64.01
Second-order effect	56 195 876	23.70
Total profit	237 137 500	100.00

Source: Author's calculations based on UN, 2008.

Finally, the second-order effect accounts for 56 million USD, or 24 % of export change. Significant changes in national cereal exports in the period analysed were due decisively to positive competitive effects; that is, to the fact that the Hungarian market share grew parallel with national cereal export growth. In other words, Hungary's competitiveness in terms of cereals has significantly improved compared to other exporters in the EU15 market from the average of 1995-1998 to the average of 2003-2006.

Table 4: Results of first level CMS model analysis for cereals for the EU15 member states, by country

Country	Market share*, %		Effects, USD		
	1995-1998	2003-2006	Scale-effect	Competi-tiveeffect	Second-order effect
Austria	2.44	7.34	4 295 121	18 873 193	8 618 186
Belgium	0.00	0.19	0	0	0
Denmark	0.07	0.10	123 491	82 754	39 005
Finland	0.00	0.03	0	0	0
France	0.22	0.46	1 614 292	4 357 282	1 752 676
Germany	0.86	1.84	7 126 768	22 115 754	8 100 728
Greece	0.04	11.26	62 833	41 370 820	16 314 514
Ireland	0.07	0.03	155 482	-171 283	-90 200
Italy	1.06	2.67	7 202 193	33 573 891	10 992 166
Luxemburg	0.00	0.01	0	0	0
Netherlands	0.42	1.38	2 350 984	17 642 060	5 424 206
Portugal	0.04	0.01	97 941	-204 808	-73 883
Spain	0.87	1.23	5 323 644	5 707 438	2 146 168
Sweden	0.12	0.14	154 052	72 402	35 296
United Kingdom	0.05	0.31	355 020	4 790 131	2 079 599
Total	0.49	1.44	29 160 286	151 781 338	56 195 876

Source: Author's calculations based on UN, 2008.

Note: * Share of Hungary's cereal exports of EU15 cereal imports.

Table 4 shows results detailed by EU15 member state. One can observe that Hungary continuously gained market share in the cereals sector of the main markets of the EU15 from the average of 1995-1998 to the average of 2003-2006 (from 0.49 % to 1.44 %), which relates to an increase of the market share of 13 countries, according to detailed data. The highest average market share was obtained in Greece from 2003-2006, while the lowest share was in Luxemburg. Moreover, Table 4 also shows that Hungary increased its competitiveness in the cereal markets of 13 countries (except for Ireland and Portugal), where competitive effects were positive from the base period to the average of 2003-2006. According to results of the first level analysis, export performance growth concerning the 13 member states was less due to market growth and more due to growth in competitiveness.

3.2 Second and third level analysis

Results of second and third level analyses by scale and competitive effect are shown in Table 5.

Table 5: Results of second and third level analyses of the CMS model by scale and competitive effect, from 2003-2006 (%)

Denomination	**Scale effect**	Scale effect		**Scale market effect (SME)**		
		SAGE	SME	**SRE**	**SPE**	**SIE**
EU15	12.30	37.02	-24.73	-10.73	-61.94	47.94
Denomination	**Competitive effect**	Competitive effect		**Competitive market effect (CME)**		
		CAGE	CME	**CRE**	**CPE**	**CIE**
EU15	64.01	192.71	-128.71	36.85	-32.63	-132.93

Source: Author's calculations based on UN, 2008.

The cereal sector market size in the EU15 grew by 12.30 % from 1995-1998 to 2003-2006 (Table 5). This occurred for two reasons: The change of scale-aggregate growth effect and the scale market effect. Scale aggregate growth effect refers to the extent to which the EU15's cereal imports changed from 1995-1998 to 2003-2006 (an increase of 37.02 %). Scale market effect shows to what extent Hungary's cereal exports were able to keep pace with these changes; that is, to what extent did the national cereal export structure facilitate adoption to rapidly-changing markets. Based on these facts, it can be concluded that Hungary's cereal export position with the EU15 group was unfavourable; national cereal exports grew at a faster rate than what the rate of market increase justified. As the scale aggregate growth effect was higher in the case of EU15 countries than the decrease of scale market effect, however, the market increased for Hungary as a whole.

Furthermore, it is clear from competitive effects that Hungary was able to increase its competitiveness in the EU15 cereal markets over the period analysed. Competitive aggregate growth effect (CAGE) shows how Hungary's average cereal market share increased by 192.71 % in EU15 markets from 1995-1998 to 2003-2006. This growth, however, was not endorsed by the fact that the Hungarian export structure did not match the import needs of the EU15; that is, in most cases Hungary exported higher quantities to descendant markets and vice versa. In other words, Hungary gained huge market shares in unimportant markets and small market share in significant markets. On the whole, national competitiveness improved relative to EU15 markets, as the competitive effect was positive.

Third level decomposition further analyses drivers. As Table 5 shows us, Hungary's cereal exports did not respond to changes in market sizes in the EU15; that is, they did not transport the theoretically-determined ideal quantity to proper markets. It follows that Hungary could not position its products and quantities on the ideal markets. Moreover, scale interaction effects show that the latter two effects strengthened each other. According to second and third level analyses of scale effect, it can thus be concluded that the Hungarian cereal export structure did not favour the EU15 markets, which showed above average market growth (Hungary thus exported "incorrect" products to "incorrect" markets). As competitive interaction effects extinguished positive competitive region effects, Hungary choose a bad market strategy on the EU15 markets.

4 CONCLUSION

This paper presented the results of calculations based on the CMS model of cereal market competitiveness and integration. Hungarian average cereal exports to the EU15 grew by 237 million USD from 1995-1998 to 2003-2006. This growth was mainly due to the increase in national competitiveness (64 %) and partly to changes in market sizes and other effects (36 %). The specification of results by country can solve the challenge of finding the correct markets for export. In connection with these analyses, it is shown that it is worthwhile to transport cereals to EU15 member states (with the exceptions of Ireland and Portugal).

From the second and third levels of analysis using the CMS model, it is shown that the Hungarian cereal export structure did not favour EU15 markets where market growth was above average (Hungary exported "bad" products to "bad" markets). Despite the fact that Hungary gained huge market shares in unimportant markets and a small market share of significant markets, national competitiveness improved against EU15 markets.

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REGIONAL SPECIALISATION OF AGRICULTURE AND COMPETITIVE ADVANTAGES OF EAST-EUROPEAN COUNTRIES

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ABSTRACT

The integration of 12 new members into the European Union (EU) raises important questions about structural changes, not only in the relationships among the EU-27 nations, but also in the relationships with their newly-established bordering nations. In particular, the new EU member states of Poland, Slovakia, Hungary and Romania all directly border Ukraine, which recently has regained its former leadership position in world food markets. In this paper we seek to identify the sources of the new competitive agricultural production advantages of this nation relative to those of the new EU members, all of which depend on agriculture in significant ways. The primary purpose of our research is to identify newly emerging patterns of regional specialisation within and across these nations, and in future work to examine their effects on agricultural productivity, regional competitive advantages and international trading patterns. We draw on various public data sources and employ a variety of statistical methods to analyse and understand these new patterns of geographic concentration.

Keywords: Regional specialisation, agriculture, location of agriculture, East-European Countries.

1 INTRODUCTION

Agriculture is an important economic sector in most Eastern European Countries. Countries such as Romania, Hungary, Poland, Slovakia, Moldova, Belarus and Ukraine heavily depend on the level of agricultural production and rural development in the structure of the economy. Some of these countries produce similar types of agri-food products and, therefore, compete in the same European and world markets. In addition, most of these countries have a similar structure of agricultural production, and similar educational levels among employees in agriculture, percentage of rural population, and governmental programmes implemented in the

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last ten years. However, nearly every country has unique characteristics concerning agricultural production and place within the world market. One of the main problems facing all of these countries is achieving agricultural specialisation, which could bring additional advantages for all Eastern European Countries with regard to differentiation in the markets.

The goal of our paper is to determine the advantages and opportunities facing Eastern European Countries such as Romania, Poland, Slovakia, and Ukraine according to specialisation of their agriculture. To achieve this goal we attempt to answer the following questions: First, what is the agricultural specialisation of the above countries? Second, does this specialisation lead to advantages in the European market? And, finally, what will be the consequences if some meso-regions in different countries have the same advantages for the same products and markets?

2 METHODOLOGY AND DATA

2.1 Methodology and methods

Regional specialisation and the geographic concentration of industries can be generally defined in relation to production structures (RICARDO, 1817; HECKSCHER, 1919; OHLIN, 1933). Regional specialisation refers to the distribution of the industry shares in total industry output in a specific region compared to a norm. A region is found to be specialised in a specific industry if this industry has a high share of total output for the region (KRUGMAN, 1979, 1980, 1981; HELPMAN and KRUGMAN, 1985; KRUGMAN and VENABLES, 1990; PORTER, 2003). A region's industry structure is "highly specialised" if a small number of industries have a large combined share of total production. Geographic concentration measures the distribution of regional shares in a specific industry. A specific industry can be considered as "concentrated" if a large part of production is carried out in a small number of regions. To analyse and compare the agricultural specialisation of the countries, we use the common methodologies of the main indicators of regional specialisation and geographic concentration of industries:

- Classical TCI, RCA (BALASSA, 1965): BALASSA's method of revealed comparative advantage indicates an "ex-post competitiveness", i.e., competitiveness is revealed in the export performance of the country. Therefore, the main policy recommendation from this kind of approach would be the development of the country's export potential in goods for which a high export specialisation is already achieved (BALASSA, 1989). BALASSA's method includes the following indicators: Revealed Comparative Advantage, Trade Coverage, Relative Revealed Comparative Export Index, Relative Import Penetration Index, and Relative Trade Advantage Index.

- GL Index of Intra-Industry (WOLFMAYAR-SHNITZER, 1998; BRUNHALT, 2001): The size of intra-industry trade indicates the extent of the economic integration of one country. To this effect, in our analysis we use the Grubel-Lloyd Index (for theoretical considerations concerning intra-industry trade and the Grubel-Lloyd index, respectively, see WOLFMAYR-SCHNITZER, 1998; BRÜLHART, 2001).

- Indicators of regional specialisation and geographic concentration of industries – Herfindahl index: This is an absolute measure of specialisation often used in industrial economics. The Herfindahl index sums up the squares of industry shares in the total activity of the region. As such, it takes on values between zero and one and is positively related to regional specialisation. Given the absolute nature of the Herfindahl index, the sum of the square of shares is biased towards larger regions.

- Dissimilarity indexes of specialisation (DSR) and concentration (DCR) (KRUGMAN, 1991; AIGINGER et al., 1999; DEVEREUX et al., 1999; MIDLEFART-KNARVIK et al., 2000): The main indexes we use in our research are indicators of regional specialisation and geographical concentration of industry (the indicators used in this paper to analyse regional specialisation and concentration of industries are defined in a way that is similar to AIGINGER, et al. 1999).

- The GINI coefficient of regional specialisation (DEVEREUX et al., 1999): Particularly in empirical work on income distribution, GINI indices are widely used to describe patterns of inequality. The GINI index is known as the area between the Lorenz concentration curve for a given distribution and a hypothetical curve for equal distribution of the factor under scrutiny (For an explanation of the Lorenz concentration curve, see BRÜLHART, 2001). It constitutes a measure of relative concentration, assuming the value of zero for equal distribution. In the context of regional specialisation, the degree of equality of the distribution of industries in a given region is to be assessed. Reasonably, the industrial structure in that particular region is set in relation to an average value for the units to be compared (i.e., the nationwide distribution) rather than to an equal distribution of industries (see DEVEREUX et al., 1999).

2.2 Data

Data on regional average wages is used to calculate regional relative wages, which is the dependent variable in (later) regressions estimating the impact of trade liberalisation and the role of transport costs on the regional structure of wages. Data on GDP is used in the analysis of the relationship between regional specialisation and growth. While the variables introduced so far are used for descriptive purposes or as dependent variables in econometric analysis, the following are used to control for various demographic and economic characteristics of the regions in the subsequent econometric analyses: The distance between pairs of county capitals, numbers of domestic firms, number of firms with foreign participation, number of self-employed, density of national public roads, number of personal cars, number

of students enrolled in higher education, number of telephone lines, population and public expenditure. Most data is taken from regular publications of national statistical offices. Data that is not officially reported has been collected from other sources. In particular, among others, some countries' labour market data are from labour offices or similar institutions, whereas firm-level data has been partly collected from commercial registers. In the case of Slovenia, due to the lack of availability of data from official sources, the data set is extended by data gathered from companies' balance sheets. Regional variables are available at "Nomenclature of Territorial Units for Statistics" (NUTS). All regions listed in NUTS II only serve for the purposes of statistics and planning, whereas in most countries, the NUTS III level consists of meso-level units of state administration with rights of self-government. In the present research we did not conduct our research at the NUTS III level of analysis.

3 RESULTS

3.1 Classical TCI, RCA (BALASSA, 1965)

Analysis of the Relative Revealed Comparative Export and Import Indices provides the results for 3 individual countries and one group of countries: World (regarding Ukrainian trade with the world), Romania, Poland and Slovakia.

Table 1: XRCA Index

Commodity	WORLD	Romania	Poland	Slovakia
Meat products	0,392	9,428	0,430	0,453
Sugar	0,335	1,351	0,208	0,191
Cereal	7,591	2,579	9,104	8,263
Corn	4,895	1,521	7,630	6,689
Oil seeds	1,726	0,074	0,766	0,642
Technical seeds	3,861	0,842	4,426	3,007
Sunflower oil	39,835	1,585	101,191	45,810
Rapeseeds oil	1,190	1,848	0,565	0,548

Source: Author's calculation.

The results of the XRCA calculations (Table 1) indicate the relative advantages of the Ukrainian cereal, corn, sunflower seeds and rapeseeds, and sunflower and rapeseed oil on the world market. Compared to Poland, Ukraine decreases its own advantages on items such as sunflower seeds, rapeseeds and rapeseed oil. The reason for such changes is these products' high level of production by Ukraine's neighboring countries. The same reason can be given for losses of export advantages in sunflower seeds and rapeseeds relative to Romania. The XRCA indices for Slovakia are rather similar and indicate that the Ukrainian export of cereal products, corn, rapeseeds and sunflower seeds has comparative advantages in export. The

results of the Relative Revealed Comparative Import Index (Table 2) describes the different levels of competitiveness for different types of commodities at the country and world levels; only sunflower seeds are found to have a disadvantage, while other products have some positive results.

Table 2: MRCA Index

Commodity	WORLD	Romania	Poland	Slovakia
Meat products	0,345538615	0,2960261	0,40516343	0,395078942
Sugar	0,464945618	0,00628351	0,455060986	0,421608328
Cereal	0,019234386	0,00037522	0,027174212	0,026709072
Corn	0,637829738	0,01321274	0,956886275	0,906020766
Oil seeds	4,368006266	0,03325696	2,408518368	2,155330219
Technical seeds	0,484284405	0,00682623	0,494365516	0,479493997
Sunflower oil	0,049100894	0,00050208	0,036361372	0,03427726
Rapeseeds oil	0,006512149	5,57631205	0,004038415	0,003852776

Source: Author's calculation.

The MRCA results obtained for Poland indicate that wheat and oil (sunflower and rapeseeds) have disadvantages. The results for Romania show disadvantages only in rapeseed oil, and for Slovakia disadvantages only in sunflower seeds. We explain the results by the structure of the Ukrainian agri-food production (with a focus on plant production in the most efficient sectors) and proper governmental attention on support programmes. On the other hand, the increasing demand for agri-food products on the world markets contributes to such results.

The TCI describes the Ukrainian position relative to the main countries as competitors on the European and world markets (Table 3). Ukraine shows the biggest value of export to the world market in technical and sunflower seeds. Between the neighboring countries Ukraine is traditionally the main exporter of sunflower seeds, as well as oil and cereal. Unfortunately, the level of meat production export is extremely low, and countries like Romania and Poland have great value for Ukrainian imports.

Table 3: TCI Index

	WORLD	Romania	Poland	Slovakia
Meat products	0,00	1,00	1,00	0,00
Corn	3,42	0,00	125,42	6,27
Technical seeds	118,00	1,00	17,30	2,10
Rapeseed oil	1,31	1,00	0,03	2,86
Sunflower oil	25,00	937,00	86,75	9,61
Sunflower seed	4,72	0,08	42,11	3,93
Cereal	15,70	1,00	88,38	52,95

Source: Author's calculation.

3.2 GL Index of intra-industry

The size of intra-industry trade indicates the extent of one country's economic integration. To measure this effect, we use the Grubel-Lloyd index in our analysis. According to Table 4, the economic integration in given countries are similar. Only Poland and Romania have a higher integrated level (GL index 18.3 and 23.8 respectively). The results for other countries can be explanied by the structure of economic and geographical positions.

Table 4: GL Index

	GL Index Value
Romania	23,8
Hungary	42,0
Poland	18,3
Slovakia	61,0
Moldova	54,7
Belarus	48,2
Ukraine	46,5

Source: Author's calculation.

3.3 The dissimilarity indices of specialisation (DSR) and concentration (DCR)

The main indices used in our research are indicators of regional specialisation and geographical concentration of industry (the indicators used in this paper to analyse regional specialisation and industry concentration are defined in a way that is similar to AIGINGER, K. et al., 1999. The dissimilarity index is a modified version of the index proposed in KRUGMAN, 1991b: Regional specialisation

Table 5: The dissimilarity indexes of specialisation (DSR) and concentration (DCR), 2000-2004 for country and minimum value for region inside the country (in brackets)

	DSR	DCR
Romania	0.263 (0.248)	0.0015 (0.0017)
Hungary	0.249 (0.279)	0.0003 (0.0275)
Poland	0.334 (0.321)	0.0085 (0.0091)
Slovakia	0.368 (0.409)	-0.0012 (0.0075)
Moldova	0.982 (0.982)	0.0037 (0.0037)
Belarus	0.293 (0.166)	0.0092 (0.0014)
Ukraine	0.326 (0.288)	0.0062 (0.0035)

Source: Author's calculation.

and the geographical concentration of industries are defined in relation to production structures. Our research shows the important role of agriculture in economic development in all examined countries. For some (such as Ukraine, Poland, Slovakia and Moldova), this is one of the most important branches of the economy. The agricultural structure of all regions is "highly specialised", where a small number of industries have a large combined share of total agriculture.

4 DISCUSSION

We expect that our results will be conducive to determining the most efficient production patterns according to regional specifics and specialisation. The level of specialisation during the last 10 years in various countries has taken different directions. The new members of the EU have started to differentiate the specialisation and structure of their economies. On the other hand, changes in the economic structure of Ukraine, Moldova and Belarus are not occurring as rapidly and in these countries agriculture remains one of the main branches of the economy. This may suggest that these countries are falling behind in terms of development relative to neighbouring countries. On the other hand, Ukraine's agricultural specialisation is an opportunity for the country to become a major player in world markets (cereal, corn, rapeseeds, etc.) and use world events (the financial and food crisis) for its own development of agricultural and rural areas as effective and developed business (as opposed to the heavily supported agricultural sector in Europe).

5 CONCLUSION

Despite the use of different approaches to the regional specialisation of agriculture and competitive advantages of Eastern European Countries, some of our results lead to similar conclusions. First of all, Ukraine has its own commodities and market shares on the European and world markets and possesses very favourable conditions to improve its position. The country has also seen some positive trends in agricultural specialisation relative to its main competitors – primarily neighbouring countries (including Post-Soviet countries). Our research also shows that as far as long-term trends in comparative advantage are concerned, Ukraine will also enjoy a larger advantage in the production of unprocessed products (wheat, corn, sunflowers, rapeseeds, sunflower oil and rapeseed oil). The regional specialisation of Ukrainian agriculture heavily depends on the level of employment (in some regions more than 30% of capable people are employed in agriculture) and on historical trends (in some regions agriculture is the main industry, but GDP is extremely low). The same tendencies can be observed in the other analysed countries (Romania and Poland), but in Ukraine they are less observable than in other post-Soviet countries (Belarus and especially Moldova). Finally, as Ukraine is a large country with substantial differences in regional conditions, it would be useful to conduct the competetiveness analysis with regard to regions. Our results

are based on the NUTS II level, but the NUTS III level will be our research preference in future, as this might be helpful to provide information for regional planning and regional policies.

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GOVERNANCE AND USE OF NATURAL RESOURCES

Multi-level Processes of Integration and Disintegration
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AN ANALYSIS OF BIODIVERSITY GOVERNANCE IN THE KISKUNSÁG NATIONAL PARK ACCORDING TO THE GOVERNAT FRAMEWORK

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ABSTRACT

To address the questions of how natural resource governance functions in Europe's multi-level governance setting and what role participation plays therein, the research and training project GoverNat has developed an analytical framework. With this framework we examine the multi-level governance of natural resources, such as biodiversity or water, through the perspective of various systems: Politics, culture, economy, society and nature. We further distinguish between the local, regional, national, European and international levels of governance. In particular, the framework has helped to highlight some issues in national park governance in Hungary, where there are good links between the national and the international level. Hungary has joined all relevant international agreements and its nature conservation policy is well respected internationally. Yet on the local level of implementation many conflicts occur, especially between farmers and the national park directorates, which have the status of regional nature conservation authorities. These conflicts have become stronger since transition and accession to the EU: The introduction of market logic has placed enormous pressure on the national park directorates. The availability of EU funds has increased the competition for land between the national park and farmers. The Kiskunság region in central Hungary suffers from water shortages caused by inadequate water management and the situation is now becoming even more severe due to climate change. The participation of expert NGOs at the national level is well developed, yet there is little stakeholder participation at the local and regional levels. Due to this missing link at the lower levels, expert NGOs working mainly on the national level may lack legitimacy.

Keywords: Multi-level governance, biodiversity governance, nature conservation, national park, NGOs, farmers.

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1 INTRODUCTION

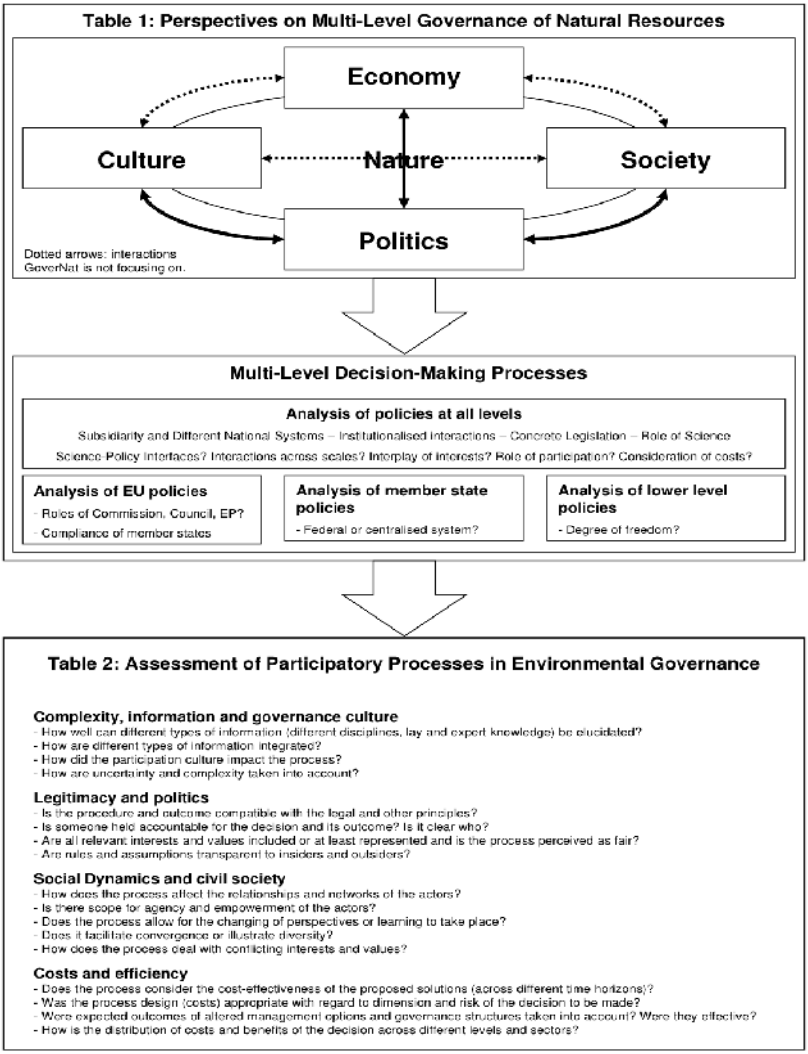
The Research Training Network titled "Multi-level Governance of Natural Resources: Tools and Processes for Biodiversity and Water Governance in Europe" (GoverNat), which is funded by the EU under its 6th Framework Programme, aims at analysing the role of participation within the multi-level governance of natural resources in Europe (RAUSCHMAYER et al., 2007). In order to gain a profound and comprehensive understanding of this complex governance setting, the GoverNat framework was developed as a guideline for data collection and analysis of the various case studies conducted by GoverNat fellows. Apart from this comparative analysis, the framework has also helped to highlight certain features of biodiversity and water governance in a single case study. In the following we will discuss the application of the GoverNat framework to the case of resource use conflicts in the Kiskunság National Park in Central Hungary.

2 THE GOVERNAT FRAMEWORK

The GoverNat framework consist of two parts: The first focusses on the multi-level governance (MLG) of natural resources (Table 1) and the second on the assessment of participatory processes in environmental governance (Table 2). The theoretical basis of the GoverNat framework is structural functionalism's division of modern society into four subsystems: The political system, civil society, the economic system and the expert or cultural system (RENN, 2008; WESSELINK and PAAVOLA, 2008). In the GoverNat framework (Table 1, upper part) the natural system ("Nature") appears in the background with broad interfaces to the four societal systems ("Economy", "Society", "Politics" and "Culture"), because it is the basis for all human systems and can be analysed through the lenses of the four societal systems. The arrows between the system boxes indicate that there are strong interactions, and even overlaps between the different systems. The lower part of Table 1 focusses on the multi-level governance system and interactions between levels. The questions noted in this part of the framework are examples for possible questions, not a complete list.

The second part of the GoverNat framework (Table 2) provides an assessment guide for participatory processes in environmental governance. The analysis is again structured according to the four systems of Structural Functionalism: Complexity, information and governance culture (expert/cultural system), Legitimacy and politics (political system), social dynamics and civil society (civil society), and costs and efficiency (economic system). The assessment criteria (effectiveness, legitimacy, acceptance, and efficiency) have been formulated as assessment questions (Table 2) (WESSELINK and PAAVOLA, 2008). The single questions will not be discussed in detail in this paper. The analysis of the Kiskunság case study will instead follow the system division of the GoverNat framework and discuss multi-level interactions.

Table 1 and 2: The GoverNat framework



Source: WESSELINK et. al., 2008, p. 17.

3 NATURAL RESOURCE GOVERNANCE IN THE HOMOKHÁTSÁG REGION IN CENTRAL HUNGARY

3.1 The natural system

The diverse landscape of the Kiskunság region was formed by flooding from the rivers Danube and Tisza and through traditional extensive agricultural practices. The landscape, with its diverse soils, comprises a variety of habitats, especially wetlands (floodplains, swamps, wet grasslands and alkali lakes) and dry habitats (sandy and alkali grasslands, steppes and sand dunes). The Kiskunság National Park is famous for its moving sand dunes. Protected endangered species include the Great Bustard (*Otis tarda*) and the Sibirian Iris (*Iris sibirica*) (BIRÓ et al., 2007, 2008; GILLY, 1999; KALOTÁS, 2004).

The trees of the original forest steppes were cut in the 16th-18th century. As overgrazing on the sensitive sandy soils destroyed the vegetation and caused sand storms, people began cultivating orchards and vineyards. The homesteads that developed from the end of the 18th to 19th centuries have contributed to the diversity of the landscape. Large parts of the land were commonly owned pastures, where the cattle herds continuously moved from one plot to another to avoid overusing the pastures (GÓMEZ-BAGGETHUN and KELEMEN, 2008; KELEMEN and BELA, 2008).

Because of water regulations in the socialist period and less rainfall due to climate change, the area has become very dry; the groundwater level is decreasing, former lakes are desiccating and the whole area is in serious danger of desertification (BIRÓ et al., 2007, 2008).

3.2 The political system

Regional level

The Kiskunság National Park was founded in 1975 as the second Hungarian national park. The national park directorate has a powerful role in regional nature conservation, as according to Hungarian national legislation it can decide on obligatory management rules for all protected areas within its administrative territory (284,165 acres in total). This includes the nine strictly protected areas of the national park (123,550 acres), as well as all nature conservation, landscape protection, and "ex lege" protected areas in the region. The administrative territory of the Kiskunság National Park is a mosaic of strictly to less strictly protected areas between non-protected areas (GÓMEZ-BAGGETHUN and KELEMEN, 2008; hompage of the Kiskunság National Park). The national park directorate pursues a strict nature conservation policy, with the aim of preserving the landscape according its appearance around 1900. The park has the right of first bid when protected land is

to be sold. Currently the national park is using this advantage; its aim, as stated in its management plan, is to buy 4,000 ha from surrounding settlements (KELEMEN and BELA, 2008).

National level

Hungary has joined all international nature conservation agreements (CITES, CBD, etc.). Internationally the country's nature conservation legislation is very well respected, as it places priority to nature conservation issues over economic interests. During socialism, nature conservation was a policy sector where international co-operation was supported. With EU accession, the legal framework and administrative procedures fulfil all EU requirements. Many informal institutions are, however, still influenced by the former socialist regime. There are many top-down policies and problems with their implementation. The administration is overloaded and has few financial resources due to austerity measures. In line with the introduction of the market logic for authorities, the Hungarian national park directorates now have to find their own income sources (KELEMEN and BELA, 2008; JONGMAN et al., 2008). The main administrative body for nature conservation on the national level is the Ministry of Environment and Water.

European Union

EU funds have played an important role in regional nature conservation management (e.g. agri-environmental programme, LIFE programme). Funds from the agri-environmental programme are available to whomever manages the land, not to the owners. Nineteen per cent of the Homokhátság region has been designated as Natura 2000 sites; management plans are currently being developed (KELEMEN and BELA, 2008).

United Nations

Three areas within the Kiskunság National Park (Upper Kiskunság Alkaline Lakes, Lake Kolon at Izsák, and the Upper Kiskunság alkaline steppes) have been designated as Ramsar sites because of their value for international bird migration. A part of the national portion was declared as a MAB-Biosphere Reserve in 1980 (KALOTÁS, 2004).

3.3 Civil society

Since the foundation of the national park, there have been conflicts between the national park and local farmers, starting with the eviction of farmers from homesteads located in the designated core zone of the national park. Preventing local people to access places they had used for traditional festivities has also created friction. Today, the conflicts focus on who has access to lands for agricultural use and to (EU) funds. Local farmers regard the national park as a state authority that acts against their interests (KELEMEN and BELA, 2008). There are also, however, some

encouraging examples of good co-operation between environmentally-minded farmers and the national park directorate (FLACHNER and KOVÁCS, 2003). There exists no farmers' association at the local or regional level where they could find a common position concerning interactions with the national park; instead, every farmer makes individual deals with the national park (KELEMEN and BELA, 2008).

The national park and local farmers have the common interests of keeping as much water in the area as possible and of bringing back some of the water from the rivers that flooded the area until water retaining construction was carried out in the 1970s. Already detailed plans for an irrigation project have not been implemented so far because the national government has not made funding available (KELEMEN and BELA, 2008). The Kiskunság National Park has been the site of many natural and social science research projects. There is a long history of co-operation between the national park and conservation experts. The advisory committee to the national park directorate, which was established in 2005 upon a national decree, (according to which it shall trace the work of the national park, state its opinion on strategic questions and strengthen the role of civil participation) is dominated by university teachers and technical experts. Environmental NGOs are very active at the national level and have a good working relationship with experts in the ministry. Experts from NGOs were asked to help with compiling the national list of Natura 2000 sites for the European ecological network of protected areas.

3.4 The economic system

The unemployment rate in the region is about 10 %, which is above the national average. Many people commute to the nearest town of Kecskemét, or to Budapest (GÓMEZ-BAGGETHUN and KELEMEN, 2008). The major farming activities are orchards, vineyards and cattle grazing – the national park has a large herd of Hungarian Gray Cattle. Sheep herding is practiced by some farmers and is actually better from a nature conservation point of view (especially with the native Racka sheep race), yet it is hardly profitable due to the low market prices. As forestry is an economically viable alternative in this dry region, the number of plantations is increasing. Even though the water shortage decreases the value of the land for agricultural activities, the demand for land has increased as people require more land to continue their economic activities (KELEMEN and BELA, 2008).

Since the restitution process, most parts of the national park territory are owned by the state. The fact that the national park has the right to make the first bid for land that is sold causes conflicts with farmers, who would like to enlarge their property. The national park has rented land to farmers for extensive agricultural use. The prolongation of the lease contracts is, however, uncertain. There are plans by the national park directorate to keep the land for cultivation by the park itself in order to gain revenues through EU funds. This means a great deal of economic uncertainties for farmers (KELEMEN and BELA, 2008).

3.5 The cultural system

The farmers in the Kiskunság region have a long history of independence. The Cumans ("kun" in Hungarian) were independent noblemen directly responsible to the king in the Middle Ages and even retained some self-governance rights as late as the 19th century. During socialism the single homesteads, which are typical of the area, were not fully collectivised as they were in the rest of the country because this heterogeneous landscape with its sensitive soils was not suitable for the industrial agriculture of the large state co-operatives. Most farmers in the Kiskunság only had to join so-called specialised co-operatives (e.g. for the exchange of machines) but could cultivate their lands individually. Because of these historical roots, the farmers today strongly identify with farming and have a strong sense of independence.

Local people place a high value on the aesthetic qualities of nature, and particularly older people who still remember the huge lakes and swamps with their diverse bird life would like to have the lakes back again. Some alienation from nature can be seen over the last decades. The strict protection policy of not allowing local people into the core – and most beautiful – areas of the national park has had some negative effects on environmental awareness, as people can no longer enjoy the local environment as they used to (e.g. for traditional feasts).

A lot of the local farming knowledge has been influenced by the industrial cultivation methods of the socialist period and does not comply well with the requirements for nature conservation (KELEMEN and BELA, 2008).

Since until 20 years ago there had never been a democratic government, there are still many paternalistic governance structures, so most local people do not understand that they can have a voice in the decision-making process, but rather rely on personal relationships. Most farmers who actively co-operate with the national park and are interested in nature conservation have a higher education and have moved to the area. Experts have had a strong influence on policy making during socialism (BERG, 1999).

Yet very slowly a changing of perspectives has occured: Farmers are beginning to recognise the value of the national park for eco-tourism development and the park directorate has begun to see that halting cultivation in the core zone of the national park was not in every case the best decision for protection. This is because of the spread of invasive species on uncultivated land, and because the famous sand dunes have stopped moving due to vegetation growth.

4 DISCUSSION OF MULTI-LEVEL GOVERNANCE ISSUES

The main groups of stakeholders in the resource governance of the Kiskunság National Park are the national park directorate and farmers. The upper level bodies (national government and ministry, EU) are important for defining the rules and for funding.

Hungarian nature conservation is internationally well respected and regarded as successful. This can be attributed to a long history of nature conservation and to the expertise of Hungarian scientists, who have ensured ongoing international exchange. Many of the experts are members of environmental NGOs. Through good personal contacts to experts working in the Ministry of Environment and Water, they have opportunities to influence nature conservation policy by providing advice. The national environmental NGOs also have good links to their European and international umbrella organisations.

The Ministry for Environment and Water has over-focussed its attention on the international and European levels but rather neglected the regional and local levels of implementation where the conflicts occur. Thus, the formal rules for nature conservation in Hungary are excellent but the praxis is often difficult.

The Hungarian government and the Ministry for Environment and Water have given a lot of authority and freedom to the national park directorates operating at the regional level. The national park directorates have, however, not been equipped with sufficient financial and personal resources for proper management.

In the Kiskunság National Park there are many conflicts between the national park directorate and local farmers, conflicts which have their roots in the history of the national park and are maintained by the current competition for land use rights. The EU funds have been welcome because they brought money to the region; the agri-environmental programmes are crucial for financing the nature conservation management of the protected areas. Yet the availability of EU funds has also increased the competition between farmers and the national park, which as a result of the cuts from national funding, was forced to seek income to finance its nature conservation activities. The EU funds have, moreover, been incentives for unsustainable agricultural investments (the number of cattle kept by the national park and farmers is too high relative to the decreasing productivity of the land).

In the course of EU accession, advisory committees to the national park directorates were established with the aim of improving civil participation. Most members of the advisory committees are university teachers, and only few other stakeholders were brought into the decision-making process.

Members of environmental NGOs are active at the local level in rather technical ways, (e.g. bird watching) but seldom interact with the local farmers that are managing the ecosystems.

Even though both nature conservationists (i.e., the national park directorates and NGOs) and farmers in the Kiskunság region suffer from the same major problem of water shortage, the two groups have not joined forces to try to find common solutions (e.g. lobbying for the highest subsidies for farmers who keep rainwater on their fields instead of draining it before the cultivation season). Closer co-operation between the two groups is made difficult by the many old and ongoing conflicts between them, as well as the missing organisation for farmers. True support from the national level to solve the major problem of water shortage in the region is missing (the government did not fund an already developed irrigation project, and many EU regulations support unsustainable practices).

5 CONCLUSION

There is an urgent need to better integrate local farmers (who have been managing the landscape for a long time) into nature conservation governance in the Homokhátság region or in Hungary more generally. This is not to say that there are no positive examples for good co-operation between farmers and national park directorates in the Kiskunság and other national parks. Yet all these are not sufficient for sustainable and legitimate governance of natural resources.

RENN (1993), when discussing his three-step model for decision-making, emphasised that in legitimate democratic policy-making, technical and economic rationality should be combined with public values and preferences. Decision-making processes should specifically integrate stakeholders' concerns and personal experience, as well as social interests. Expertise is important but should only be used to evaluate different options, as the decisions themselves are based on values. So while advice by experts is valuable, stakeholder concerns have to be taken into account when developing solutions for policy problems. In the Kiskunság, expert advice has been very influential, but the concerns of local stakeholders have not been sufficiently respected.

KLAUSEN and SWEETING (2004) argue that because selective and unsystematic inclusion of organised actors in a polycentric system can erode the legitimation basis of collective institutions, it is important to keep in mind the three principles of legitimation – consent, accountability and utility – and that these principles should be complementary, not exclusionary. For the Kiskunság case study, we can state that only the principle of accountability has been fulfilled; it is clear who is responsible for the decisions. Yet consenting with the decisions taken by the park directorate is low, and the utility of the governance is not good, as the resulting resource use is not sustainable.

NGOs could contribute to a more legitimate governance setting by increasing awareness within the ministry and the national park directorate for the concerns of local stakeholders, and by working more intensely with local people to improve understanding and acceptance of nature conservation. This could stimulate an improved co-operation between the national park directorate and local farmers, which is an important basis for environmentally and socially sustainable development of the region.

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HIERARCHICAL NETWORK MODELLING AND MULTICRITERIA ANALYSIS FOR AGRI-ENVIRONMENTAL MEASURES IN POLAND

JADWIGA ZIOLKOWSKA *

ABSTRACT

In this paper multicriteria aspects of agri-environmental measures in Poland after accession to the European Union are analysed. The paper addresses the question of how to integrate qualitative expert and farmer assessments into quantitative analysis; it also investigates how to allocate available budgets to achieve the environmental objectives of agri-environmental measures to the widest possible extent. To address these questions, two methodical approaches were used: Analytic Hierarchy Process (AHP) and Linear Programming (LP). The results of the investigation illustrate the necessity of interactive decision-making support in agri-environmental policy in order to more comprehensively consider qualitative and quantitative decision criteria.

Keywords: Multicriteria analysis, decision support, Analytic Hierarchy Process, Linear Programming, agri-environmental policy, Poland.

1 INTRODUCTION, PROBLEM SETTING AND OBJECTIVES

Agri-environmental measures have been regularly realised in Poland as obligatory policy instruments since accession to the European Union (EU) in May 2004. During the initial years of membership (2004-2006), seven agri-environmental measures ("Sustainable agriculture", "Organic farming", "Extensive meadow farming", "Extensive pasture farming", "Soil and water protection", "Buffer zones", and "Domestic farm animal species") were co-financed by the European Agricultural Guidance and Guarantee Fund (80 %) and the Polish state budget (20 %) (MRiRW, 2004). As agri-environmental measures are new in Poland, the only information source regarding farmers' interest in participating in the National Agri-environmental Programme is a descriptive evaluation based on statistical data. In order to extend the knowledge of this term by multicriteria issues, we use two methodical approaches: The Analytic Hierarchy Process (AHP) according to

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SAATY (1990), and Linear Programming (LP) according to KIRSCHKE and JECHLITSCHKA (2002).

In this paper, we address the importance of considering various stakeholders in political decision-making processes. Several studies confirm the necessity of involving various stakeholders in decision-making. MORRIS (2004) analysed the implementation of agri-environmental measures in the United Kingdom as a process which requires the diversity of actors to be taken into account. PRAGER and NAGEL (2007) stressed the necessity of considering administrative staff, experts from research institutions, as well as those stakeholders who are directly involved in the implementation of political measures. Therefore, the critical examination and evaluation of agri-environmental schemes can be ensured. MORRIS et al. (2000) investigated factors that can influence farmers' participation in agri-environmental schemes. The authors claim that the best advocates of agri-environmental schemes are farmers themselves. MARCHAMALO and ROMERO (2007) investigated different views and perceptions of the different criteria underlying the decision-making process while analysing the conflict of interests between agricultural production and electricity generation in Costa Rica. These authors developed a distance-based framework and showed how to structure the aggregation of preferences within a participatory decision-making process in a context of natural resources planning.

In this paper, we investigate how different ratings derived from two stakeholder groups (agricultural experts and farmers) can influence the objective function and the financing of the agri-environmental measures in Poland. To answer this question, we use the AHP and LP approaches due to several benefits of these methods. As an aproved practice-oriented Hierarchical Additive Weighting Method (FORMAN and GASS, 2001; WEBER, 1993: 73; MALCZEWSKI et al., 1997; KURTTILA et al., 2000; MASOZERA et al., 2006), the AHP is particularly recommended to be used in estimating intangible (immeasurable) environmental variables. Using this multi-criteria approach, relations between the measures and objectives and relative weights for each measure and for each objective can be estimated with pairwise comparisons. Moreover, the validity of results can be verified by the Consistency Ratio Index, which is mostly important in the case of environmental benefit values for which no reference criteria are available. By applying the LP approach for the analysed question, a simple one-dimentional structure can be constituted and a linear objective function can be maximised without the necessity of considering relations between variables from other structure levels (see ZIOLKOWSKA, 2007: 145-148). With Linear Programming, complex problems can be displayed and modeled in a simple and transparent way. Due to these benefits, the method has already been used for evaluating intangible resources (SAATY et al., 2003; CHANDRAN et al., 2005).

Using the AHP approach, we develop a hierarchical network model for agri-environmental measures in Poland. In order to estimate qualitative issues of

environmental protection in agriculture, a case study in the Subcarpathia region was conducted (ZIOLKOWSKA, 2007). Thereby, qualitative assessments of regional experts and farmers on their priorities with regard to environmental protection in agriculture were estimated and integrated in the AHP approach. Further, the results of the AHP approach were integrated in the Linear Programming approach to answer the question of how to allocate the available budget to best achieve the environmental objectives defined in the National Agri-environmental Programme 2004-2006.

The paper is structured as follows: The second chapter describes the methodology and data used. In chapter three, the results of the Analytic Hierarchy Process and the Linear Programming method are presented. In chapter four, conclusions and outlook are formulated.

2 METHODOLOGY

For the presented research questions, two approaches were used: Analytic Hierarchy Process according to SAATY (1990) and a Linear Programming approach according to KIRSCHKE and JECHLITSCHKA (2002). Using the AHP approach, we develop a hierarchical network model for agri-environmental measures in Poland, including the main goal to be achieved (improving environmental protection), criteria – environmental objectives ("Protection of natural resources", "Protection and conservation of biodiversity", and "Conservation of cultural landscape"), and alternatives (seven agri-environmental measures realised in 2004-2006, including: "Sustainable agriculture", "Organic farming", "Extensive meadow farming", "Extensive pasture farming", "Soil and water protection", "Buffer zones", and "Domestic farm animal species"). In order to operationalise the model and to consider priorities of regional experts and farmers with regard to environmental protection in agriculture, an explorative case study in the Subcarpathia region in South-eastern Poland was conducted in 2005. Within this case study, 8 agricultural administration experts in the Marshal Office in Rzeszów in the Division for Agriculture and Rural Development, and a random sample of 100 farmers realising agri-environmental measures were interviewed. The farmers were chosen according to the principle of considering representatives from all 21 circles in the voivodship who are participating in each form of the agri-environmental measures. Assessments of the administration experts provide information from the point of view of regional policy-makers, while farmers' assessments reflect priorities of practitioners directly affected by political rules of environmental protection in rural areas. The farmers were interviewed by agri-environmental advisors as, due to legal regulations of data protection, a direct survey was not possible.

Using the AHP ratio scale of 1-9, the interviewed stakeholders assessed in pairwise comparisons the importance of the agri-environmental measures with regard to environmental objectives. Based on this, ratings for the agri-environmental

measures and weights for the environmental objectives were calculated using the eigenvector method. Using SUPER DECISIONS SOFTWARE (2008), the results were synthesised and overall priorities for the agri-environmental measures were calculated, thereby expressing environmental benefits of the agri-environmental measures.

The results of the AHP approach were further used in a Linear Programming approach to answer the question of how to allocate the available budget to best achieve the environmental objectives defined in the National Agri-environmental Programme 2004-2006. For this reason, an aggregated objective function was defined as a sum of separate objective functions for the three analysed objectives of the agri-environmental measures ("Protection of natural resources", "Protection and conservation of biodiversity", and "Conservation of cultural landscape"). Each objective function was calculated as a sum product of the given expenditures for the respective measures in 2005 and of objective coefficients (ratings estimated by means of the AHP approach) (formula 1).

$$\max_{BA_1,\ldots,BA_7} Z = \alpha_1 \sum_{i=1}^{7} z_{1i}\, BA_i + \alpha_2 \sum_{i=1}^{7} z_{2i}\, BA_i + \alpha_3 \sum_{i=1}^{7} z_{3i}\, BA_i \quad , \tag{1}$$

where: Z is the aggregated objective function;

i = 1, ..., 7 is the index for the agri-environmental measures;

z_{1i}, z_{2i}, z_{3i} are the constant objective coefficients (for the three objectives respectively) of one monetary unit of the measure i;

BA_i are budget expenditures for the measure i;

α is the weighting factor for the objectives;

and $\alpha_1 = \alpha_2 = \alpha_3 = 1$.

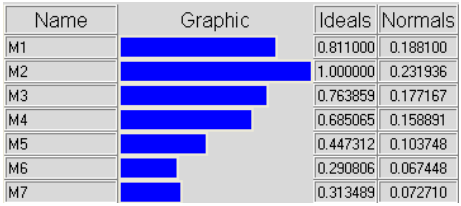
Each objective function was weighted at 1, in order to equally consider the environmental objectives in the base scenario. The objective weights estimated with the AHP approach were not used for this analysis. Investigating the objective-oriented budget allocation by considering both the AHP weights and the weights of 1 for all objectives, delivers the same results. Thus, in order to facilitate the model description and calculations, the weights of 1 for each objective were presumed. Additionally, three constraints were included in the LP model: Total budget for agri-environmental measures, farming area under agri-environmental programmes, and income losses resulting for farmers from the implementation of the agri-environmental measures. The upper budget bounds of the model were set to 200 % of the total expenditures for the agri-environmental measures in 2005, for the purpose to fix the solution space for the objective function. The lower budget bounds were set to zero due to missing legal rules in this term. In the base scenario, a situation of budget scarcity was simulated. For this scenario, the aggregated objective function was maximised and an objective-oriented budget allocation from a regional perspective was calculated.

3 RESULTS AND DISCUSSION

3.1 Results of the analytic hierarchy process

Using the AHP approach, the interviewed stakeholders' priorities were estimated. Utilising Super Decisions Software, the results were synthesised and overall priorities for the agri-environmental measures were calculated. The synthesised results show visible differences between the respective priorities of farmers and agricultural experts with regard to environmental protection in rural areas (Figure 1 and Figure 2).

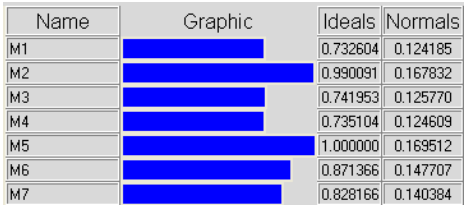
Figure 1: Overall synthesised priorities for the agri-environmental measures (farmers)



Name	Graphic	Ideals	Normals
M1		0.811000	0.188100
M2		1.000000	0.231936
M3		0.763859	0.177167
M4		0.685065	0.158891
M5		0.447312	0.103748
M6		0.290806	0.067448
M7		0.313489	0.072710

Source: Author's calculation.

Figure 2: Overall synthesised priorities for the agri-environmental measures (experts)



Name	Graphic	Ideals	Normals
M1		0.732604	0.124185
M2		0.990091	0.167832
M3		0.741953	0.125770
M4		0.735104	0.124609
M5		1.000000	0.169512
M6		0.871366	0.147707
M7		0.828166	0.140384

Source: Author's calculation.

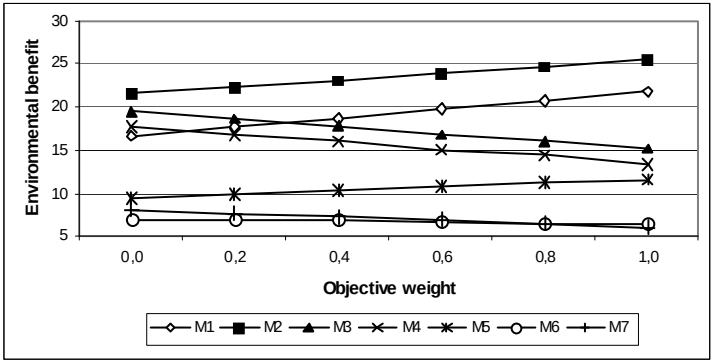
Notes: M = measure, M1 = "Sustainable agriculture", M2 = "Organic farming", M3 = "Extensive meadow farming", M4 = "Extensive pasture farming", M5 = "Soil and water protection", M6 = "Buffer zones", and M7 = "Domestic farm animal species".

The results show that from the farmers' perspective, the measure "Organic farming" would be most effective for achieving the environmental objectives "Protection of natural resources", "Protection and conservation of biodiversity", and "Conservation of cultural landscape". These are followed by "Sustainable agriculture" and "Extensive meadow farming", which contribute 81 % and 76 %, respectively, to the achievement of the environmental objectives. The lowest contributions are from the "Buffer zones" and "Domestic farm animal species" measures.

Considerably different priorities were found for the group of experts. According to the results, the measures "Soil and water protection" and "Organic farming" are most effective in achieving the environmental objectives, followed by "Buffer zones" and "Domestic farm animal species", which had a contribution of 80 %. Other measures, such as "Sustainable agriculture", "Extensive meadow farming" and "Extensive pasture farming" all contributed approximately 70 % to the achievement of the environmental objectives from the experts' point of view. The results show that ratings derived from farmers are more diversified and dispersed compared to experts' ratings, which are rather undifferentiated without particular preferences for the respective measures. Hence, in order to comprehensively consider differentiated assessments given by different stakeholders, as well as different environmental aspects that can influence decision-making processes directly, the application of multicriteria analysis seems to be a suitable instrument for addressing these questions.

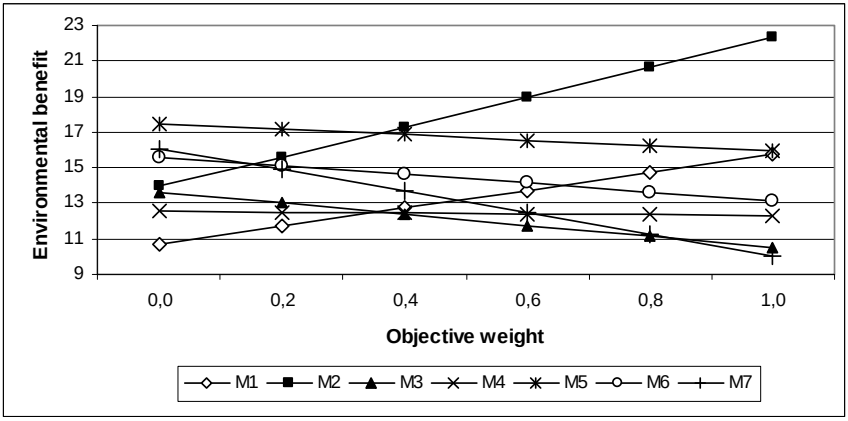
The ratings of agri-environmental measures derived from farmers' and experts' assessments using the AHP approach reflect the respective base scenarios. However, ratings are changing by different objective weights. In order to investigate these changes, sensitivity analyses for the objectives' weights were conducted for the interviewed stakeholders. In this paper, we present exemplarily the sensitivity analysis for the objective "Protection of natural resources" both for farmers and experts (Figure 3, Figure 4).

Figure 3: Sensitivity analysis for the objective weight "Protection of natural resources" (farmers)



Source: Author's calculation.

Figure 4: Sensitivity analysis for the objective weight "Protection of natural resources" (experts)



Source: Author's calculation.

The sensitivity analyses show that the preferences for agri-environmental measures strongly depend on the objective weights given. Thus, different objective weights determine the overall ratings of the measures which express the environmental benefit of the agri-environmental measures. As the ratings were estimated by pair-wise comparisons of the measures with regard to immeasurable criteria (environmental objectives), environmental benefit also has no tangible unit in the analysed case.

In the analysis, stronger dependencies were found for the group of experts, which means that the ratings of the agri-environmental measures derived from this stakeholder group are strongly influenced by the weight of the objective "Protection of natural resources". For this group, a small change of the objective weights brings about large changes in measure ratings. Most visible positive dependences/ changes were found for the measure "Organic farming" while parameterising the objective between 0 and 1. The absolute priority changes for this measure amount to 37.5 % (priority increase) from the perspective of agricultural experts. The most negative change (priority decrease of almost 60 %) was found for "Domestic farm animal species". For the group of farmers, most positive changes were found for the measure "Sustainable agriculture" (23.9 %), while the most negative were for "Domestic farm animal species" (36.7 %) (Table 1).

Table 1: Sensitivity of agri-environmental measures subject to parameterisation of the objective "Protection of natural resources" between 0 and 1 (in %)

%	M1	M2	M3	M4	M5	M6	M7
Experts	32.0	37.5	-29.4	-2.0	-9.9	-19.0	-59.9
Farmers	23.9	15.3	-28.3	-31.3	18.1	-9.4	-36.7

Source: Author's calculation.

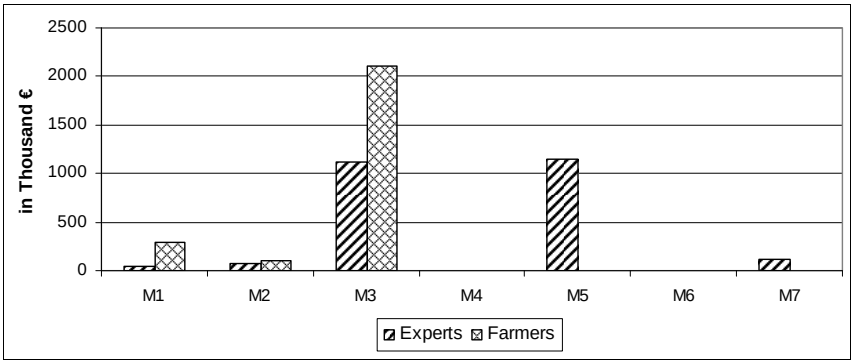
The results show that the assessed priority vectors have a fluctuating and unstable character. The presented question regarding the sensitivity of agri-environmental measures by changing objective weights emphasises the necessity of further exploring and discussing the advantages and disadvantages of qualitatively estimating priority vectors, as well as the need to use more complex multilevel approaches considering aspects of costs and risks of decision-making in a long-term perspective.

3.2 Results of the Linear Programming

The priority vectors estimated by means of the AHP approach were used in a Linear Programming model according to KIRSCHKE and JECHLITSCHKA (2002) and KIRSCHKE et al. (2004, 2007). Using this approach, we analysed objective-oriented budget allocation for agri-environmental measures in the voivodship Subcarpathia. The objective-oriented budget allocation was calculated provided a budget scarcity of 20 % (compared to the given allocation in 2005), which corresponds with future expectations about reduced available funds.

According to the results, visible differences in an objective-oriented budget allocation were found for the group of farmers and experts. From the farmers' perspective, only three measures should be supported with the available budget: "Extensive meadow farming" with the highest amount of 2.1 million €, "Sustainable agriculture" with 287.3 thousand €, and "Organic farming" with 105.4 thousand €. From the experts' perspective, the budget should be additionally allocated to the measures "Ground and water protection" (1.14 million €), and "Domestic farm animal species" (112.7 thousand €). Thus, the highest expenditures would be spent on "Extensive meadow farming" and "Ground and water protection" (Figure 5). Given these budget allocations, the objective function is maximised, which means that the maximum value of the environmental benefit under the model's maximisation conditions was achieved.

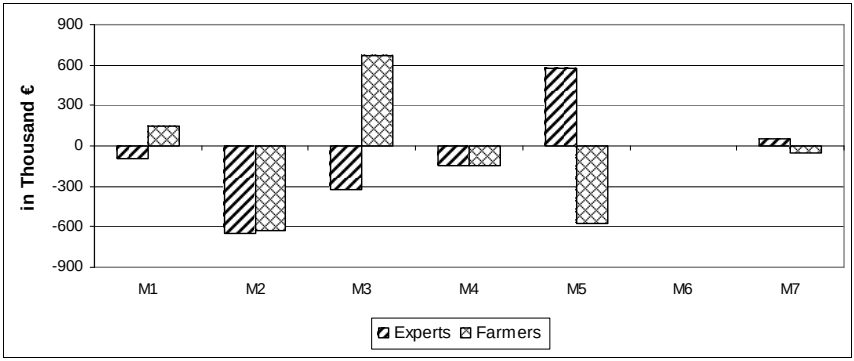
Figure 5: Objective-oriented budget allocation from the perspective of farmers and experts in the base scenario for the Subcarpathia region



Source: Author's calculation.

The difference between the calculated objective-oriented budget allocation and the given allocation in 2005 shows missing consistencies between the groups of farmers and experts. Similarities for both interviewed groups were found only with regard to the measures "Organic farming" and "Extensive pasture farming", which should be reduced when optimising the environmental benefit. The budget allocation for the other measures widely differs when comparing the estimations of farmers and agricultural experts (Figure 6).

Figure 6: Difference from the given budget allocation in 2005 from both the farmers' and experts' points of view



Source: Author's calculation.

The results prove the necessity of including the assessments of different stakeholders in an interactive process while planning political measures in rural areas

in Poland. This would help to more comprehensively consider multicriteria aspects of environmental protection by agri-environmental policy.

4 CONCLUSIONS AND OUTLOOK

In this paper, multicriteria aspects and hierarchical relations between agri-environmental measures in Poland were analysed, and an objective-oriented budget allocation for the measures, maximising the aggregated objective function, was estimated. The investigation delivers new insights into the problems associated with the qualitative estimation of environmental multicriteria issues. The sensitivity analyses prove that the preferences for agri-environmental measures strongly depend on the criteria weights and hence on individual value systems. Therefore, interactive case studies with ministry representatives and political decision-makers at the regional and national levels are recommended in order to consider various ratings reflecting different stakeholder preferences. This would help to better recognise specific regional problems and environmental necessities in rural areas and to solve questions of program planning, evaluation and budget allocations in a more comprehensive and environmentally-oriented way (compare: ZIOLKOWSKA, 2009).

Moreover, due to the intangible unit of the environmental benefit and missing reference data on environmental outcomes that can be achieved while realising agri-environmental measures in Poland, no comparison analysis can be conducted, which would be necessary to further develop the applied hierarchical network methodology. Also, more complex multilevel approaches considering aspects of costs and risks of decision-making should be implemented in future for the analysed question of environmental aspects in rural areas in Poland. With regard to the results of the LP approach, the analysis proves the necessity of considering various stakeholders and their different priorities on environmental protection in an interactive decision-making process in order to design the agri-environmental policy in Poland in a more objectively-oriented manner in the future.

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ASSESSING RURAL LIVELIHOOD DEVELOPMENT STRATEGIES COMBINING SOCIOECONOMIC AND SPATIAL METHODOLOGIES

K.C. KRISHNA BAHADUR[*]

ABSTRACT

This study employed a combination of socioeconomic and spatial methodologies to assess the rural livelihood development strategies in the hills of Nepal. Socioeconomic data were collected through a family survey from spatially randomly selected farm households and linked to Geographical Information Systems (GIS) using each family's respective geographical position, and then their spatial distributions were observed by interpolation. A multivariate regression model was run to assess the association between socioeconomic and biophysical conditions by taking farm income as a dependent variable and cost distance to the market and land quality parameters as independent variables. Multivariate linear regression showed that costs associated with distance to market and land quality extracted from remote sensing (RS) and GIS explain the income potential of a farm in a given location. Future strategies of reducing travel costs through road improvements and increasing the quality of land through soil and water management activities were found suitable for rural livelihood development.

Keywords: Combining socioeconomic and spatial methodology, spatial differentiation.

1 INTRODUCTION

In many mountainous regions of Asia, poor socioeconomic conditions and resource degradation follow a certain spatial gradient leading to further resource degradation and socioeconomic differentiation. Thus, the co-existence of rural resources and socioeconomic problems suggests a relationship between resource availability use and livelihood for the farming families. However, inter-dependencies between social and natural systems are often insufficiently described. Studying the effect of human activities on land and water has typically involved joining social science data with remotely sensed and other spatial data (WALSH et al., 2003). Biophysical and socioeconomic data are quite different given that they are measured in

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different scales. Thus, linking the social and spatial sciences has proven a major challenge (LENTES, 2003). In this context, this paper addresses the issue of linkages to socioeconomic data gathered with remote sensing and Geographical Information Systems (GIS) derived biophysical and infrastructure data in order to model the socioeconomic status of farming families and to test the future strategy of improving physical and infrastructure conditions relative to the economic success of farming families.

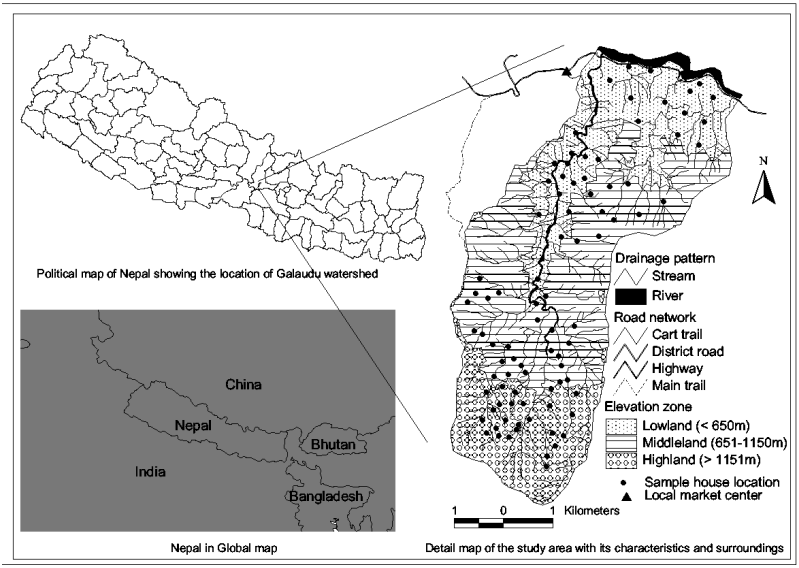
This study is based on the hypothesis that there is a direct relationship between resource availability, utility potential, use and management, and socioeconomic development (DOPPLER, 1998), and seeks to reach a differentiated view of problems in an area of spatial differentiation with regard to rural resources and socioeconomic development. This study, therefore, addresses the problem of how the differentiation in resource availability and utility potential, use and management under various physical and environmental conditions leads to differentiation in resource use, management and living standards of farm families. This study also examines the impacts of natural resource use according to differentiation in farming systems on the socioeconomics of farm families, as well as the prospects for the future development of these families. Concretely, the study analyses the influence of resource availability, use and management, particularly land and water resources, on decision-making within these mountain families, their income, and the tendency towards future development in these mountain-farming systems under different assumed conditions. The study seeks to analyse the complexity of systems interaction in an interdisciplinary approach combining socioeconomic and spatial methodologies.

2 METHODS

2.1 Study area

The area studied constitutes a small mountainous watershed in the midhills of Nepal (Figure 1). Most of the watershed is mountainous under hill forest and upland cultivation. The area has a sub-tropical climate, with a mean annual rainfall of 1404mm. The elevations of the highest and lowest points are 1960m and 217m above msl, respectively. The watershed can be divided into fertile, relatively flat valleys along the rivers (lowlands) and surrounding uplands (midlands) with medium to steep slopes (highlands). Agricultural land in the valleys is under intensive management with multiple cropping systems and is mostly irrigated. Paddy, potato, wheat and vegetables are major crops cultivated in the valley. Rain-fed agriculture, with or without outward facing terraces, is practiced on the rest of the agricultural land, much of which is not suitable for crop production without strong soil and water conservation measures because of their high erodibility and low productivity (ICIMOD, 1994).

Figure 1: Location of the study area



Source: Author.

2.2 Methodology

This paper is based on the methodological concept of combining the socioeconomic situation with the biophysical condition in a GIS environment. Information was gathered from family surveys, satellite images, global position system surveys, analog maps and digital GIS data. Family surveys are based on spatial random sampling of the families in the watershed. Ninety families were chosen for the family survey. Standardised questionnaires were applied for the interviews. The geographical position of a sample household was registered using GPS. The biophysical condition of the watershed was assessed using RS/GIS-based techniques. The socioeconomic conditions of the people were assessed using data acquired from the family survey by means of econometric and statistical methods. After the econometric assessment, spatial distributions of socioeconomic conditions were assessed. The spatial distribution of aggregated socioeconomic information such as farm family income, e.g. per family, per person, per hectare of cultivated land and so on were linked to the GIS by using each family's respective geographical position. Further, their spatial auto-correlation was observed, and then continuous thematic raster layers were produced for those factors found spatially auto-correlated by performing interpolation.

Land quality indices were prepared using the various indicators of the land. Cost distances from the different parts of the watershed to the nearest market centre

was measured using a GIS-based cost-weighted distance model (ESRI, 1997) and distance grid cells for travel from various locations of the watershed to the nearest market centre were prepared (K.C., 2005). Finally, the entire grid cells were combined, resulting in a complete picture of the socioeconomic and biophysical condition of each and every grid cell. By exporting the grid cell information to spreadsheet and then to the SPSS programme, correlations between variables were observed. Cost distance to the nearest local market centre and land quality parameters were found to be significantly highly correlated with farm incomes. Finally, a multiple regression model was established by taking farm income as a dependent variable and cost distance to nearest market centre and land quality parameters as independent variables. Estimated income and impact maps for different scenarios were constructed by bringing back the regression result into the GIS. The GIS-based multiple regression model is used to estimate potential future income generation in different scenarios of farm management. For this purpose, the land quality index of the grid cells and cost distance from each of the grid cells to the nearest market centre was modified from the current situation.

In future strategies testing, consideration was given, for example, to what would happen if the given weights were modified to match the desired scenario. If the final weight of a grid cell increased, e.g. from 1 to 1.1, the higher land quality index for the given cell could be expected. Likewise, if the final weight of a grid cell decreases, e.g. from 1 to 0.9, then the smaller value of land quality index for the given cell can be expected. Cost distance values after the improved road scenarios were used for simulating the effects of improved infrastructure on the income/ha of the sample household. For this purpose, the functional relationship found in the current situation was applied with the new cost distance values. Thus, the new income/ha for each and every grid cell was estimated and compared with the current situation and differences were taken as the impact of improved roads.

3 RESULTS

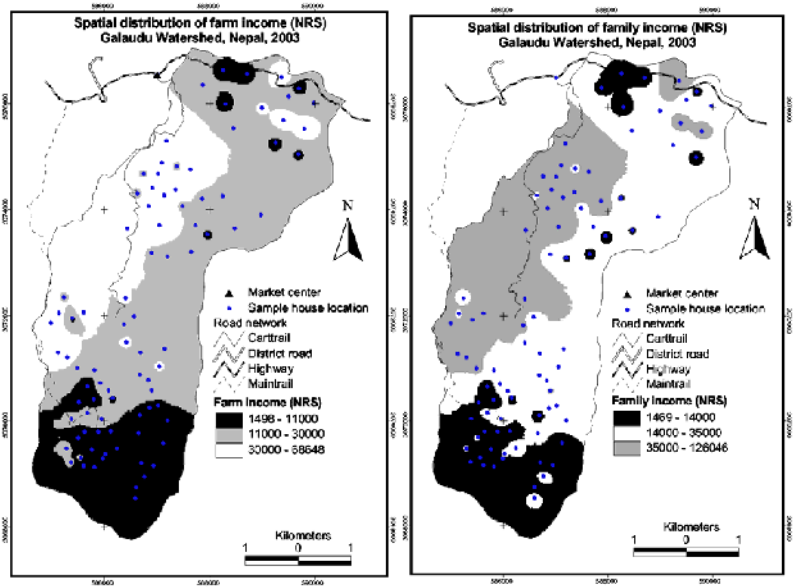
3.1 Farm family income and spatial distribution

The results of farm, off-farm and family income are presented in Table 1. In crop year 2002/03, farm income was 35,396; 29,498 and 8,229 Nepali Rupees (NRS) in the lowland, midland and highland areas, respectively. Average off-farm income was 8,283, 5,614 and 4,781 NRS in the lowlands, midlands and highlands, respectively. The average annual family income was 43,679, 35,113 and 13,011 NRS in the lowlands, midlands and highlands, respectively. According to the Kruskal Wallis test, there were statistically significant differences between sub-study zones in farm, off-farm and family incomes (probability of 99 %). A pair-wise test of significant differences between two sub-study zones in family income (Mann-Whitney Test) showed that the combinations of lowlands and highlands and midlands and

highlands were highly significantly different, but lowlands and midlands did not differ as much in the level of family income.

The spatial distribution of farm and family incomes are presented in Figure 2. Income differentiation in the space shows a higher farm and family income in the most favourable zones and nearby road and market centres. The spatial differences in farm income between these sub-zones are mainly due to the proportionally smaller size of irrigated land per family in highland areas and their productivity compared to lowlands. Additionally, vegetable farming, which is intensively practiced in lowland areas, could be another reason for high farm incomes in lowland areas. This was also confirmed from the higher farm income per ha of cultivated land and per person from the lowland areas as compared to highland zones (Table 1). Farm income was more or less similar in lowlands and midlands. Families in these areas were able to earn similar levels of farm income because of well-terraced land, more intensive use of external inputs and crop diversification that allows crop rotation and reduces the risk of crop failure. Farm income accounts for a greater share of family income in all three sub-study zones. Family income per person and per labour unit were significantly higher in lowlands as compared to highlands, which could be due to the accumulated effect of land quality, educational level of farmers, distance from market and road quality.

Figure 2: Spatial distribution of farm and family income



Source: Author.

Table 1: Farm and family income by sub study zone, 2003

Income (NRS)	Lowlands	Midlands	Highlands	Overall
Farm*	35396 (27523)	29498 (27940)	8228 (4874)	24375 (25428)
Per hectare of cultivated land*	56327 (47205)	26027 (15799)	15117 (12067)	32490 (34091)
Per person*	5840 (4498)	3883 (2391)	1442 (1028)	3723 (3475)
Off-farm**	8283	5614	4781	6226
Family*	43679 (34607)	35113 (27750)	13011 (6748)	30601 (28719)
Per person*	6835	4730	2219	4595
Per labour unit*	16844	12211	6061	11705

Source: Author.

Notes: NRS = Nepali Rupees (1US$= 80 NRS) Figures in parentheses are standard deviation. * and **=Significant at 99 % and 90 % respectively.

3.2 Future strategies testing

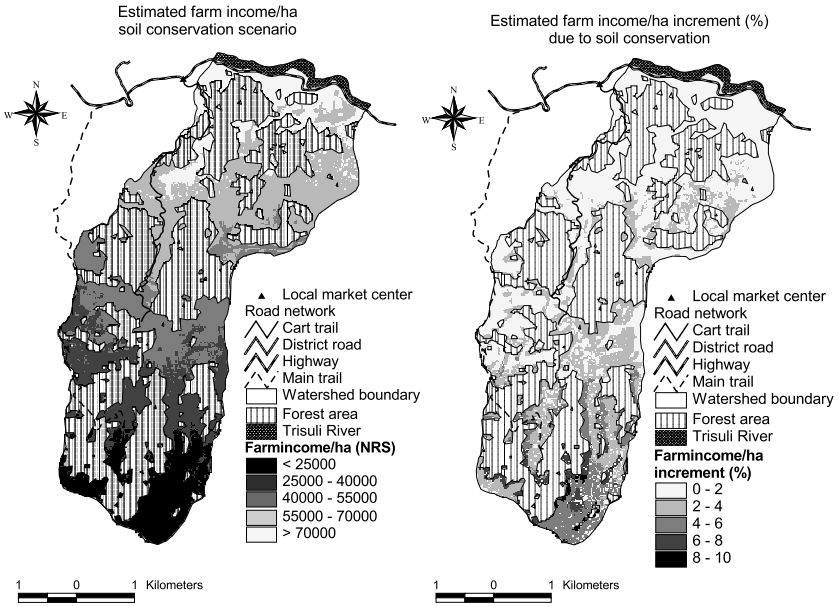
Improved land management scenario

Results of improved land management on income are presented in Figure 3; income generating potential is increased through improved land management. After the implementation of assumed land management scenarios, simulated income will not be distributed evenly throughout the study area. Simulated income will still be the highest in the current highest income areas and in the area where the impact of changed management is estimated to be highest. As in the current situation, the high-income areas remain as they were before. Nevertheless, the situations changed in the low-income zones, especially in the highland zone. While the current income in much of the highland zone is below 20,000 NRS, the improved situation predicts that income per hectare will reach and exceed 25,000 NRS (Figure 3). The percentage increase of income with soil conservation measures compared to the current situation can be seen in Figure 3. The low-income areas in highland zones benefit most from the changed management.

Improved road network scenario

Figures 4a and 4b show the cost distances (both current and after the improvement of infrastructure) from various parts of the watershed to the nearest market centre, respectively. On a spatial level, the improved situation shows the great differences over the current situation. The results of the cost distance calculations were used for simulating the effects of improved infrastructure on the income/ha of the sample household. Results of the improved road network on income are presented in Figures 4c and 4d. A significant impact on farmers' income was observed before and after the improvement and development of road networks in the remote areas. The situation of the high-income areas in midland and lowland zones is expected to improve only slightly less than 16 % and increase with greater distances from the marketplace.

Figure 3: Assessment of future strategies of soil conservation on farm income: Simulated farm income with soil conservation (left) and impact of soil conservation on income (right)



Source: Author.

Combined strategies of land, water and road improvements

Results of the combined strategies of improved land, water and road on income are presented in Figure 5. On the spatial level, the improved situation shows great differences over the current situation. A significant impact on farmers' income was observed before and after the improvement of water resource management, especially in the highland zone. The impact of improved roads was the highest in remote areas. Since these areas possess the greatest potential for increased income through the introduction of improved land and water resource management activities, the combination of more than one measure yields the best response. Still, income is low in this area compared to the highest income. In the zone with the current lowest income (20,000 NRS/ha) the scenario predicts the highest increase. The model results show that an increasing income trend can be achieved by combined strategies. For the currently high income areas, the increase of income is predicted to be less than 16 %. A better response is found in the rest of the midland area and most of the highland zone, where a 31,104 % increase of income is predicted in the case of combined land and road improvements; this figure is 30,143 % in the case of combined water and road improvements. Nevertheless, the impact of water resource

management on the sustainability of the farming system is expected to be substantial in these zones since the cultivation of slopes induces heavy soil loss in this area.

Figure 4: Assessment of road improvements on farm income: (a) cost distance current situation (b) cost distance after road improvements (c) simulated farm income with road improvements (d) impact of road improvements on income

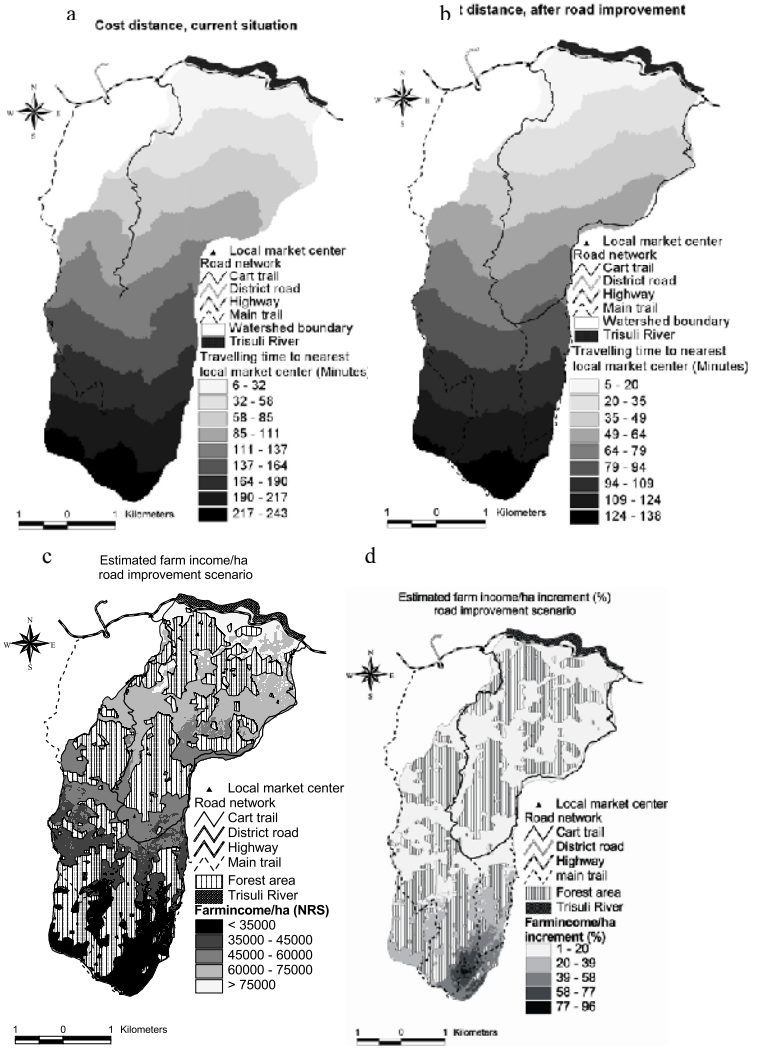


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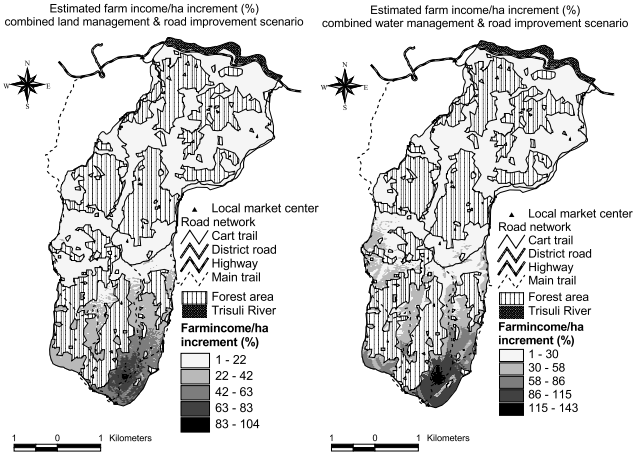
Figure 5: Assessment of the combined strategies: Impact of combined land and road improvements on income (left) Impact of combined road and water improvements on income



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4 CONCLUSION

Results from GIS-based multivariate linear regression showed that cost distance and land quality parameters extracted from RS/GIS techniques can explain the income potential of a farm in a given location. Based on the functional relationship between income and cost distance and land quality parameters, future strategies of reducing cost distance through road improvements and increasing the quality of land through soil and water management activities and their impact on income shows the increasing trend of farmers' on-farm income and decreasing spatial differentiation of incomes among farmers living in the various watershed zones. Tests of future strategies suggest that if the tested strategies were implemented, an improvement of living conditions in the currently disadvantaged areas with low levels of natural resource endowment and poor living standards could be achieved. The development strategies of different scenarios tested in this study do not necessarily fully solve the problem of low living standards, especially in highland areas. The tested strategies would help to increase the economic success of farming families and their standards of living on one hand, and on the other hand it would reduce the level of resource degradation and standards of living gaps between the highlands and lowlands. With respect to the sustainability of the farming systems, the results of the study show that managed land use yields a better economic response in zones with marginal land endowment. Hence, this has demonstrated that the combination of socioeconomic and spatial concepts and methods is an

appropriate methodological option for formulating and testing long-term problem solving strategies that aim to improve standards of living for rural farmers in general and farm income in particular. The paper presents a methodological concept suitable for dealing with such problems, as well as empirical results which can be relevant for strategy testing in other similar regions in mountainous zones.

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SUSTAINABLE AGRICULTURAL LAND USE

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LINKING ECONOMIC AND ENERGY MODELLING WITH ENVIRONMENTAL ASSESSMENT WHEN MODELLING THE ON-FARM IMPLEMENTATION OF ANAEROBIC DIGESTION

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ABSTRACT

In order to determine the effects of the introduction of Anaerobic Digestion (AD) within a farming environment it is necessary to take into account all of the potential factors affecting on-farm biogas production in an integrated way. One of the problems faced by those trying to build integrated models is that the drivers for environmental, economic and energy production often conflict with one another and may be incompatible. This paper considers some of these drivers and how the three approaches for economic, environmental and energy assessment may be integrated in order to address conflicts between them.

Keywords: Anaerobic Digestion, integrated farming, economics, environment, energy.

1 INTRODUCTION

A number of authorities have recognised the contribution that agriculture makes to greenhouse gas (GHG) emissions through the production of livestock and livestock manures. GHGs also result from the use of land fill and the decomposition of green and organic wastes. Anaerobic Digestion (AD) has been identified as having a role to play in reducing these emissions (see, for example, EC, 2005; FAO, 2006). This potential role, including the use of anaerobic digesters on-farm, is recognised in many European Union (EU) and subsidiary national policy initiatives in support of GHG reduction and the promotion of renewable energy. The capability of Anaerobic Digestion to use organic wastes and a wide range of plant materials enables the production of biomass-based renewable energy whilst avoiding conflict with food production. The process also provides improved nutrient management leading to the potential to increase crop yields.

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In order to determine the potential effects of the introduction of AD within a farming environment, it is necessary to take into account all of the potential factors affecting on-farm biogas production in an integrated way. One of the problems faced by those trying to build integrated models which consider all of these factors is that the drivers for environmental, economic and energy production often conflict with one another and may be incompatible. This paper briefly examines some of the issues relating to the economic, environmental and energy aspects of on-farm energy production using AD and methods that can be used for modelling or assessment. Each of these areas is considered individually, and is followed by an assessment of how the methods may combine or conflict, and how this might impact an integrated farm-based model.

2 ECONOMIC MODELLING

The economic modelling of AD cannot be meaningfully done in isolation, but rather has to place the activity into the physical, commercial, social, market, policy and regulatory contexts within which it will operate in practice. This context forms an extremely complex set of interacting factors which both impact upon the AD activity and are impacted by it. Any economic modelling exercise must reduce the dimensionality of this context in order to be practicable, while simultaneously capturing its essential determinants so that the representation of the system functions adequately. As the focus of this enquiry is farm-based AD, a key component of this context has to be the farm business within which AD operates. The nature and scale of this problem in large part determines the choice of modelling approach. Since the 1960s, Mathematical Programming techniques have been widely used to model farm-level management decisions (see, for example, GLEN, 1987), although other approaches are available. Mathematical Programming is a method for solving a problem where one function (the objective) is maximised, or minimised, while other functions (the constraints) are satisfied. Linear Programming (LP) is the most commonly used form. In this case the maximised objective would be the profit of the whole farm business, subject to constraints on, amongst other things, the availability of farm resources. Modelling would be based on a traditional activity analysis framework (see, for example, HAZEL and NORTON, 1986) with the deployment of AD as a novel land using activity, competing for farm resources with the more "traditional" land uses.

One of the criticisms levelled against Mathematical Programming is that it is data intensive, requiring a consistent set of input-output coefficients (for each model activity) and detailed information on farm resources. The lack of availability of such data is often an obstacle to the construction of farm models. When constructing farm-based models it is therefore often necessary to use multiple sources of data, drawn from official datasets, independent surveys and other farm management publications, and care needs to be taken to ensure consistency between sources.

While serviceable input-output data can usually, with effort, be obtained for the main land-using agricultural activities, it is more problematic to obtain data for minor agricultural enterprises and non-agricultural activities, particularly when they are relatively novel, as is the case with AD. A particular problem for AD is that some of the inputs are farm wastes, which have traditionally been overlooked in surveys and other farm data collection exercises, as they have been perceived to have very low economic value.

In Mathematical Programming a single objective is maximised, i.e. farm profit (usually expressed as a Gross Margin or some form of Net Margin). The advantage of this approach, as opposed to just accounting for the profit margin attributable to AD, is that it captures any indirect effects that AD may have on other farm enterprises, both in terms of profit margins and management decisions. This could mean, for example, that AD may not enter the model solution at all, in spite of being profitable, because to do so would negatively affect other enterprises and so reduce whole-farm Net Margin. The converse is also possible. The limitation of this approach is that it does not directly account for other farming objectives, such as lifestyle (i.e. maximising leisure time of the farmer and family), or environmental goals. There may also be specific non-profit goals for the AD enterprise itself, in addition to the general farming goals. Subsidiary goals can be accounted for in the modelling through the use of constraints. For example, limits can be placed on the amount of inorganic fertiliser that can be imported onto the farm, as would be the case under a certified organic system. The limitation of using constraints to reflect other farming goals is that they can only approximate the effects of more general objectives. However, the main difficulty in capturing non-profit farming goals in economic models lies in actually knowing what they are and how significant they are relative to one another.

An important consideration when modelling AD is the market and policy context. Experience has shown that when enterprises are economically marginal they are much more heavily influenced by changes in market conditions and also much more dependent on policy support. This is even more the case where new and untested technologies are concerned. As the policy and market environment for AD is changing rapidly, a multi-scenario approach would be preferable, i.e. modelling AD under a range of policy and market assumptions. When there is uncertainty over likely future market and policy conditions, it may be useful to carry out a sensitivity analysis to identify price threshold and policy settings that determine the feasibility of AD. It should also be remembered that the agricultural policy and market environments are also subject to change and scenarios should reflect this.

3 ENVIRONMENTAL IMPACT ASSESSMENT

Biogas production on farms is likely to affect the environment in a number of ways. The most direct effects may result from the spreading of liquid or solid digestion residues on the land. While digestate can provide a valuable fertiliser for crops, it can also be the cause of environmental nitrogen and phosphorus enrichment. On a full life-cycle basis, the digestion of livestock manures and the spread of digestate on land has the potential to reduce CH4 and N2O emissions. However, the spreading of digested energy crops leads to additional ammonia emissions and are thus likely to be incompatible with current policy objectives to reduce nitrogen and phosphorus leaching and gaseous emissions from agriculture. Emission abating measures include reducing the amounts of digestate spread per hectare or using injection application equipment.

While the direct emissions of NH3, CH4, and N2O from digestate application have been measured (CLEMENS et al., 2006) and can be used in models, the indirect environmental effects of AD are more difficult to quantify and are often not considered at all. If crops are grown specifically for AD, this new production goal is likely to change farming practices. Under these circumstances a new biomass-quantity-optimised production focus will accompany a change in cropping pattern, leading to altered sowing/harvesting dates and possibly even a two-cultivation system with significant changes in field operation times. The environmental effects of these changes are manifold and complex and would therefore be difficult to generalise in the modelling of biodiversity impacts.

"Planned" biodiversity comprises the crops and/or livestock the farmer chooses to - be economically beneficial, for example insects which pollinate the crop, or damaging, such as pathogens, pests and weeds. Unplanned biodiversity may become part of farm planning in the sense of that they are actively promoted or eliminated. Such management is directed towards the elimination or promotion of either population processes (e.g. pest control) or ecosystem processes (e.g. N fixation). These approaches are associated with species diversity and functional group diversity, respectively (BRUSSAARD et al., 2007).

Farmers producing crops for AD in Europe have tended to grow maize as feedstock due to its high biomass yield. However, while maize may seem suitable from an economic perspective, it is by no means ideal from the environmental point of view, as it requires high fertiliser inputs and the bare soil between rows promotes soil erosion. Maize also provides few habitats for birds, insects and small mammals. When maize comes to dominate arable rotations, it has the potential to significantly reduce biodiversity. This could be abated by a number of means, including limiting the share of maize in a crop rotation, limiting field sizes and providing corridors for wildlife moving between habitats. However, these management options are unlikely to be funded under current CAP Pillar II agri-environment schemes

and are likely to be associated with reduced machinery efficiency, leading to higher energy input and therefore higher AD feedstock costs. The magnitude of this loss in efficiency largely depends on farm structure.

Biodiversity promoting measures may not affect smaller, low input farms with mixed farm systems to the extent that they would larger, more specialist farms. In this case, an indicator related to field sizes is a suitable measure to implement and transmit information from the environmental assessments to the economic and energy modelling.

Changing the farm management system to grow crops specifically for use in a digester can significantly influence environmental outcomes. The economic need for high yields of biomass per hectare can lead to pressure to convert grassland to arable crops such as maize, as this is usually more productive. This conversion is associated not only with reduced biodiversity, but also with carbon release from the soil due to cultivation. All these factors need to be accounted for in the environmental assessment.

Many environmental effects cannot be quantified in a "generalised" assessment, as they depend on site-specific conditions. What can be achieved, however, is a representative assessment which ranks relevant agronomic factors according to their environmental significance. For example, in terms of the impact of maize on biodiversity, the relevant agronomic factors might be:

- The percentage of maize in a rotation;
- The size of individual fields;
- The presence of catch crops;
- The presence of hedges and field boundaries providing nesting sites;
- The presense of habitat-connecting corridors;
- Reduced pesticide application;
- Harvest times in relation to breeding requirements.

Once each of the above factors has been ranked according to its significance for biodiversity (and factor-values allocated accordingly), a specific farm situation can be assessed by scoring each of the above factors according to whether they are addressed on the farm or not. Multiplying both values and summing the products to provide whole-farm scores would allow between-farm and between-scenario comparisons.

4 ENERGY MODELLING

The main drivers for renewable energy production come from the requirements of having to replace limited fossil fuel sources, provide energy security and combat climate change. Figures published in the World Energy Outlook (WEO) 2008 (IEA, 2008) suggest that fossil fuel use for energy production could increase to 17,010 million tonnes oil equivalent (Mtoe) by the year 2030. Directly linked to this increase in energy use is the increase in global warming as a result of the emissions produced through the combustion of these fossil fuels. According to the WEO (IEA, 2008), global energy-related CO2 emissions will increase from 28 Gt in 2006 to 41 Gt in 2030. Renewable fuels that can be considered as replacements for these include wind, wave and solar power. In this paper we are concerned with biomass as a source of energy, particularly through farm-based anaerobic digestion. When assessing any form of renewable energy it must also be considered in terms of its sustainability. Can more energy be produced than is used (from fossil fuel sources) in the generation process? Also, can the yield of energy be achieved year on year, and can this be done without adversely affecting the landscape, soils, air and water quality and biodiversity? In terms of climate change, can the energy be produced without generating any more CO_2 than is taken up by the biomass used as feedstock for the process?

An indicator of the sustainability of an energy production process can be determined from the energy balance, which can be calculated for any given energy modelling scenario by using life cycle analysis methods. These calculations take into account both energy directly used, in the form of diesel, oil, gas and electricity, as well as energy indirectly used. Energy used directly in the cultivation of crop based feedstock materials and the generation process includes the fuel required for the production of crop based biomass, the transport of this biomass to the digester, the heat and electricity requirements of the digester and any further processing of the biogas and digestate produced. Energy used indirectly includes that consumed in the production of inputs for biomass cultivation such as the manufacture and transport of fertilisers and sprays, but it can also occur in the manufacture, delivery and maintenance of tractors and machinery, and in the construction of buildings and the digester. Having calculated all these energy requirements, they can then be compared with the energy value of the fuel produced and any substitution of energy resulting from the replacement of fossil-fuel-derived energy and material sources. If the energy value of the fuel produced is greater than the energy put into production, then the balance is positive and is sustainable from an energy perspective. If the input energy is greater than the energy value of the fuel produced, then the process is unsustainable and should be reconsidered.

GHG and other emissions can be linked directly to energy production and use. It is therefore possible to calculate the emissions of the fuel production process and

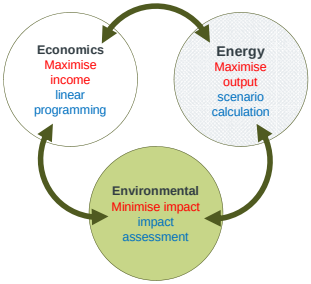
compare those with the fossil fuel equivalents. For a fuel to be deemed sustainable the emission of greenhouse gases from its generation should be minimal and preferably negative compared to fossil fuel equivalents. In order to achieve this, the use of fossil based fuels and fertilisers in the crop production and energy generation process must be kept to a minimum. In terms of AD, emissions of GHG's must also be minimised by ensuring that fugitive emissions are reduced and the use of digestate as a fertiliser is as efficient as possible and thereby does not lead to nitrate leaching and N_2O emissions.

5 INTEGRATION

Previous farm-based AD modelling exercises have focussed on existing AD plants for which "real" data has been available over a number of years, making it possible to define site-specific models which can be validated by comparison with observed practice. Such approaches are limited in terms of a general application to predict farm income and potential environmental effects that might accompany changes of existing farm practices to those associated with a switch to energy production. In attempting to model farm-based AD, the whole farm must be represented and techniques adopted that allow all the different drivers and outcomes to be considered. This type of approach allows for scenario-based exploration of different strategies designed to maximise the synergies and overcome the conflicts between the various drivers and outcomes. For example, the use of maize as a feedstock material for AD is encouraged by economics, i.e., it is high yielding and a good source of biogas, but has many negative attributes from an environmental perspective. It can be hard to reconcile the economic and environmental assessments directly, as the drivers are often in apparent opposition.

By adopting a whole-farm modelling approach, scenarios can be explored that place emphasis on each of the different drivers, so that the outcomes can be assessed. Is the aim of introducing AD to produce as much income as possible regardless of environmental impacts? Is the aim to maximise the production of sustainable energy or is the aim to reduce environmental impact by reducing the use of fossil fuels in energy production and in the fertilisers used for crop growth? As outlined above, when deriving whole-farm implications for the introduction of AD, the modelling process involves three distinct approaches, as shown in Figure 1. Each of the approaches can be applied in isolation; however, integration can be achieved by using the outcomes of each approach to provide input to the others.

Figure 1: Three modelling/assessment approaches



Source: Authors.

For example, an initial assessment can be made based on optimising the farm arrangements from an economic perspective using a range of possible digester sizes. This in turn affects the energy production and potential amount of digestate generated. The storage and application of the digestate and the resulting changes made to the cropping system will have environmental impacts which can be assessed. Suggestions for alternative cropping systems will affect potential energy production and related emissions, which can then be fed into the economic assessment. Similarly, the application of fertiliser is governed by climatic, crop and soil considerations that may affect the potential economics of the digester. Restrictions on the application of the digestate may result in the requirement of possible alternative processing options such as drying and waste water processing. These processes may require energy to operate, which will reduce the energy available for sale, and require financial investment, which will reduce the overall profit.

It is often assumed that farmers make decisions on the type of AD technology that they require, together with its scale, based solely on the pre-existing supply of feedstock. In actuality, the selection of appropriate AD technology and scale will be very much dependent on the farming system i.e., the choices made on livestock farms with a good supply of slurry will be very different from choices made on organic, mixed or arable farms. This in turn affects the models selected and their resulting assessments. By using the three linked assessment methods outlined here, it is possible to capture and explore the effects of the often contradictory drivers and resultant economic, environmental and energy impacts. It will then be possible to develop an overview of the potential effects of the introduction of AD in an integrated farming system, which can then be validated against real data.

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PHYTOREMEDIATION OF A HEAVY METAL CONTAMINATED AGRICULTURAL AREA COMBINED WITH ENERGY PRODUCTION

MULTIFUNCTIONAL USE OF ENERGY MAIZE, RAPESEED AND SHORT ROTATION CROPS IN THE CAMPINE (BE)

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ABSTRACT

Due to the atmospheric deposition of dust, a large agricultural area in Belgium is moderately superficially (0-40 cm) contaminated with lead (Pb), zinc (Zn) and cadmium (Cd). Phytoremediation is a technique that uses plants for the removal of pollutants or to render them harmless. Rapeseed and SRC seem a good choice because of the high accumulation of metals. When income and energy production come into play, energy maize has a competitive advantage. Multi-Criteria Decision Analysis (MCDA) can be a helpful tool to decide on the appropriate non-food purpose crop.

Keywords: Phytoremediation, agriculture, multi-criteria decision analysis.

1 INTRODUCTION

From the end of the 19th century until the mid-1970s, zinc and lead were refined at several locations in the north-east of Belgium (Campine region; Dutch: de Kempen) using a pyrometallurgical process (VANGRONSVELD et al., 1995; HOGERVORST et al., 2007). Through atmospheric deposition over the years, an estimated area of at least 280 km^2 is nowadays enriched with several metals, including Zn, Cd and Pb (OVAM, 2008). Most of the metal enriched soils are in agricultural usage. There is a possibility that growing food and fodder crops might be restricted in the near future over safety concerns (e.g. potentially exceeding Cd limits, which are 1.1 mg Cd/kg

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dry matter). This imposes a burden on the involved (mostly dairy cattle) farmers that use the land to grow fodder (maize and grass). Therefore, measures need to be taken that guarantee sustainable use of the contaminated land, if possible with due remediation, while at the same time guaranteeing farmers of a certain income. One possible solution is growing non-food/energy crops which take up the heavy metals. When these crops are harvested, metals are taken away at the same time.

Phytoremediation is a technique that uses plants for the removal of pollutants from the environment or to render them harmless (GARBISU and ALKORTA, 2001). It is a technique that is best suited for the remediation of slightly to moderate and diffusely polluted areas and takes place at much lower cost than conventional methods (KUMAR et al., 1995; RULKENS et al., 1998). Recently, fast-growing crops with high biomass production have also been used for phytoremediation, resulting in a final metal extraction that can be equal to hyper-accumulating plants despite the lower metal concentrations in their plant compartments (VASSILEV et al., 2002; MEERS et al., 2005).

The valorisation of the contaminated biomass has promising avenues, e.g. as a "renewable energy source" (ROBINSON et al., 2003; GHOSH and SINGH, 2005). Each of the crops will be harvested according to agricultural know-how and sold by the farmers to be used, e.g. as input in an energy conversion installation. If farmers wish to continue current activities – Given that this is technically feasible – they will need to buy fodder for the cattle from outside the contaminated area. The farmers' current income is then supplemented or reduced with revenues/costs originating from activities during remediation. In the other case, their new income consists of revenues/costs from remediation activities.

In this study, the potential of energy maize, rapeseed and short rotation coppice for sustainable agricultural land use purposes is assessed based on energetic, economic, technical, social and remediating aspects using a Multi-Criteria Decision Tool (MCDA). MCDA has been used to assess forest management (ANANDA and HERATH, 2008), to analyse crop choice for farmers (VAN HUYLENBROECK and DAMASCO-TAGARINO, 1998), sustainability of agricultural crops (SADOK et al., 2008) and contaminated land management methods (JANIKOWSKI et al., 2000). This paper is a contribution to the MCDA discussion, as it will integrate the assessment of sustainable agricultural crops with that of contaminated land management by assessing the concept of phytoremediation in agricultural areas.

2 DATA AND METHODS

2.1 CBA versus MCDA

Economic theory is based on the concept of rationality, i.e., each individual makes decisions based on a comparison of costs and benefits. This is encompassed in the theory of Cost-Benefit Analysis (CBA): One maximises the present value of all benefits less that of all costs, given certain constraints (BRENT, 1996). In CBA the different benefits are thus condensed into a single composite measure (BRENT, 2003). It is not always clear how a market mechanism can be set up to value benefits, e.g., associated with the farmer feeling more comfortable with one crop than with another (i.e., an intangible private criterion). Therefore, in those cases, CBA could be supplemented with a technique to measure environmental costs in terms other than monetary (JOUBERT et al., 1997; MIRASGEDIS and DIAKOULAKI, 1997).

In MCDA, many (conflicting) objectives are handled rather than a single objective (economic benefit) and the goal is no longer to find an optimal decision but a satisfactory one. The decision problem is structured into an isolated objective function with predetermined boundaries. This function is then optimised over a set of feasible solutions – given that the decision-maker is rational and tries to maximise his welfare/utility function – by evaluating the alternative solutions (GUITOUNI and MARTEL, 1998). Many authors come to the conclusion that it is very difficult to find one appropriate MCDA method for a specific decision process. Ideally, different methods should be combined (SADOK et al., 2008; LOKEN, 2008).

2.2 Conflict analysis method

The analysis focuses on an integrated assessment of rapeseed (O_2), energy maize (O_3) and SRC (O_4) as possible alternative crops for conventional farming activities on heavy-metal contaminated soil. Another action alternative (O_5) is included, as well as a no action alternative (O_1) (Table 1).

The choice of option depends on various criteria that together lead to an integrated assessment of the problem. Scores on different evaluation criteria are integrated according to their relative importance to the final crop selection. The model used in this study is the Conflict Analysis Multi-criteria Method (CAM), which calculates preference indicators for each pair of alternatives (P(a,b)). First, scores for each criterion have to be re-scaled to an impact score between 0 and 1 using a preference function chosen by the decision-maker.

Table 1: Different options for the Campine region

Option	Option content
O_1	The farmer continues current activities, i.e., growing fodder maize for dairy cattle.
O_2	Rapeseed is grown and pressed to Pure Plant Oil. This oil is used to replace diesel oil by farmer.
O_3	Energy maize is grown, which has a 20 % higher biomass production and is sold to a local digester.
O_4	Short Rotation Coppice (SRC) of willow is grown, SRC is a non-food crop and is sold for co-combustion.
O_5	The soil is remediated using conventional excavation techniques. Excavation has a short duration.

Source: Authors.

Next, the difference in impact score on criterion *j*, for which alternative *a* scores better than *b* ($\hat{e}_j(a,b)$) is multiplied with the normalised weight/relative importance of each of the criteria (g_j) (see Eq. 1). These preference indicators are then compared and added to a final score to produce a ranking of options. To read more on this model, see VAN HUYLENBROECK (1997) and VAN HUYLENBROECK and DAMASCO-TAGARINO (1998).

$$P(a,b) = \frac{1}{n}\sum_{j=1}^{n} g_j \cdot \hat{e}_j(a,b) \qquad \text{(Eq. 1)}$$

Behind the analysis lies the hypothesis that choice between the different options is determined by 5 criteria. The valorisation potential of the crop has to be determined to the degree that crop will be able to generate an income for the farmer that is comparable to his income before the switch. Scores on this criterion are based on own calculations using a CBA analysis. The technical aspects criterion consists of different components: Soil characteristics, know-how of the farmer, whether the crop can be combined with current activities, the ease of further conversion, e.g. into energy. Scores on this criterion are based on interpreting a survey performed by the RESEARCH INSTITUTE FOR NATURE AND FOREST (2006), a report from IEA BIOENERGY TASK 30 (n.d.), a study on the potential of biofuels in Flanders (2006), MCGRATH et al. (2001) and VASSILEV et al. (2004). Social acceptance of the neighborhood scores are based on the RESEARCH INSTITUTE FOR NATURE AND FOREST (2006) and own interpretations. Remediation duration is the fourth criterion. Extraction capacities come from experiments conducted on a trial field in the Campine region. Final scores are determined given a multilevel preference function. This criterion is of importance as legislation might change and remediation of the site might become obligatory. At that time it is important how far one is from the goal. Finally, the crop can be used for renewable energy purposes (e.g., when energy

maize is digested, the resulting biogas can be converted to heat and electricity, rapeseed can be pressed to oil) or can be used for other purposes (e.g. digestate as an alternative for chemical fertiliser, paper production of woody crops). The criterion is measured by the total CO_2 emissions avoided within defined system boundaries, here perceived as direct emissions coming from the use of fossil fuel energy and indirect emissions of energy embodied in machines and materials (MATTHEWS, 2001; HELLER et al., 2003). The various criteria used in this study are by no means to be considered exhaustive. The criteria have to be related to crop choice. Scores on criteria will vary within the region and amongst farmers (e.g. degree of contamination) and might also have an impact on the assessment of the crop choice, but fall within the purview of further research.

2.3 Sensitivity analysis

Uncertainty is a crucial element of MCDA (TRIANTAPHYLLOU et al., 1998). One of the crucial steps in MCDA is weighting the importance of criteria/objectives. These weights are sensitive to the way a problem is presented (GUITOUNI and MARTEL, 1998). Scores on criteria are subject to market prices, technological evolution, natural occurrences that lie outside the decision-maker's control. Uncertainty can be handled by constructing scenarios for the different values of the parameters in the model (DIAKOULAKI and GRAFAKOS, 2004).

3 ANALYSIS

3.1 Weights

All criteria with their different components are not equally important. Therefore, each of the components will be weighted, according to how this is taken into account by the stakeholders (Table 2). Three scenarios are developed for the weights. The phytoremediation scenario values the remediation duration the most (1). The sustainable management scenario has as its main goal not a short remediation period but a sustained income for the farmer (3). The equal weights scenario values all criteria as equally important.

Table 2: Rank order and normalised weights (Norm)* for the different criteria, given three scenarios

	Phyto (1)	Norm (2)*	Sust. Man. (3)	Norm (4)*	Equal weights (5)
C_1(NPV)	2	0.26	1	0.46	0.2
C_2(TECH)	3	0.16	2	0.26	0.2
C_3(SOC)	4	0.09	3	0.16	0.2
C_4(REM)	1	0.46	5	0.09	0.2
C_5(CO_2)	5	0.04	4	0.04	0.2

Source: * For example, see VAN HUYLENBROECK and DAMASCO-TAGARINO, 1998.

3.2 Results of the CAM-analysis

In CAM-analysis, an option can reach a good score when it performs best of all options on one or more criteria, as is the case for SRC in the phytoremediation scenario and energy maize in the sustainable management scenario. Table 3 shows that when emphasis is placed on phytoremediation, there is an explicit choice for SRC (O_4). Despite the fact that maize is not a good accumulator, it places second (O_3). The status quo (O_1) is the least preferred option (mainly due to the energy and CO_2 aspect). In the two other scenarios, growing energy maize is the best option (O_3). Rapeseed (O_2) comes second and third in the scenarios of sustainable management and equal weights, respectively. The scenario of conventional remediation (O_5) places third or worse.

Table 3: Final scores of the different options given the different scenarios for the weights

Option	Phyto	Sust. man.	Equal weights
O_1(SQUO)	-0.88	0.33	-0.39
O_2(RAP)	-0.55	0.94	0.21
O_3(MAI)	0.27	**1.48**	**1.03**
O_4(SRC)	**0.88**	-0.67	0.32
O_5(CONV)	0.15	-2.08	-1.17

Source: Authors.

3.3 Sensitivity analysis

Using the CAM-method, influence comes mostly from different weights (Table 3), but also from the way the scores are normalised using preference functions and the criteria that are used. By making the preference difference for a certain criterion smaller, the final score of an option regarding another option can be influenced. Without social acceptance of the neighborhood as a criterion (ceteris paribus), O_5 comes second and third in the phyto and equal weights scenarios, respectively.

To a lesser extent, the final ranking is sensitive to small changes in criterion scores. Given options *a* and *b*, where *a* scores worse than *b* on criterion *j*, a small change in a criterion score can cause option *a* to perform better than option *b*. This has an impact on the final ranking. In the other case, the preference score of *a* to *b* remains 0. However, the preference score of *b* to *a* becomes smaller, having a small influence on the final ranking. Changing prices of willow coppice, rapeseed, straw, cake, oil and maize (ceteris paribus) of ±10 % has negligible influences on the final ranking of the options.

4 CONCLUSION AND DISCUSSION

CAM contributes to the ranking of the different options and eliminates the option of conventional remediation (O_5) and status quo (O_1). Energy maize is likely to be the most appropriate crop in the scenario of sustainable land management, where SRC is likely to be advised in the case when fast remediation is the main purpose.

Further research should focus on the differentiation between farmers in the region caused by different degrees of contamination due to their distance to the former zinc refining site. This might have an impact on every criterion, as, e.g. a larger degree of contamination might result in lower biomass production and thus in lower economic and CO_2 reduction potential. Moreover, the score of the remediation criterion might also be influenced, because as contamination increases, so does the score of highly remediating crops.

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