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General problems related to innovation and its potential in the Hungarian agro-food sector[1]

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Abstract

This paper stresses that innovation in Hungary leaves something to be desired, and a perpetual lack of innovation also applies to the agro-food sector which, of course, consequently weakens the nation's general competitiveness.

The 2007-2013 period and the subsequent resources provided by the EU present new challenges. It is not overstating the case to say that if Hungary is not able to capitalize on this period, then it will face competitive disadvantages capable of placing Hungarian agriculture in a critical situation. To avoid this, the conditions for innovation and innovation performance must be improved.

The system of innovation in the Hungarian agro-food sector does not lend itself to the application of the model constructed on R+D. Therefore, it appears practical to follow the adaptive innovation model, which would be particularly useful for SMEs.

Keywords

innovation, agro-food sector's innovation, agricultural innovation, innovation models, adaptive innovation

Introduction

A slogan says: "innovation is the engine of progress". In the developed word this thought certainly rings true as the effort devoted to innovation is gaining more and more prominence. In the developed world one sees that research and technical development transform the economy and society (Kleinheincz, 2005). In Hungary the situation is slightly different where, in the 90s, the country already lagged well behind the international standard, and actually worsened after 2000.

In order to improve the current situation we need ideas and mechanisms which bolster domestic enterprises' competitiveness and the national economy. If Hungary wishes to meet EU requirements, it needs to improve its standard of education, research, technical development and innovation.

The dynamism that characterized innovation in the 1970s is long gone. This circumstances surrounding universal innovation problems render it pertinent to deal with agro innovation.

Currently within agricultural production, efforts at innovation are considerably weaker when compared to the 70s when innovation in producing raw materials compared favorably to that in processing and distributing food.

Current problems are also aggravated by the Hungarian agro-food sector's difficulty in coping with the late 80s change in the social system and EU accession.

This general decline could actually lay the groundwork for potential recovery, but this is hindered by an incessant lack of innovation, which could create a hopeless situation throughout the entire sector.

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It has long been said that the domestic agro-food sector requires innovation processes, innovation strategies, and innovation policy to improve its competitiveness.

Therefore, this paper's topic is pertinent since development policy for the 2007-2013 period could be crucial to long-term competition between EU nations. If Hungary fails to take advantage of this period, it could easily and permanently be pushed to the sidelines, which would be regrettable as Hungary needs a prosperous food industry. Numerous forums have outlined the challenges facing the agro-food sector.

The study analyses:

- The elements typical to the innovation category
- The main characteristics of domestic innovation, especially in the period following transition
- The characteristics of the previous process and environmental conditions related to agro innovation
- How the agro innovation model can be developed
- The kind of problems that make applying the classical model difficult
- Opportunities present in the agro-food sector which could improve innovation (with focus on SMEs and the opportunities for adaptation

The interpretation of innovation and its influencing factors

Based on Schumpeter's classic interpretation of innovation which encompasses new product, new process, new sales market, new supply market and new organization, there are a number of definitions which strive to clarify the concept of innovation. Let me highlight some of them:

"Innovation is not a single procedure; it is the series of activities interacting with each other. It is not just the discovery of new knowledge, not just the development of a new product, procedure or service, but it is all of the above. It is a process where we can find all the elements from research to service and these have an integrated effect on the collective aim of the elements." (Morton, 1972, in: Szakály, 2002)

"Innovation is a tangible creative thought, usually a very effective new product, technology or organizational procedure that is adapted by society." (Kádas, 1981, in: Szakály, 2002).

"Innovation is such a process where a new product, procedure or service is born from a given idea." (Saren, 1984, in: Szakály, 2002)

"…innovation is an effort aiming to create a concentrated change in the economical and social potential of an enterprise." (Drucker, 1985, in: Szakály, 2002).

"Every idea, method or subject that is perceived as new by the medium accepting it, can be considered as innovation." (Duncan, 1994, in: Szakály, 2002)

According to Gáspár (1998) innovation is "a purposeful, professional and intensive effort done by an organization or an individual developer. This effort leads from an elaborated creative idea till the new product (in an absolute or relative sense) accepted by the users."

This definition:

- considers input, transformation and output as an inseparable whole
- assumes the combination of different innovative factors
- identifies the starting and end point of the whole innovation process
- indicates that the main function of innovation is to stimulate users and to satisfy their needs through new products

In its third issue, the Oslo reference book, written under the auspices of the European Commission, and with the cooperation of professionals from 30 countries, has embraced a definition of innovation that approaches Schumpeter's original idea. According to Schumpeter: "Innovation is the introduction of a:

- new or significantly improved product (goods or services) or process
- new marketing method
- new organizational method

occurring in business practice, at a workplace, or in external relationships."

Compared to previous definitions, this represents as significant change as it removes the concept of "technology" for the product-process innovation. However, this does diminish the role of technological innovation, but enables enterprises with less extensive R+D and also the service sector to use it.

According to the new Oslo reference book, every scientific, technological, organizational, financial or sales activity can be considered as an innovation activity that effectively helps or controls the advent of innovation. This definition covers all activities during the innovation process, and R+D is not directly linked to a specific innovation. Thus, unlike in former reference books, R+D is not defined as a separate type of innovation, but still retains its stature in the innovation process.

The 2004 CXXXIV law on R+D and technological innovation can help people involved in innovation understand each other. This law is known as the law of innovation and was approved by the Hungarian Parliament on 20 December 2004. The following definitions are in the law:

a) **Basic research:** concerning experimental, empirical, systematizing or theoretical work, that aims at extending the academic/scientific knowledge concerning primarily the essentials of phenomena and the observable facts.

aa) **Straight basic research**: research aimed at extending academic/scientific knowledge and not at reaching direct social or economic utility or using the results for solving functional problems.

ab) **Targeted basic research:** Research aimed at extending academic/scientific knowledge that is likely to serve as a basis for solving existing or future problems

b) **Applied (or industrial) research:** original study aimed at obtaining new knowledge, done for the sake of a primarily defined functional target

c) **Pilot or (pre-competitive) development:** activity gained from research and/or practical experience, based on existing knowledge, that aims at creating new materials, products, processes, systems, service or improving the existing ones

d) **Research and Development:** includes the basic research, the operative research and pilot development

e) **Technological innovation:** the mixture of scientific, technical, organizational, economic and sales activities done to improve the efficiency and profitability of economic activities and to achieve favorable social and environmental effects. The results of

these activities are new or significantly modified products, processes, services, newly launched technologies, including changes that are considered new solely in the given sector or in a given organization.

Based on the above references the universal characteristics of innovation are:

- its basic mission is to satisfy market needs and to facilitate economic development
- a strategic tool to improve competitiveness
- it encompasses work phases ranging from R+D to sales
- it potentially aims at primarily developing and renewing a product/procedure
- it is a complex activity based system not abstracted from time and space
- its qualification is based on success.

Based on Hungarian innovation performance during the last 15-20 years, one can state that innovation is in a sorry state. Pakucs (2007) is correct in declaring that, according to all known evaluations, Hungary's competitiveness has worsened. In the 2006-2007 Report of the World Economic Forum, in aggregated ranking Hungary fell from 37th to 41st place.

According to the EU's 2005 innovation index (SII) Hungary ranks 18th among 31 countries. When it comes to the major internationally defined parameters, Hungary lies on the periphery when it comes to innovation.

Although we live in a competitive world in constant fluctuation where there is intense pressure for progress, Hungary's present circumstances do not bode well for the future. In a favorable context, Hungary might actually progress, but Hungary could also decline as the nation is unable to move forward economically. The ratio of the contribution of innovative activities to GDP growth is decreasing (Pakucs, 2007).

When one measures a nation's innovativeness, its potential is defined by the parameters of its current status, its historical traditions, its size, natural resources, and geographical location. Other factors are the knowledge level and norms of its society, and how organized its society is. Of course there are other factors too.

EU expansion has altered Hungary's relationship with Europe. By adding 10 additional members, then followed by Romania and Bulgaria, the EU has proven its theory as to how countries with differing levels of development can function together.

However, this does not eliminate the need to bolster international aspects of research and development since relative advantage within the system is based on the difference between accumulated knowledge and that which can be converted into a production force.

Clearly every country should strive to increase its relative innovation position, or at least preserve it, and Hungary is no exception. But it is not easy to handle this problem as, due to long-term development issues, conflicts emerge between individual and societal interests.

Moreover, it is pertinent to stress that innovation is not a short-term phenomenon, and only the future can tell whether investments will prove profitable or not. In Hungary's current situation, it is hard to decide how to distribute socially limited resources: health care, education or culture?

In Hungary "brain drain" is a definite problem. Hungary's professional elite constantly receives promising and lucrative job offers from abroad, and this threatens the quality and ranks of the Hungarian research community, and the nation's ability to recognize and solve essential problems.

Obviously it is in Hungary's national interest not only to hang on to its domestic talent, but to entice foreigners to move to Hungary. To accomplish this, Hungarian society has to become much more dynamic than it is now.

Of course EU membership does not entail only opportunities, but also responsibilities. According to Losoncz (2008), Hungary, regardless of its deficiencies and weaknesses, must conform with R+D technological and innovation policy.

In March 2002 the Lisbon Program for internal EU equalization decided that the ratio of R+D expenditures for member states has to reach 3% of GDP by 2010. However, "The Kok report" reviewing the program at its midpoint indicates that there has been little progress, and that cheap Chinese and Indian imports increase the problems (Kok, 2004).

A US analysis confirms that increasing R+D expenditures bolsters growth. This study tried to ascertain if there was an optimal ratio for R+D expenditures. Jones and Williams (1998) deduced this optimal ratio based on how R+D expenditures affect social return.

By social return, they mean how much future consumption is increased by one extra unit of resources invested in R+D now. As a result of the study, they discovered that this ratio could even be 100% in terms of synergic effects. The study concludes that the current level of investment in R+D falls 2 or 3 times short.

Innovation in Hungary

Table 1 data show that in Hungary R+D expenditures were 0.7-0.8 % of the GDP till 2000 and 0.9-1.0% since 2001.

Obviously Hungary can only meet European norms by growing faster than developed countries. Currently Hungary does not meet these conditions. The aims of the above mentioned innovation law cannot be questioned, but specific solutions are still missing.

Table 1

Distribution of he Hungarian R+D expenditures by financial sources

Title	1998	1999	2000	2001	2002	2003	2004	2005	2006
GERD* (md Ft)	71.2	78.2	105.4	140.6	171.5	175.8	181.5	207.8	238.0
GERD*/GDP (%)	0.70	0.68	0.82	0.94	1.01	0.95	0.89	0.95	1.00
GERD*/person (USD)**	72.2	76.4	96.2	125.6	147.1	145.1	144.8	164.9	..

***G**ross **E**xpenditure on **R**esearch and **D**evelopment
** At **P**urchasing **P**ower **P**arities (PPP)
Source: Hungarian Central Statistical Office's Issue of Research and Development, 2006

In order to approach the EU target, Hungary's GDP would have to triple. Based on widely held professional opinion, Losoncz (2008) states that if R+D expenditures do not reach 1% of the GDP, then these expenses will be totally ineffective. The critical mass of expenses is 1% of GDP. The Hungarian figure is at this critical level. In 2004 Hungarian R+D expenditures entailed 31% on basic research, 32% on applied research, and 37% on development.

Again, clearly Hungary can only approach European norms by growing faster than the developed countries. A precondition for fast growth is to increase innovation related expenditures.

Table 2 data illustrate the central traits of Hungarian financing problems. For example, in Sweden ⅔ of R+D expenditures derive from enterprises, but in Hungary the 2003 ratio was only 30.7% (Hungarian Central Statistical Office).

If one examines R+D expenditure sector by sector, one sees that the ratio for enterprises never attained 50%. As for the resources, the government's remains stable at 55-60%, while for the enterprises it is 30-35%. Within the EU-27, this ratio compares poorly. All EU members intend to reduce their government contribution.

Table 2

Distribution of R+D expenditures, 2003

percentage

Country	Entrepreneurial sector	Government	Other national sources	Foreign Countries
EU-25	**55.5**	**34.7**	**2.2**	**7.6**
OECD	**61.6**	**30.5**	**4.9**	
Hungary	***30.7***	***58.0***	***0.6***	***10.7***
USA	63.1	31.2	5.7	
Japan	74.5	17.7	7.5	0.3
Sweden	65.0	23.5	4.3	7.3
Poland	30.3	62.7	2.4	4.6

Source: Havas and Nyíri, 2007

Although not major, sensible changes still occurred over the last couple of years in Hungary.

Table 3

Distribution of R+D expenditures by financial sources

Title	1998	1999	2000	2001	2002	2003	2004	2005	2006
Enterprises	36.1	38.5	37.8	34.8	29.7	30.7	37.1	39.4	43.3
State budget	56.2	53.2	49.5	53.6	58.5	58.0	51.8	49.4	44.8
Other domestic source	0.4	2.7	2.1	2.4	1.4	0.6	0.7	0.3	0.6
Foreign source	4.9	5.6	10.6	9.2	10.4	10.7	10.4	10.7	11.3

Source: Hungarian Central Statistical Office's Issue of Research and Development, 2006

Improving R+D and the innovation processes will only happen through the expansion of domestic resources and the risk taking ability of the entrepreneurial sector. But this solution is more difficult, more time-consuming, and longer.

It would serve the R+D sector well if the ratio for entrepreneurial expenditures were higher, meaning the business sector's R+D activity is not satisfactory and is poorly structured. According to related data, 80% of entrepreneurial sector R+D expenditures occur at foreign-owned enterprises. However, in Sweden and the Czech Republic it is only 40% and in Japan a mere 5%.

From more than 20 thousand milliard (billion) HUF of net revenue, the domestic entrepreneurial sector (representing the higher ratio per headcount, revenue and generated income) spends 10 milliard HUF on R+D which only counts for 0.05% of the net revenue.

Such a polarization of the Hungarian economy (the discrepancy between the R+D activities of enterprises with domestic or foreign owners) can be considered as a barrier to competitiveness and permanent growth.

According to OECD Analysis results (Kleinheincz, 2005), it is evident that most enterprises have limited scope for innovation. Most of the enterprises are not involved in innovation activities, and innovative enterprises have different innovation levels. There are four different innovation levels:

- The **static** enterprise never or rarely undertakes innovation; however, potentially, it has a steady position on the given conditions.
- The **innovative** enterprise undertakes continual innovation activities in a steady competitive market, related to steady technological conditions.
- The **learner** enterprise has the ability to adapt to its changing environment.
- The **renewing/reforming** enterprise is able to transform itself into another market or create a new market using its essential technological capabilities.

In Hungary circa 500-600 companies undertake innovation activities, and 100-150 out of these are SMEs. According to the Hungarian Innovation Association (HIA), the success of the domestic development policy depends on the number of the enterprises with R+D activities expanding by ten. In this regard, the SMEs represent the greatest potential.

"However the enterprises are the main areas for technological innovation, but it is clear that their activities are not separated and not independent from their environment. The enterprises share information and there is a mutual learning process in their relationships – while they supply to and order from each other.

There is an interaction between the enterprises and a number of institutions taking part in innovation activities. They get in connection with universities or other R+D institutions, consulting agencies, state organizations or authorities." (Kleinheincz, 2005).

Innovation must be one of the riskiest things a company can do, and business strategies are sensitive to the company's ability to take risks. Most Hungarian companies only wish to survive and this, unfortunately, has been true for a long time. There is a widespread view that it is very risky to start a business based on innovation because of the volatile political and economic situation. Taxation laws tend to fluctuate and there is no long-term guarantee that subsidies will remain in place.

However, what's more important is companies' (improving but still weak) financial muscle. Their ability to accumulate capital was limited by overspending in the budget and the relatively strong Hungarian Forint (HUF). There are few medium sized companies with growth potential and large capital.

The internal demand market, which could encourage the R+D sector, is weak. Companies' inability to adopt scientific results is a problem, but in some cases the scientific results are not marketable either.

There is a need to find a solution to these problems since other nations' fast growth has often been thanks to their ability to adopt more productive technologies.

A number of studies prove that economic growth did not derive from a growing need for capital, but depended on how fast the given country could adopt the domestic or foreign technologies.

Technological diffusion can answer questions related to economic growth that capital-intensive explanations cannot. One of the main resources of these processes can be the adaptation of foreign innovations. According to published data, more than 40% of US economic growth originates from foreign innovations (Borsi, 2004).

Characteristics of Hungarian agriculture's social and economic situation

In previous decades, the Hungarian agro-food sector and agriculture, which is my particular field of research, have often proven that they are promising areas when it comes to innovation. According to Szántó (1990) 'innovation made Hungarian agriculture known and recognized internationally'. Between 1960 and 1980 Hungarian agriculture significantly differed from industry as it had its own values and system approach. This paradigm created dynamic development among countries with the same political system.

Unfortunately, the agricultural paradigm's initial excellent results were accompanied by deteriorating economic conditions, of which costs exceeded the local optimum and later the Hungarian economy fell into crisis, blocking agricultural development. However, this does not diminish the value of Hungarian agricultural innovation (at least in the mentioned period). Looking back, we can say that the golden age was in 1970s, after which Hungarian agriculture had to function in an increasingly tough business environment.

In the late 80s agriculture's problems culminated with the unexpected regime change. New problems had a serious impact on the system of innovation.

Cooperation between innovation oriented groups is weak. Previous mechanisms have disappeared, and the new ones not yet functioning. It is disconcerting that those involved in innovation are in survival mode, and lack the energy to cooperate and seek innovative partners. Moreover, most often the will for coordination is missing, which constitutes a huge problem as Hungarian agriculture's previous success was based not only on the industry and trade but also on the he R&D sector.

It is a mistake to think that organizations engaged in education, research, breeding, development, production, industry and trade related activities can continually keep working separately toward putative or real business interests. Those in the agro-food sector have recently discovered this.

Regime change deeply restructured the national economy, including agriculture. It is not always valid to link changes in agriculture to current and historical events, but the 1989 regime change definitely impacted on the sector. According to Jávorka (1995) the transformation was more significant in agriculture than in industry or infrastructure.

No other sectors in Hungary faced more changes in companies' property, structure, or in their philosophy of production. Moreover, during the last decade there was palpable hostility toward the agricultural sector, and it was often stated that Hungary did not need such extensive agricultural production due to EU restrictions. Probably this attitude stemmed from the fact that agricultural ceased being viewed as a model sector whose example should be followed.

The agricultural research network is unfortunately scattered here and there, and efforts at integration have not proven successful. The still existing research centres are struggling and in survival mode ("to be or not to be"). In this situation these centres are not only unable to publicise new findings but also cannot fulfill their role in terms of international technology interface either. Today the situation is bleak when compared to the past when the network of educational and research institutes played an important part in economic activity and development of the sector. Innovation should also be inspired from the users, but this is only visible at the big farm level. Small producers' precarious circumstances mean they are unable to engage in innovation activities.

Short-term thinking has become the prevalent strategy. Unfortunately, this tendency runs counter to innovation. It is noteworthy that small organizations play an important role in agricultural production, and it is disturbing that the food industry lacks a national strategy; thus, those involved in this field do not have any future vision. Developing a complicated system like an agro-food enterprise is most difficult if one doesn't know where one is and where one wants to go.

International cooperation regarding Hungarian innovation has some unusual aspects. In the early 70s adaptation and integration of foreign technologies provided a basis for progress in Hungarian agriculture, but after this period a situation emerged where the major food industry branches (sugar, vegetable oil, tobacco and sweet industry) were bought by foreign investors.

Partly due to this food trade has come under the influence of foreign supermarket chains. As the foreign owners have invested mainly in processing, packaging, and trading, they are now able to coordinate the output of key supermarket chains. They thus have a significant effect on the performance of the whole innovation system, which they can alter, without assuming the role of a regular company.

Agricultural trends influencing innovative performance

To plan innovative projects we need to identify trends in agriculture which are crucial to the projects' success. There is a wealth of experience showing that it is unwise to apply analogies stemming from industry to the agricultural sector as doing this can have deleterious effects. For example, there are traditional **factors** which dramatically influence the success and outcome of agricultural development. Without mentioning each of them, here is an overview of the various factors.

It is an old truth that agriculture is an endless **struggle** between people and the forces of nature. Farming is a success if people can triumph against the natural elements or harness them over the long term. To achieve this people must recognize the natural *trends* that determine the difference between this branch of the national economy and the others.

Due to natural factors the following can be considered basic "*agricultural characteristics*":

- Because of its dependence on nature, farming **cannot be isolated** from natural conditions.
- Natural conditions are **objective**; their effects cannot be altered by technical-technological progress, even to a limited extent.

Natural conditions, including climate, soil conditions, and natural geography basically dictate what kind of farming can be carried out in a given area. To this extent, these factors fundamentally determine the value of a given field (or area). Therefore, the **basic elements** of organizing and planning in agriculture constitute the precise enumeration of natural conditions**.**

Among natural conditions the followings are **determining**:
a) climate, weather conditions,
b) soil conditions,
c) field conditions and
d) water conditions.

ad a). Climatic conditions can be observed in weather changes. From an agricultural standpoint, weather has "two faces" as, at the same time, it harbours opportunities and conditions. It is thus not surprising that there are numerous sayings describing the relationship between weather and agriculture.

In terms of weather's *measurable effects* the followings can be underlined:
- temperature (the different seasons and year by year);
- the quantity and distribution annual and seasonal precipitation;
- heat units;
- relative humidity;
- the intensity, frequency and direction of winds;
- hail and fog.

The above factors' effects are observable in**:**
- crops,
- the quality and quantity of products,
- the fluctuation in the quality and quantity of production,
- the animal breeding trends,
- the organization of production and
- farming profitability.

Since the weather is objective, it is important to keep abreast of **local** weather conditions and to pay continual attention to forecast services' data and information. However, it is also useful to keep track of one's own experience and findings as weather is repetitive.

In farming a reliable weather *forecast* is vital as unexpected bad weather can ruin a farmer's plans.

ad b). Concerning crop distribution in a given area, **soil** is a major determining factor. The "quality" of soil primarily depends on its composition, nutrition-content and the soil's characteristics. To evaluate soil one can utilize various mechanical, physical and chemical tools.

Combining the quality of production sources and the soils' natural features, one can talk about soil's *economic productiveness,* which is presented in the real volume of yield.

Soil productiveness – as with other production sources – is purely *potential,* but harnessing this potential depends on several factors.

ad c). Field conditions refer to the natural location of the soil, showing how far the soil is above sea-level and the quality of the soil surface (flat, sloped, mountainous).

The soils' surface influences cultivation methods, and determines machinery and how it can be used. Hungarian soil is generally flat or rolling and this means crop production predominates while in the mountainous areas pasture-based animal breeding is prevalent.

The area surrounding agricultural land can have a negative or positive impact on the value of a given field as mountains, forests, larger rivers, and lakes are usually advantageous.

ad d). Water conditions refer to water-absorption ability. This depends on the proximity of flowing water, their runoff, and the level of ground water etc.

These factors impact on crop production, but also may impact significantly on, for example, the creation of animal breeding farms, which require a lot of water.

Based on the above it is clear that farmers must recognise that nature is in full command, and that they must deal with the effects of natural factors.

Other points to consider:

- Agriculture's main activities are crop production, animal breeding and horticulture, and crop production especially requires working outside and being **exposed to the elements, which sorely tests the individual farmer.** This holds true even if modern machinery such as a tractor's enclosed driving compartment makes life somewhat easier for the farmer.
- Agriculture means working with living organisms and **live materials,** and their limited lifespan means agriculture is **time sensitive,** linked to a biological-agro-technical optimal period. It is highly recommended to keep in mind these periods as, otherwise, successful farming is less likely. It is important to remember that live materials behave similarly to humans. If they are hungry, they want to eat. If they are thirsty, they want to drink. If they are cold, they put on warmer clothes. If they are hot, they shed some clothes. **One of the basic elements of successful farming** is understanding life-cycles of live materials and organisms. It is also essential to understand which human human activities help them.
- Most agricultural activities are dispersed in different farm areas**,** and they often require a change of location. An important organizational task is harmonizing farm labour in different farm field locations with the necessary machinery and workforce. It is also necessary to to meet the social needs of workers and – if required – to organize transport to and from the workplace. A major problem may be the condition of rural roads.
- In agriculture, time is an erratic factor as there are periods when the working day is long, and periods when it isn't, meaning autumn to spring. Weather also influences farm work and it is frustrating when a time sensitive activity such as the harvest is disrupted by rain or bad weather.
- In agriculture another problem is **checking the quality** of completed work. Often after a job is completed, the quality of the work can either not be checked or perhaps only in a haphazard manner. This holds true for sowing or plant protection work where mistakes are only uncovered after the fact and cannot be rectified.
- There are marked differences between the major branches of agriculture. In **crop production and horticulture** crucial factors are the need for large amounts of land, dependence on weather conditions, and the existence of busy and slack seasons. But **animal breeding** entails continual and repetitious tasks so there are no days off.

The basic nature of agriculture *cannot be separated from space and time*, and the above list can be expanded if one focuses on a specific enterprise. Therefore, concrete development projects require that the factors listed above be considered in terms of **space and time.**

Results and discussion

Logical innovation model

Frequently during my research I had to create logical **models** representing typical phenomena of a process or a solution. In doing so I wished to illustrate the situation as well as to include the major characteristics of an innovation related problem, its internal and external relations, and to describe the area in which they could be functional. In this regard, this paper deals with the classical model of agro-food innovation and one possible model of adaptive innovation.

To create the simplified model of agro-food innovation, some basic principles are required. Some of them are the following:

- There are several similarities between agricultural innovation and other types of production innovation. For example, basic and applied research need to be part of the agricultural innovative process. However, due to the complexity of agricultural production, the innovation processes of three independent areas are integrated in agricultural innovation. These innovation processes are related to biological, chemical, and technical conditions.
  - **Biological** conditions are related to raw materials and species of agricultural production. Primarily they require a genetic focus. Obviously to produce and sustain modern species is a complex task.
  - **Chemical** innovations are related to the production of agricultural chemicals, fertilisers, medicines for animals, and plastics. The agro-food sector is considered as a good market for the big chemical companies. In these fields innovation competition is very heavy and new products and technologies are developed dynamically.
  - **Technical** innovations are connected with agricultural machinery, buildings, automotive solutions and energy management. These areas are highly varied and require numerous types of innovative processes. There are different technical tasks in various areas of agriculture. In plant production, horticulture and animal husbandry there are varied technical challenges.
- Given the sector's unique nature, the tasks are different for basic and applied research and development.
- Following the R+D stage, the critical question is how to transform the R+D results into agricultural production. During this transformation process "technical development" plays a key role as it must ensure that the results from the former innovation phases, human resources, and ecological elements, are all considered during the transformation.

I prepared and used the *general model of agricultural innovation* (Figure 1). This model clearly demonstrates the related work needed to be done. It shows that innovation fragments can be systematized under two umbrellas: marketing and knowledge. Marketing is important of innovation success is decided in the market. The whole innovation process should be geared to market success. Knowledge combines previous experience and recent information within the entire process.

The functional logical model (Figure 1) is an appropriate instrument for
- Reviewing systematised processes related to agricultural innovation
- Introducing the relation between the part processes
- Analysing the status of agricultural innovation
- Defining what to do in the area of development

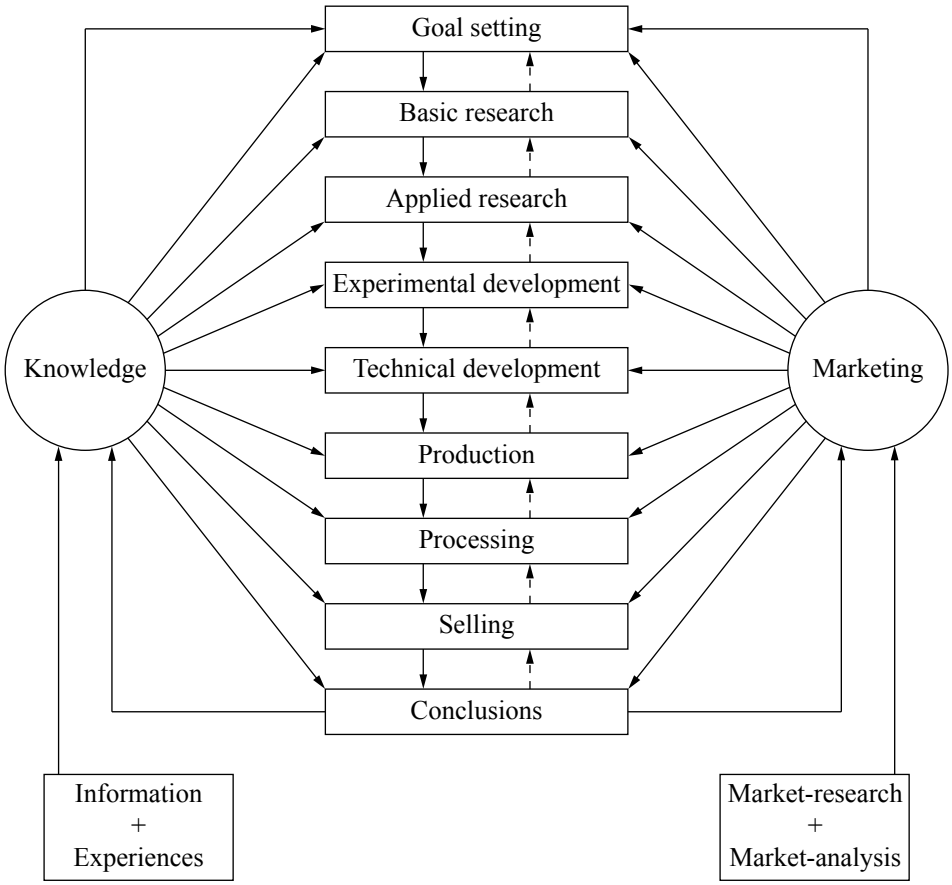

Figure 1: The simplified model of the agro-food sector's innovation

One can conclude Hungarian agriculture was successful as long as the innovators could perform their activities in a harmonized way as represented by the model.

However, the situation has radically changed. In theory the old practice should work, but the SME's (mainly private farms who play an important role in agricultural success or failure) do not enjoy the necessary conditions to follow the model. The other problem is that the previous harmony between those involved has changed.

In order to improve agricultural efficiency, agricultural innovation, agricultural research, and technical development need to be overhauled, and one must determine which sector to devote attention to in order to improve efficiency. Financial reality does not allow for improving every area.

Hungary is endowed with specific agro-eco potential when it comes to agricultural production. Circumstances dictate prudence and the country should opt for straightforward planning. Rash action could seriously damage the entire Hungarian agro-food sector and damage the nation's reputation. Recent successes should serve as a model, and Hungary's limited resources need to be concentrated in those areas which have encountered competitive success. Sometimes it is harder to improve a "normal" activity than to catch up to the others by entering unfamiliar ground.

The era of the *great leap forward* is long gone.

One possible model of adaptive innovation

There are a couple potential methods for dividing innovative solutions. One of them distinguishes between the original and the adaptive innovation. The original innovation is a result of the organization's own investment, R+D activities, and co-workers' activities, while the adaptive innovation is built on results already developed by others. (Consisting of an idea, an invention, know-how, a plan-documentation etc...)

I am not aware of any publication that details how many Hungarian enterprises have undertaken original or adaptive innovation activities. Relying on the above mentioned HIA-estimations and on my experience, it is safe to declare that the domestic companies' capacity for innovation is very worrisome. Moreover, for the agro-food sector it is even worse.

Reviving agricultural innovation was this paper's initial objective. In this vein, my focus was on adaptive innovation as I feel that the role of the previously ignored SME's should be reconsidered within the context of the entire domestic innovation strategy.

There should be no illusion about these organizations' ability to finance R+D's in the long run. Instead, their adaptive skills should be improved, but even in the short run this presents a challenge. Success requires challenges in both quality and quantity in the area of education, extension and research.

There are numerous factors influencing the processes of adaptive innovation. In my model I highlighted two of them (**Figure 2**). "External support" includes all external factors which impact on an enterprise. Social-political-economical changes could either strengthen or weaken innovation. Competitive pressure could mobilize dormant energy and lead to a future "escape hatch."

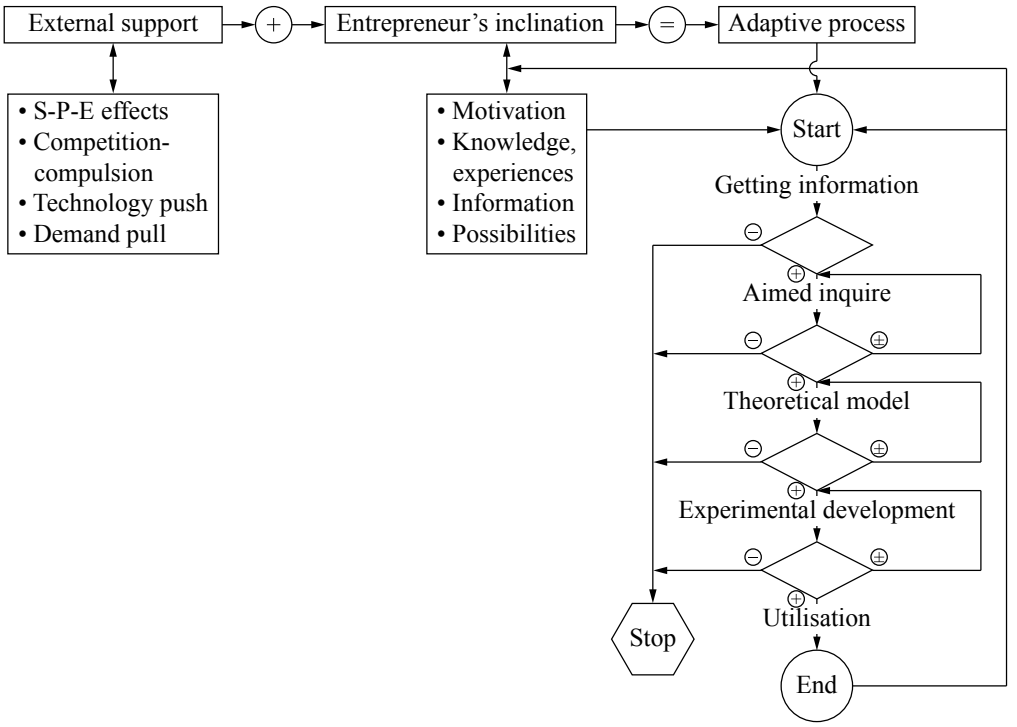

Figure 2: The adaptive innovation model

Producer-distributor organizations striving for agricultural development sense a technological impetus since their livelihood depends on how well they flog their products and services to users/customers. In this regard, supply-side pressure predominates in Hungary. The 'demand pull' represents buyers' demands and desires, as well as customers and processors of agricultural products. For organizations producing for the market, satisfying these needs is an obvious precondition for competition.

A fundamental question involves the entrepreneur's personality, his/her openness to new things, and his/her awareness that progress is vital because, without it, the organization will descend down a slippery slope.

Adequate motivation is essential, regardless of whether it stems from external pressure or a company's internal resources. Entrepreneurial knowledge and experience are most helpful. Figure 1 indicates the role of knowledge which constitutes the main model's integrating component. In our dynamic world we may frequently encounter confusion due to outdated information. Entrepreneurs require the relevant information at the right time and in optimal quantity and quality.

One of the advisory system's long-standing problems is that the **A**gricultural **K**nowledge and **I**nformation **S**ystem (**AKIS**) is still not operating at an appropriate professional standard, which represents a necessary precondition for an extensive system serving professional objectives.

Entrepreneurs' behaviour is also influenced by how capable an organization is. For agricultural enterprises the ecological environment is vitally important as it determines agriculture's potential. Other relevant factors are an enterprise's technological background, production culture, financial status, and networks.

An enterprise with sufficient external backing can initiate the adaptation process, subsequently leading to a complete or partial product or process renewal based on the principle of "considered progress". The model illustrates the adaptation process steps in a systemized order. The first essential phase, which entails acquiring knowledge, opens the door to stimuli enabling the entrepreneur to start adaptive innovation.

The ideas and information flowing from innovation can come from the enterprises' internal or external environment.

Important **internal** factors:

- management – in small enterprises it means a few people or only the entrepreneur,
- marketing – it functions mostly with very simple instruments,
- production – this is the area where the theory is tested
- company motivation factors – only in special cases can it have positive effects and this occurs with an appropriate number of employees,
- brainstorming team – in agriculture this possibility exists only theoretically,
- internal monitoring of technological development – a good system for monitoring, recording data, and collecting experience could help a lot to define the areas that need to be developed, and to select and adopt the adequate technological innovation.

Important **external** factors:

- state information, governmental or international programs supporting innovation
- exhibitions, fairs, conferences and professional meetings
- attaining technology inherent in machinery
- participation in training courses

- cooperation with:
  - customers,
  - suppliers,
  - outside experts and consultants,
  - other companies,
  - universities,
  - research institutes,
- reviewing the scientific literature
- studying the patents
- continually analysing competitors
- being up-to-date regarding law and standards.

Just like in the other phases of the process, the entrepreneur has to consider and evaluate the usefulness of new knowledge. If the idea is worth improving, then comes the "targeted direction" phase during which additional information and professional details are obtained and discussed. At this point the idea can still be rejected.

Here the often significant time factor aspect emerges in the innovation processes, and excess speculation is disadvantageous. The next step is to create a 'mental model' related to the concept. During this phase the entrepreneur mentally assembles and "acts out" the prospective innovation.

Taking one minor step at a time, the next phase is the 'small sample' phase during which the idea is practically tested as an experiment or development.

Despite preparations, problems can crop up resulting in the rejection of the idea. However, if the results are positive, then the next step could be complete acceptance, bringing about substantive adaptation, and the application of a solution(s) which was developed somewhere else.

Conclusions

- For a long time Hungary's innovation performance has been beset with critical problems, and this also applies to the agro-food sector, and to agricultural production as part of the agro-food chain. A permanent lack of innovation weakens Hungary's competitiveness and harms the sector's domestic and international prestige.

- The 2007-2013 period entails new challenges. In this period the Hungarian economy must develop more dynamically to avoid widening the gap between itself and its competitors. It is not an exaggeration to say that if Hungary is not able to capitalize on this period, it will face competitive disadvantages that could drive Hungarian agriculture into a critical situation. It could have unforeseeable effects on the whole economy

- The innovation processes need to be improved in order to to develop more intensively. A lot remains to be done both at the micro and macro levels. This paper, which deals with some of the currently necessary tasks related to Hungarian agricultural innovation, does not accept the application of the model based on R+D. Instead it opts for the more practical model of adaptive innovation, particularly useful for the SMEs.

- To improve the current situation ideas and mechanisms are needed which support those ideas which would improve the competitiveness of domestic enterprises and that of the national economy.

- We have to improve the standard of education as knowledge-intensive development can provide future opportunities. To improve adaptations, there should be more emphasis on gaining professional knowledge.
- Clearly one has to analyse: how to increase the pool of capital available for innovation and the entrepreneur's share of it.

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The social, economic and environmental impact from a hypothetical reduction in direct payments in Hungary

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Abstract

Within the context of CAP reform slated to begin in 2013, several Member States have already proposed a significant cutback in direct payments. This paper contends that such measures would have broad and harsh consequences not only for Hungarian agriculture, but also for the nation's rural employment and natural environment, ultimately leading to an increase in regional tensions.

Key words

Hungarian agriculture, direct payments, impacts in figures, farm result, employment

Introduction

Since the regular EU budget review, and in particular since the "Health Check" regarding the Common Agricultural Policy (CAP), discussions on agricultural subsidies have intensified. In the discussions involving post-2013 CAP reform, a possible drastic reduction in subsidies was proposed. A paper by the Research Institute for Agricultural Economics (AKI), based on 2006 data[2], analyses the social, economic, and environmental impact of a drastic 50 percent cut in subsidies.

Using various statistical estimates, the researchers endeavoured to calculate the expected consequences of cutbacks. In this research the basic assumption was that apart from the subsidy cutbacks, the other conditions related to agricultural production (economic, natural) do not change. The paper does not deal with other practical questions, such as the impact of direct payment reduction if the resources were allocated to rural development measures or to completely different fields such as education or infrastructure development. Given that in Hungary there are significant regional differences in terms of economic and agricultural performance, unemployment, and other indicators, a regional approach was important in the analysis.

The research results are significant as 2006 was a good year for agricultural production. The income indicators increased by 33-45 percent from the previous year (Keszthelyi, 2007); incomes in the main sectors improved; and there were no money-losing sectors among those affected by direct payments (Béládi – Kertész, 2007).

Despite Hungary's small area, there are **significant regional differences** in the role of agriculture in the national economy and also in the agricultural population:

- Agriculture's economic weight differs according to region. In the Great Plains and Transdanubian Region it is relatively high (8-15 percent); the highest is in Békés County (14.6 percent), however, in Central Hungary, it is below 1 percent (0.8 percent). Sometimes the enhanced role of agriculture is linked to subsistence farming as in Northern Hungary and, in general, to small communities.

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[2] The social, economic and environmental impacts of the hypothetical reduction of direct payments in Hungary (first approach). Agrárgazdasági Tanulmányok 2008/6

- Inverse proportionality exists between agricultural employment and the level of economic development. In the fast growth micro-regions, the rate of full-time agricultural employees is 3 percent, as opposed to 12.9 percent in those micro-regions which are lagging behind. While one-fifth of the Hungarian population are engaged in agricultural production for a range of economic purposes, this ratio is nearly 40 percent in backward regions and even reaches 52 to 55 percent in the backward areas of the Northern Great Plain Region. In poorly-developed micro-regions, agriculture represents a kind of last refuge against extreme poverty, and displaced agricultural workers will not be absorbed elsewhere.
- Agriculture's social/employment function is **of particular importance for small villages and for less educated groups.** In smaller villages devoid of employment opportunities, there is a steady population decline due to migration, a disadvantageous age structure, and mortality. While in many villages the population has not dwindled, a kind of 'restratification' has taken place, i.e. there is, thanks to a high birthrate, a growing ratio of youthful but poorly educated social groups who are idle and unemployed.
- Numerous groups are involved in **agriculture out of necessity**, since radical differences in property prices render relocation more difficult, almost impossible for poorer people, reducing the rural population's mobility. It is increasingly apparent that for small villages and farmsteads abandoning rural abodes entails property and environmental destruction. This type of decay has become a self-inducing process across wide geographical areas (e.g. scattered farms on the Great Plains and small villages in the Nyírség, Cserehát and Nógrád regions), foreboding a helpless and dependent local population.
- After small village inhabitants leave agricultural employment, commuting to work remains largely theoretical as travel is hindered by insufficient transport infrastructure, a lack of of social services in small villages (a dearth of childcare and educational institutions) coupled with their own inadequate education.
- By international standards the Hungarian level of economic activity is low, particularly in the eastern part of the country. In Szabolcs-Szatmár-Bereg, Borsod-Abaúj-Zemplén and Békés counties, the active population ratio is below 55 percent. The dependency indicator is typically in an inverse relationship: In fact, in Szabolcs-Szatmár-Bereg and Borsod-Abaúj-Zemplén counties, there are over 230 inactive people for every 100 persons with a job!
- Subsistence aid is a well-known economic and moral burden. However, a substantial portion of Hungarian families rely on social allowances, especially welfare payments as their sole source of regular income. The welfare recipient rate is particularly high in North Hungary, especially in Borsod-Abaúj-Zemplén County, where almost as many people (33,785 persons) receive regular income support as in the whole of West Hungary (35,804). In Szabolcs-Szatmár-Bereg County the welfare recipient rate compared to the active-age population is also very high (12 percent).
- While agriculture is not a major employment factor for the Roma (gipsy) population, the Roma still manage to find **substantial temporary harvest work** at plantation farms and in labour-intensive sectors in general. Moreover, in the 90s the Roma employment rate was 75 percent compared to today's overall 30 percent (12 percent in Nógrád County).

The present situation

The rationale for agricultural subsidies

The arguments – as well as the counter-arguments – are widely discussed by economists and politicians. Here we do not wish to present ironclad reasoning but merely to illustrate various statements, which form part of the Hungarian rationale for subsidies.

- In 2006 the amount of agricultural subsidies was about equal to the agricultural income[3] calculated on the basis of FADN data and equal to the employment costs of agricultural employees at minimal wages[4], meaning the subsidies could "finance" the employment costs of agricultural employees.
- Currently Hungarian agriculture responds to expectations surrounding social benefits and may thus bank on some sort of compensation from society. Such tasks are, for example: safeguarding the scenery, employment of the uneducated population, part-time employment (periodic employment of students, retired and disabled persons) or social cohesion in the villages. Thus, we contend that agriculture is a multi-functional sector in the national economy. On the one hand, it has the function of producing food products and other raw material, but, on the other hand, it behoves us to emphasize its role in the production of public goods, perhaps also to safeguard, protect and provide services in the field of public goods, but the value of the aforementioned is difficult to define.[5]
- Some specific rules regarding the subsidy schemes encourage the production and/or the protection of the above-mentioned public goods. For example, the rules for the Good Agricultural and Environmental Condition (GAEC)[6] and for the denitration directive[7].
- This encouragement would intensify subsequent to the introduction of the SPS[8], occurring probably in 2009 plus the application of the "cross compliance"[9]. The application of the latter will certainly revalue and enforce environment-friendly production. Hungarian agriculture's environmental impact is relatively low.

[3] The Hungarian Farm Accountancy Data Network (FADN) represents the holdings over 2 ESU (European size Unit).

[4] In the calculation by taking into account HUF 1.1 million/person (EUR 4,314) (the minimal wage in 2006 was HUF 63,500 (EUR 249), 31 percent social security, 4.5 percent employer' contribution, HUF 4,500 (EUR 18) health care contribution), the amount of the subsidy covers the costs of the wages of 164 thousand employees. The exchange rate applied here and also later is HUF 255/EUR.

[5] Most often the role of agriculture in safeguarding the scenery is appraised (Halmai, 2007), since the majority of the area of Hungary is managed by agriculture and forestry, and the land can be considered as cultivated and managed regularly by economic activity. "Safeguarding the scenery, prevention of erosion, ensuring the coverage of the surface, eradication of weeds, observation of the various environmental regulations, safeguarding cultural heritage connected to the rural scenery – are all positive externalities In economic terms 5. these additional agricultural services are considered as public goods. Only little information is available on the real values and costs of these public goods. However, it is certain that these public goods are not free; that is, costs and losses are connected to these positive externalities; and these are the outputs of agricultural activity.

[6] In Hungary this expression is known by the farmers as the condition of subsidies financed from the European Agricultural Orientation and Guarantee Fund This means the minimal economic and environmental requirements of EC regulations regulated by Ministerial Decree (FVM) No. 4/2004.

[7] This Directive's aim is to prevent nitrate contamination of agricultural origin in the waters of sensitive areas [Council Directive No. 91/676/EEC on the protection of waters against the nitrate contamination of agricultural origin, which was enforced in Hungary by the Governmental Decree No. 49/2001 (amended several times at present Government Decree No. 81/2007 is applicable)]. The directive covers both the surface and subsurface waters.

[8] SPS = Single Payment Scheme. The Hungarian Parliament has already created a law on the introduction of SPS in Hungary.

[9] Cross compliance means that agricultural producers have to observe some environmental, animal-health, registration, welfare and phytosanitary regulations. The simplified system led to the present relatively lax requirements, but the introduction of SPS will no longer be applicable; therefore from 2009 (or depending on the 2011 onward negotiations) Hungary will also have to apply cross compliance.

- Unprofitable production typically results in a halt in **cultivation**, and the abandonment of agricultural production; and this entails various risks. These risks are mainly phytosanitary in nature, linked to an onslaught of weeds and the frequent arrival of invasive, alien species. Unfortunately, there is limited scope for using the abandoned areas for touristic/ recreational activities. In recent Hungarian history the above has become a well-known process since currently large parts of the so-called marginal areas are already fallow land. These are flood vulnerable areas, inland waters, plus eroded and infertile sandy areas. In fact, one fourth of the arable land in Nógrád County is uncultivated. One third of Hungarian grazing land is untended and changes in animal breeding mean it is wild and unattractive.

Questions concerning direct payments

Table 1 shows the amount of direct payments provided to Hungarian agriculture. In 2006 HUF 200 billion (EUR 784 million)[10] was provided to about 2,000 thousand holdings.

Table 1

Summary table of direct payments

Legal form of holding	Unit	Total
Subsidized holdings	Number, pc	203,139
Individual holdings	Number, pc	196,702
	share, percent	96.8
Corporate holdings	Number, pc	6,437
	share, percent	3.2
Total of direct payments	M HUF M EUR	198,351 779.8
Share of individual holdings in total payments	M HUF M EUR	104,432 409.5
	percent	52.7
Share of corporate holdings in total payments	M HUF M EUR	93,919 368.3
	percent	47.3
Subsidy per holding	1000 HUF EUR	976 3,827
Average of individual holdings	1000 HUF EUR	531 2,082
Average of corporate holdings	1000 HUF EUR	14,590 57,216

Source: Agricultural and Rural Development Authority (ARDA) of 2006

62 percent of the subsidies originated from the EU (SAPS)[11] and 38 percent from additional national payments (top up). First of all, crop producers benefit from the payments since based on animal breeding entitlements only 2 percent of the eligible holdings received payments. On average

[10] Based on financial statements on the results, meaning the payments of the entitlements independent of the fact that a part of that was paid by the Agricultural and Rural Development Authority in 2007.

[11] SAPS = Single Area Payment Scheme, the Hungarian SAPS is in fact an area payment, which is independent of production.

the subsidy per holding was HUF 976 thousand (EUR 3,827), and the average received by one company was HUF 14.6 million (EUR 57,216), while that of individual holdings was HUF 0.5 million (EUR 2,082). The lowest county average was paid in Szabolcs-Szatmár-Bereg (HUF 488 thousand, EUR 1,914), and the highest in Komárom-Esztergom County (HUF 1,512 thousand, EUR 5,929).

97 percent of the subsidized holdings (196,702 holdings) are individual holdings[12]. A large part of the subsidized holdings (about 115,000, 56.6 percent) obtained only a small subsidy[13]. These are almost all individual holdings and received 5.1 percent of the direct payments (HUF 10 billion, EUR 39.2 million) based on the area in use, which accounts for 6 percent of total agricultural land. It might sound contradictory but these small subsidies are in fact important. Several hundred thousand rural families benefit from these subsidies and, if one considers their financial situation, HUF 18 thousand (EUR 71) is nothing to sneeze at!

Most subsidized individual holdings are owned by elderly farmers of which 62 percent are over 50, 33 percent over 60, and those under 30 only compose 6 percent (11 thousand). The elderly farmers tended to work small parcels of land, 60% of those over 60 cultivating an average "farm size" of 1.4 hectares[14]!

The amount of subsidy is closely related to the farm size; Figure 1 shows its development by size categories.

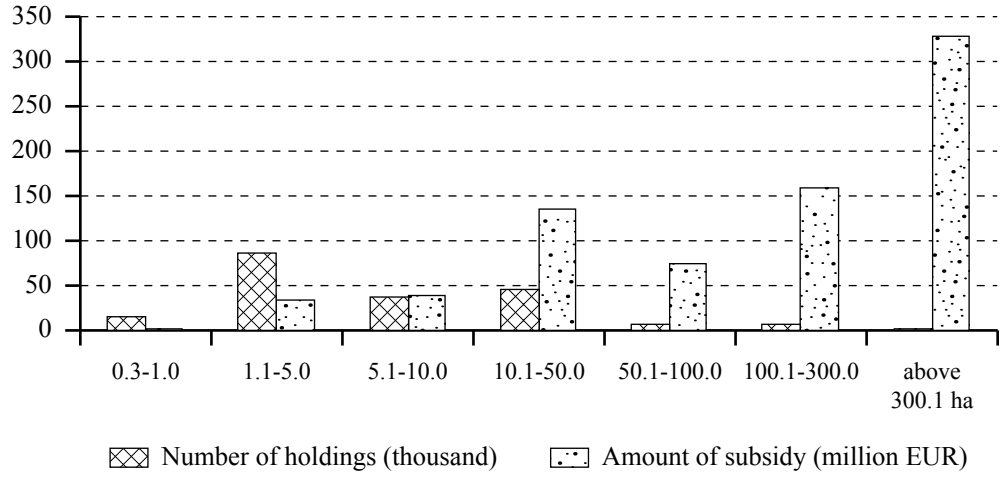

Figure 1: Number of subsidized holdings and the amount of subsidies by farm size

Source: Agricultural and Rural Development Authority (MVH) of 2006

The figure shows that the largest group of subsidized holdings are those between 1-5 hectares and that holdings over 300 hectares receive the most subsidies.

[12] In practice this means that based on Hungarian Central Statistical Office (HCSO) data from the household defined as holdings every third received payments. This is mainly due to the fact that two thirds of the holdings did not reach the threshold of entitlement, which is 1 hectare.

[13] A payment less than HUF 210 thousand (EUR 824) can be considered as a minor payment, which equals the amount of subsidy paid for 6 hectares of land. On such an area approximately GM of 2 ESU can be produced on average.

[14] Calculated on the basis of the area entitled.

Results and conclusions

Probable consequences of a potential reduction in subsidies

Based on FADN income and cost data the pre-tax profit of the holdings were calculated both for direct payments for reduced direct payments in terms of the legal forms of farming and the production lines; then the data were projected to the total of holdings. A 50 percent decrease in direct payments would decrease the pre-tax profit of the total of holdings (total of individual holdings and corporate holdings) by 58 percent! This is the balance of the profit of HUF 159 billion (EUR 624 million) and the loss of HUF 99 billion (EUR 388 million).

The pre-tax profit would decrease for all farm types, both in individual holdings and corporate holdings; as Figure 2 shows.

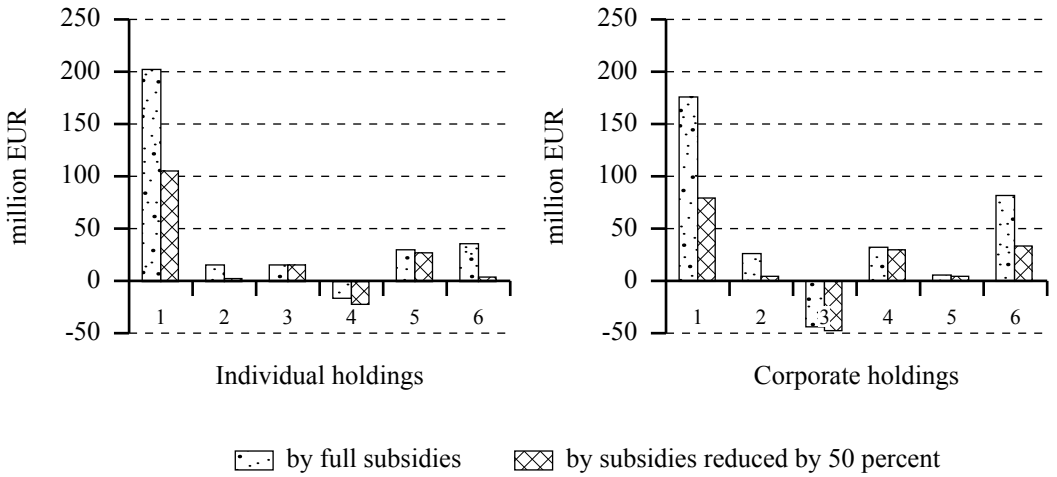

Figure 2: Profit before tax of agricultural holdings by production lines

Production line: 1. specialist field crop producers; 2. Livestock I (specialist grazing livestock); 3. Livestock II (specialist granivores) ; 4. specialist horticulture (Plantations); 5. specialist horticulture (vegetable); 6. Mixed agricultural production

The direct and indirect impacts of profit reduction to be expected are various; the potential consequences can be categorised as follows:

1. Consequences of finances and incomes

Compared to previous years, **2006 was a good year for agriculture**, and none of the sectors affected by direct payments suffered a financial loss. However, a 50-percent cut in direct payments would make financial results plummet, and not only cause a considerable increase in the number of holdings suffering a loss, but also increase the size of such losses for both individual and corporate holdings.

The data obtained are the following:

1.1 If the EU decided to curtail direct payments by 50 percent, **Hungarian agriculture would be forced to forego revenues to the extent of HUF 99.2 billion (EUR 389 million), while the country would lose an 'external income' of HUF 61.6 billion (EUR 242 million)** compared to 2006. That loss of income could be compensated for by increasing the average price of the two major grain crops (wheat and maize) by 28 percent or through an equivalent increase in the crops' average yield. Of course these figures are hypothetical as Hungarian producers have little leverage over crop prices, while yield increases would only occur if there were a considerable increase in inputs.

1.2 The hardest hit regions would be the three least developed, meaning the Northern Great Plain Region (23.8 percent), Southern Great Plain Region (22.8 percent) and Northern Hungarian Region (10.0 percent).

1.3 Cutting back direct payments by 50 percent would reduce the pre-tax profit of holdings over 2 ESU by 58 percent so **nearly one in two holdings** (45 thousand individual holdings and almost 3 thousand partnerships) **would lose money.** This would mean 58 percent of the producers (more than 100 thousand families!) for whom the subsidy is vitally important.

1.4 Clearly the decline in profit would differ by farm type, i.e. Specialised field crops and mixed cropping/crops-livestock would be hurt the most. Specialised grazing livestock would be moderately hurt, while most specialised horticulture would cease to be profitable. The already critical situation of specialist granivores would also deteriorate. The cost-related profitability of each affected sector would certainly worsen.

1.5 While the cost-related profitability of each affected sector would decrease considerably,
- the profitability rate of major arable land sectors, including wheat and sunflower, as well as grape and plum growing and beef cattle breeding would approach a critical level (would decrease to the level of 6 to 8 percent, i.e. lower than the interest rates for financing current assets),
- virtually no income would be generated from secondary spiciferous cereals (autumn and spring barley and triticale),
- rye and oat production and sheep breeding (lamb raising) would become money losing sectors.

2. Change in employment and its subsequent social consequences

The producers (owners) will probably discontinue money losing holdings and sectors. Under that scenario:

2.1. Withdrawal from money losing sectors would terminate approximately a full-time equivalent of (FTE) 45 thousand jobs with an overwhelming majority (about 96 percent) in crop farming. With the disappearance of money losing holdings, nearly 83,000 FTE labour force would lose their employment. However, **a lot more people would in fact be affected**, since agricultural employment is highly seasonal, largely met by workers from other sectors of the national economy and retirees.

2.2. Regarding individual holdings, 75% of the decline in the demand for labour would affect mixed agricultural holdings (32 percent), specialist horticulture holdings (28 percent) and specialist field crop producers (22 percent). Among corporate holdings, specialised granivore farms would be forced to lay off the highest number of workers.

2.3. Reducing the need for agricultural labour would **increase the rural labour surplus**, which would harm rural wages and especially agricultural wages. An even larger problem is that 80 percent of those laid off by agricultural organisations – due to age and educational reasons – will not be able to find any rural employment and will require various government social benefits (early retirement, unemployment benefits, social benefits, health-care benefits).

2.4. Due to their age and educational background, it seems unlikely that all workers leaving agriculture could find job opportunities outside agriculture. According to our calculations, the direct costs resulting from social benefits to be paid could amount to HUF 34 billion (EUR 133 million) a year (obviously decreasing over time), sometimes accompanied by additional costs or loss of revenues (unpaid social security taxes). During the first few years, the sum of the aggregated benefit costs and loss of income would thus approach HUF 40 billion (EUR 157 million), i.e. equivalent to almost half (44 percent) of the money *saved* on agricultural subsidies.

3. Critical regional impacts

3.1 Halving the amount of subsidy payments would result in a HUF 35 billion (EUR 137 million) loss of income and 35% of this would affect disadvantaged micro-regions where the economy is either stagnating or lagging behind every indicator. Therefore, one can expect differences in economic performance to increase among regions with differing levels of economic development.

3.2 Moreover, this is not simply an income loss for the producers since in half the farms this income **ensures a moderate living which all those concerned need to survive.** If the unprofitable holdings abandoned their activities, especially in stagnant or economically backward micro-regions, we contend that there would be **no alternative employment for displaced workers**. The demographic situation is unfortunate in terms of age, educational level, poverty and people living on social benefits, but deficient infrastructure means the business environment is not at all entrepreneur-friendly.

3.3 There are 54 micro-regions suffering economic stagnation and backwardness, and their flimsy economic foundation will further erode due to the decline of production. This in turn will cause a decline in their capacity to provide subsistence and the negative consequences of this particularly entail greater unemployment and social tensions, and a deteriorating demographic age structure with depopulation of villages.

3.4 Regional employment tensions would continue to increase as nearly 40 percent of the employment decline in money losing sectors would affect economically backward and stagnating micro-regions, this where the present unemployment rate is double the national average!

3.5 In these micro-regions, employment opportunities for **laid off agricultural workers** will certainly be well below the national average, due primarily to the scarcity of local job opportunities, the population's minimal mobility, and a higher proportion of disadvantaged social groups, which include unskilled and uneducated people.

3.6. Specialised horticulture farming with its specific labour requirements is traditionally found in the Northern and Southern Great Plain Regions, as well as Northern Hungary. If plantation farming's need for labour were to decline, it would amount to FTE of about 10 thousand workers, most affecting casual workers. This would further increase employment related tension in the Nyírség – an area of isolated farms between the Danube and the Tisza – and to a lesser extent the historical wine districts.

4. Impact on the natural environment

4.1 Reducing subsidies would **primarily affect regions with inferior quality land**, i.e. the region between the Danube and the Tisza and the Nyírség. According to income indicators based on FADN data, **agriculture production on arable land could halt on areas as large as 700 thousand to 900 thousand hectares.** Moreover, no rational alternative has been found for the utilisation of these areas.

4.2 It is difficult to precisely foretell what consequences such a spontaneous cessation of cultivation would have on the natural environment. It is almost always true that in the end nature *will have her way*, but hundreds of years are needed to create the plant communities similar to those preceding the agricultural use of the abandoned lands. For a long time, they may remain as "wild" areas, potential sources of phytosanitary contamination, causing the surrounding population to flee. On the other hand, tending them requires organisation and expenses.

5. Output of agriculture, effect on export

Radically cutting subsidies would have a disproportionate effect on producer prices, given that Europe's market share (and thus its influence on prices) is insignificant for most products, and this especially holds true for Hungary. Not only would it preserve the country's competitive disadvantage against existing EU competitors, but also significant market share would go to third countries.

Such cutbacks would engender a product supply decline of 22-38 percent and 58-76 percent for Hungarian horticulture and oil crops. A decline of about 50 percent and 42 percent could occur respectively for wheat and maize, Hungary's main cereal crops

In some of the sectors a fall in supply could decrease exports, increase imports, or even both. *It is certain that Hungarian producers would lose* **considerable market share.**

Therefore the final conclusion is that **preserving direct payments is fundamentally in the interest of Hungarian agriculture and the national economy**. Apart from worsening producers' income position, significantly reducing subsidies would also have deleterious collateral consequences on the environment and would greatly decrease employment in agricultural production. In every respect it would broadly hurt impoverished rural areas, in particular micro-regions where the economy is stagnant and inferior, meaning areas of considerable social and economic tension.

Prospective CAP reform means the proposed reduction of subsidies and/or in strengthening the modulation, meaning allocating resources for regional development measures. When doing this, one should consider two aspects. First, that the present subsidies have already been integrated into the current operating market mechanisms, meaning into cost, price and income relations. A drastic modification of these would lead to traumatic events in the regions and numerous micro-regions. Therefore, any prospective measures should be applied gradually! Second, any EU financial measures should adequately respect European diversity, and in Europe, Hungary's natural environment, food safety, and food security are fundamental values! This latter point is not only an important value at the European level but also at the regional level, and as a public good requires protection. These cannot be sacrificed on the altar of imprudent financial measures!

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Analysis and optimization regarding the activity of a Hungarian Pig Sales and Purchase Cooperation

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Abstract

In many ways, the Hungarian pork chain faces considerable disadvantages when compared to the situation in competing countries. In countries endowed with a modern meat chain, heavy concentration is the rule, but in Hungary decentralization still prevails, although thankfully the chain is not disintegrating even further. In our research we used the operation of co-operatives as a model in terms of a generalized network problem. The model allows the quantification of the number of pigs from given farms to slaughterhouses, the maximum sales revenue, the delivery threshold prices, and an analysis of the impact co-operative members exert on sales revenues.

Keywords

pork production, integration, network, linear programming

Introduction

Vertical integration links consecutive economic activities and various functions along the product path which are constructed on one another, and these structures are usually defined by their end-products.

A supply chain is an integrated process where raw materials are acquired, converted into products, and then delivered to the consumer (Csonka and Alpár, 2007). Food supply chains are composed of organisations that are involved in the production and distribution of crop and animal-based products. Supply chains can be divided into two main types (van der Vorst, 2000). First of all, there are supply chains for fresh agricultural products where the product's intrinsic characteristics remain virtually unchanged and then there are supply chains for processed food products where agricultural products are used as raw materials to make processed products with a higher added value.

The situation of processors in agribusiness differs from those in other sectors (Szabó and Bárdos, 2006) as they are working with numerous more or less small suppliers – farmers – who all deliver the same product (Schulze et al., 2006a). For the sake of producing high quality and safe animal products (e.g. meat) the whole chain is to be investigated in terms of research and in terms of production (Talamini and Malafaia, 2006). Among international food industries, the meat sector faces the most public negativity, especially because meat consumption is associated with certain health risks (Binh et al. 2007, Krystallis et al., 2007). The meat process typically involves at least three organisations: producers (farmers), processors and retailers (Simon and Taylor, 2007).

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Theuvsen (2004) claims that in the meat industry the following participants can be identified (Figure 1):

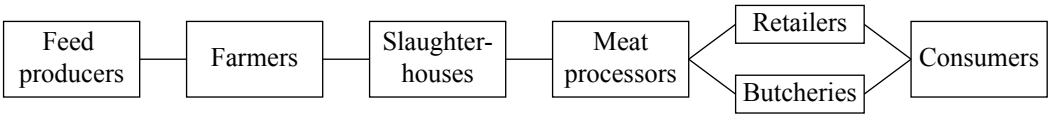

Figure 1: The food chain in the meat sector

Source: Theuvsen, 2004

In recent years, Western European countries have implemented large-scale technological changes (air conditioning, automated feeding, fodder production); therefore acquiring overwhelming advantages over new member states. To rectify this situation, a key requirement is the selection of adequate varieties and variety-specific technologies. Also needed is an improvement in the specific indicator for fodder conversion (fodder-utilization/weight growth) at growing fodder prices. Another noteworthy problem is that the majority of Hungarian pig breeders produce source materials with various genetic backgrounds so quality might radically vary from one breeder to the next. Over the past few years Hungarian genetic potential has completely failed to be renewed. Moreover, biological bases were overexploited, and breeding stock was heterogeneous. The number of breeders was low, the selection base insufficient.

High quality, safe production has to be ensured in the first segment of the animal product chain, i.e. field crop production (Goldsmith and Bender, 2004; Burer et al., 2008). Precise information is needed on soil-conservation methods, the farm's protection environment; and on whether GMO varieties are produced on the given farm (Goel et al., 2005, Beckeman and Skjoldebrand, 2007). Along the production path, the next segment is the animal feedingstuffs industry (Pérez et al., 2005). Besides the feedingstuff components of vegetable origin, industrially produced feedingstuff components and complementary feedingstuffs have to be monitored as well. Moreover, all seed mixture production steps and potential manipulations, including hydrothermic treatment, extrusion, expansion, micronisation, or other feedingstuff treatments in feed-mills have to be monitored. In this way, feedingstuffs produced are delivered to pig farms where all the significant data regarding foraging and fattening must be registered to meet the required quality standards (Komlósi, 1999; Vígh, 2005). Animals meeting a slaughter live weight requirement are taken to slaughterhouses or to meat processing facilities. Here all the segments of processing are again monitored and these data are registered in the production's path central terminal, where data evaluation indicates irregular activities in certain segments along the production chain or non-compliance with regulations and quality requirements.

At the end of the product path, supermarkets sell goods which are manufactured using designated feedingstuffs meeting quality requirements (Davie and Veeman, 2007; Stringer and Hall, 2007) and which are safe (Backus and King, 2007). Moreover, barcodes permit consumers to test product quality before purchasing them (Babinszky, 2006). In the entire chain every initiative which improves animal performance or reduces the price of the final product (Gorton et al., 2006) is important for the meat industry (Andersen et al., 2005).

In the Hungarian pork chain, market players have to cope with the following current problems (Nyárs, 2007).

Due to geographical and economic-political reasons, Hungarian pork producers cannot compete with their counterparts in countries with developed pork sectors. Hungary's geographical location means that acquiring protein sources is more expensive because of greater transport costs and because Hungary is landlocked exporting pork to a third country is also more expensive (Bartha, 2008).

For social and political reasons, in Hungary the number of crimes against property has grown considerably, and recently established protective-preventive services further increase production costs (Horváth, 2008). The high interest (12%) on foreign capital, plus disorganization in the product cycle and in agricultural extension, also pose problems for Hungarian pig breeders. The ATEV monopoly (Company for the Production of Animal Protein) results in high costs for disposing of dead animals compared to international data. Another major competitive disadvantage is that most Hungarian pig farmers don't possess agricultural land so disposing of pig manure is difficult.

On the other hand, Danish pig farmers are legally obliged to possess land. The current Hungarian Act regarding Arable Land does not permit self-employed animal farms to obtain land so reusing organic substances is practically impossible. Another core problem for the Hungarian pig sector is that the market players are unable to make long-term decisions.

The authors of this paper contend that in today's pig sector it isn't corporations – but integrations, national or regional product paths – that compete against each other. The dynamic concept of profitability dictates that an economic environment characterised by rapid technological change has to be flexible. Is it also imperative to utilise comparative advantages (Dúl Údó, 2007). Competition in the pork sector is based on selling prices, product quality, and on producers' public image. Factors which determine long-term competitiveness are the production path structure, the infrastructure level, human resources, plus the biological and economic environment (Horváth, 2008b). In our present study we have investigated the first factor using as the concrete example of a company involved in production. Following preliminary consultations with the managers of Alföldi Sertés Értékesítő és Beszerző Szövetkezet (Alföld Pig Sales and Purchase Cooperation, APSPC), a model was needed to distribute the animals of varying quality among slaughterhouses with different requirements for the maximization of sales revenues. This model can also be used for other Sales and Purchase Cooperatives or can help in refining cooperatives' existing distribution methods.

Literature review

A historical description of the Hungarian meat chain

Hungarian pig breeding has existed for approximately 60 years, and it can be divided into three clearcut, but basically similar time segments. Moreover, only the segment from 1972 to 1990 can be viewed as acceptable/appropriate in terms of stock population and production level. Out-of-date breeding and foraging conditions characterised the first segment (1950-72) where a lack of intensive breeds exerted a negative influence on the level of production. The second segment was marked by the establishment of industrial farms, expansion of modern breeds, hybrids, and modern foraging technologies. During this period Hungarian pig breeding moved into the forefront of European animal breeding for a period of about 15 years.

Following the 1989 regime change, trends in the Hungarian pork chain clashed with international trends.

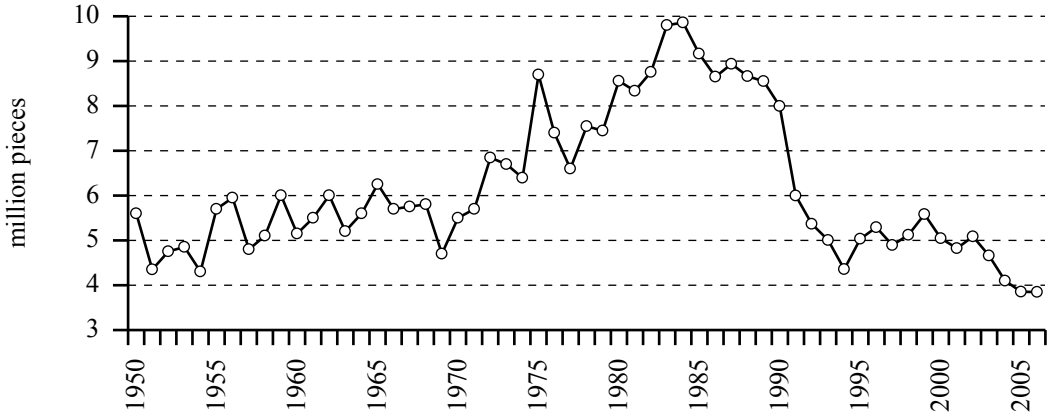

Figure 2: The development of pig stock in Hungary from 1950-2006
Source: Szabó, 2007

Unfortunately, after the 1989 regime change, the Hungarian pig sector actually fell to an even lower level than in the 1950s. This was due to a loss in export markets, technological depreciation on industrial farms, lack of proper farm sizes, and the end of integration in production. Over the past 2 decades the pig population dropped to 40%. The number of sows declined by 3%, and the production of slaughter pigs by more than 3.5%, indicating a cutback in productivity (Figure 2). Simultaneously, the number of pig breeders declined in proportion with pigs produced for slaughter leading to even less concentration.

When Hungarian data are compared with Danish data, one sees that the production of pigs for slaughter increased by 12.8% in the past 30 years and grew from the annual 7 million units in 1975 to 26.6 million, or by 385% in 2006. Meanwhile, as a result of concentration in animal stock, the number of producers plummeted to lower than 10% in the above mentioned period. The Danish pork industry is unique in terms of organization, and is unlikely to copied as it is vertically coordinated through its co-operative structure in the production chain. This characteristic coupled with higher production efficiency provides the whole system with a high level of competitiveness; the key to Danish pork's success. (Selva, 2005; Danske Slagterier, 2007). In 2006 there were 3,600 Danish finishing units, 3,100 breeding-finishing herds, and 750 piglet producers (Beynon and Best, 2007). During the same period a total of 9,500 farmers kept pigs. The majority of these farms either only kept sows with a focus on piglet production, or they only kept fattening pigs and their focus was on meat production. A small portion of the farms were mixed and both kept sows and fatteners (PVE, 2006). Keeping pigs for a given time period, widespread in Western Europe, isn't common in Hungary, but shorter production periods would lessen economic risks. In the same year in Hungary 316 thousand producers were registered, and 78 big farms provided 56% of slaughter pigs for sale. These big farms produce more than 10 thousand pigs/year and represent 0.025% of the total number of farms.

Today in Hungary the pig production path includes 4 segments (Figure 3). The first segment is the production of source materials, which we have already described above. Before Hungary's EU accession, slaughterhouses almost exclusively processed domestic source materials. In previous years, the supply of slaughter pigs continually decreased so slaughterhouses were forced to purchase pigs from abroad. In preceding years, the decline of the pig population was closely related to private farm bankruptcy. In 2006 there was a 1 million drop in the the number of pigs kept by private farms

when compared to 2000, but for economic organizations the drop was only 200 thousand. Producer organizations are weak when it comes to slaughter pig production and sales, numbering perhaps 20-25, located in the country's various regions (Nábrádi, 2007).

In most European countries, (Germany, the Netherlands, Belgium, and France) spot markets, long-term relationships and marketing contracts predominate (Traupe, 2002; Boston et al., 2004; Osinga and Hofstede, 2005; Spiller et al., 2005). In other countries such as the United States and Denmark, and partially in Brazil and Spain, production contracts, contract farming, and vertical integration have largely replaced less integrated forms of pork production (Schulze et al., 2006c; Schulze et al., 2006d). The Danish pig industry has attained a high level of competitiveness mainly thanks to its vertically integrated production chain. Besides reduced transaction costs, this unique form of coordination promotes excellent quality which adjusts quickly to consumer demand (Selva, 2005). In recent years Spanish pig production has become thoroughly professional, employing the most up-to-date technologies, and pig farming is also bolstered by high cereal productivity. Recently established Spanish farms are similar to American farms as they tend to be huge (about 100 thousand pigs) and have low production costs. In Spain vertical integrators are mills and fodder companies that also own animals, and farmers have precise contracts obliging them to feed their pigs with meal supplied by specific mills. The mill and fodder companies have also vertically integrated further along the chain; and an example of this is the slaughter of animals. What's more, they divide their business into cattle and poultry production, an idea adopted from the Tyson model. However, supplying uniform animals through contract farming is only one way of producing homogeneous products in high quantities. During the past years, new sorting technologies combined with the enormous growth in slaughterhouses allowed the same output through pre-slaughter sorting instead of vertical coordination. In Germany, a successful example of this new strategy is Toennies. Toennies, a market leader in packed pork in Germany. They created over 70 different internal classification categories into which the animals were sorted by using automatic classification technology. In the next step, the different batches are divided by automated sorting technologies to produce about 1,000 different, tailor-made products for special market destinations. A processing capacity of 20,000 pigs a day enables the company to produce sufficient quantities of uniform meat without defining homogeneous input factors (Schulze et al., 2006c). Enting and Zonderland (2006) suggest that a lack of trust between primary producers and slaughterhouses is probably the main reason why the Dutch pork industry is so unintegrated In Germany the situation is the same (Spiller et al., 2005; Schulze et al., 2006b).

The second segment includes slaughterhouses (processing I.), one third of which manufacture meat products as well as slaughter and chop. At this time, the number of purchased slaughter pigs amounted to slightly more than 50% of available slaughter capacities. Approximately 48% of produced slaughter pigs were killed in industrial meat companies, about 18% in slaughterhouses, and 34% in households (Nábrádi and Szűcs, 2004).

In the sector, not only concentration but also specialization has emerged as an important factor. 56% of pigs were primarily processed in slaughterhouses having a capacity of 200 thousand pigs/year, entailing 5% of total farms. On the other hand, in Denmark only 21,178 thousand animals were butchered in 12 slaughterhouses (Nyárs, 2007). Pig slaughter and processing are becoming increasingly separated. The third segment in the production path includes farms which exclusively manufacture meat products (processing II.), do not slaughter pigs, and purchase necessary source materials for production from slaughterhouses.

In the Netherlands there is only slight integration between the processing segment and slaughterhouses. 2003 data show that 88% of the processors do not slaughter pigs themselves, are not affiliated with a slaughterhouse, and do not belong to a business concern involved in slaughtering pigs. They purchase their carcasses from Dutch slaughterhouses or from slaughterhouses in surrounding countries like Germany, Belgium and Luxembourg. Foreign slaughterhouses' market share has reached 20%, a sign of growing internationalisation (PVE, 2004, Hoste and Bondt, 2006). In the Hungarian product path, the number of slaughterhouses exclusively producing for the domestic market is still relatively high. Nowadays, slaughtering pigs in itself is not highly lucrative, and the same holds true for boning and cutting. In fact, only finished products are lucrative (Salamon et al., 2007).

The fourth segment in the production path is domestic consumption and foreign market sales. In this segment there is a wide variety of products which require source materials of varying quality standards. Chain stores offering products customers don't require as well as competition among multinational companies (Nyárs, 2007) serve to lower quality.

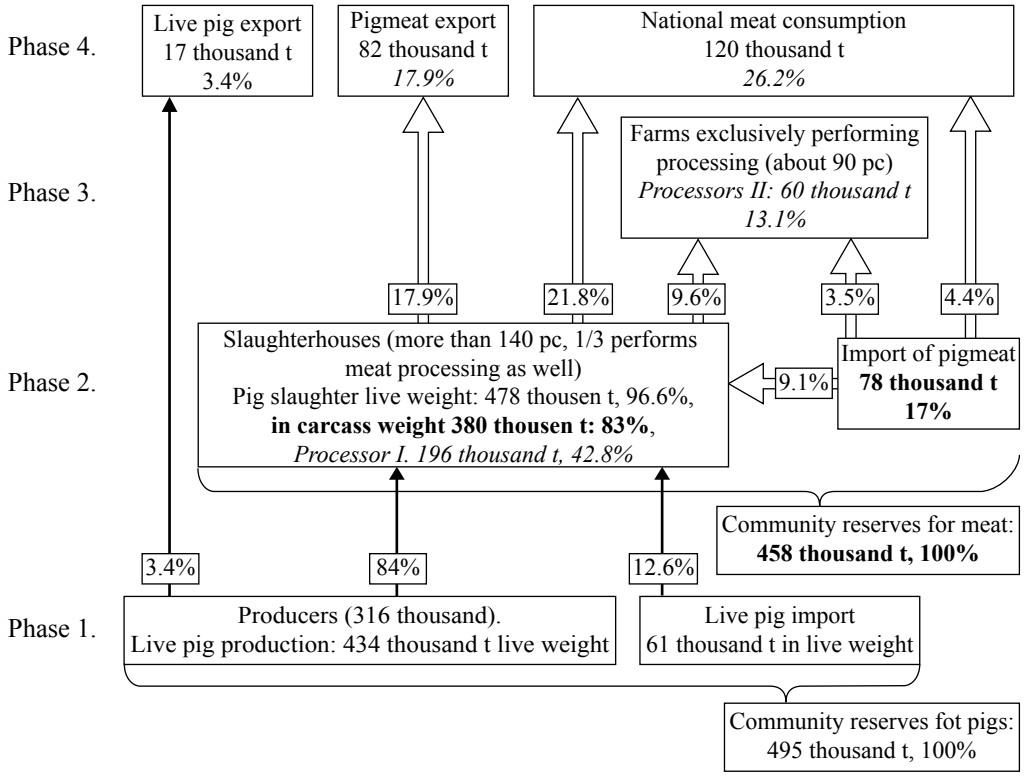

Figure 3: Segments of pork production path and distribution channels in Hungary in 2006
Source: Györe et al., 2007

Methodology

In our research we modelled a purchase and sale co-operative operating in the Northern Great Plain Region. We applied linear programming techniques within a network model. Agricultural programming models have been used in many studies such as Andersen and Stryg, 1976; Meister et al., 1978; and Pomarici and Hanf, 1996. They were also used by Jonasson and Apland, 1997; Vatn et al., 1997; and Helming, 1997. Researchers from many fields previously used the network model, among them Knoke and Kuklinski, 1982, Jonassen et al., 1993, and Iacobucci 1996. Using Winston and Albright's 1997 network model, we endeavoured to obtain an optimal solution. Our concept was very simple: to get each member to the slaughterhouse paying the highest price for the given product quality. This method benefits producers as they can derive higher sales revenue and it also benefits slaughterhouses as they receive their desired product quality

The practical realization of the concept raises two significant questions:

- How to gauge the meat quality of farm animals?
  - Grouping may be based on body weight; however, the actual meat quality parameters for certain animals will only be known after slaughterhouses provide feedback. Here it should be noted that we encountered some producers who were indifferent toward the quality of their animal which, given the current economic situation, was absolutely incomprehensible. 20 years ago English et al., (1988) reported similar cases in Great Britain.

- How to calculate return on sales for member organizations?
  - Within one organization, products having the same quality are delivered for different slaughterhouses and distribution is determined by transport distance.

The second question is the easier one and the co-operative has already found a solution. The members deliver the pigs for the co-operative and equitable distribution is ensured by applying the principle of "same weekly price for same quality". This entails joint risk-taking by the members, and ensures a safer delivery of market surplus. Trust is maintained by the continual control members exercise over management. The co-operative's Price Committee convenes weekly, oversees payment, and each member receives a weekly statement for total sales.

The first question is more difficult to answer. Through analysing previous slaughterhouse qualifications, the various meat quality distribution rates are clearly definable. Slaughterhouse quality categories can be considered uniform, but the system of deductions and bonuses is far from being uniform. Table 1 presents the primary factors influencing average prices. The basic principle is more or less the same for various slaughterhouses, but the prices and parameters that influence prices are varied.

In our network model nodes include pig farms and slaughterhouses and arcs represent the amount to be delivered (Figure 4). On the arcs we indicate the price of one pig delivered from a farm to a given slaughterhouse.

On the basis of previous qualifications the definable data regarding farms are the following:

- SEUROP quality rates, expected average delivery weight, carcass weight from this
- By using the expected average delivery weight and earlier standard deviation values, the rate and body mass of animals having lower than the standard body weight can be estimated

- Corresponding with the previous point, calculations are also performed for potentially overweight animals
- Condemnation is estimated

Table 1

Definition of average sales price

S	Basic price (Live weight – deductions = carcase weight)
E	
U	
R	
O	
P	
Cull 1	Price reduction for animals of small weight – out of P category
Cull 2	Price reduction for animals of small weight – out of U category
Overweight animals	Average price of the all above mentioned categories – price reduction
Condemnation	

Source: Authors' own creation

Based on the above statement, and taking the contracted slaughterhouse parameters into consideration, in every aspect the average sales price is calculable and, from this, one arrives at the average sales price for one pig.

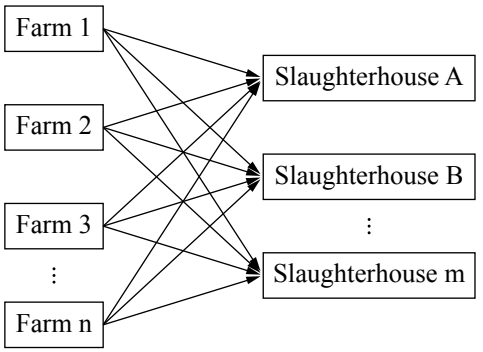

Figure 4: The schematic model of distribution

Source: Authors' own creation

The variables within the model are the network arcs, meaning. there will be as many variables as there are links which can be created between farms and slaughterhouses. Based on the above data, the model's target function can be determined:

$$\sum_{i=1}^{n}\sum_{j=1}^{m} p_{ij} x_{ij} \Rightarrow \text{MAX!} \quad (i = 1, 2, ..., n; j = 1, 2, ..., m) \tag{1}$$

where

p_{ij} = the average price of pigs delivered from farm *i* to slaughterhouse *j*

x_{ij} = the average number of pigs delivered from farm *i* to slaughterhouse *j*

The constraints are defined by nodes, separately for farms and separately for slaughterhouses. For farms the total output from a farm equals the volume for delivery if the whole quantity for delivery from all the farms is lower than or equal to the quantity for delivery: otherwise a lower limit is specified. For slaughterhouses, conditions will have an upper limit.

Constraints for farms:

$$-\sum x_{ij} = -T_i \text{ if } \sum T_i \leq \sum S_j \tag{2}$$

$$-\sum x_{ij} \geq -T_i \text{ if } \sum T_i \quad \sum S_j \tag{3}$$

where
x_{ij} = quantity flowing on arcs towards slaughterhouse *j*
T_i = the number of pigs to be delivered from farm *i*
S_j = demand of slaughterhouse *j*

$$\sum x_{ij} \leq S_j \tag{4}$$

where
x_{ij} = quantity flowing on arcs towards slaughterhouse *j*

This model is a linear programming (LP) application with 110 variables and 32 constraints. The solution requires extensive vulnerability studies. The coefficient shadow prices in the target function, and the values of permissible increases and decreases, present the threshold prices for certain delivery relations and the lower and upper limits, which can include the target functions' variations' values without modifying the optimal solution. The shadow prices related to the variables may allow evaluating the influence for the potential expansion or restriction of certain delivery relations on the sales revenues. The Co-operative members' influence on sales revenues can be analysed by "What if …" examinations. The negative feedback from the information can inform and increase safety for the network members, which in turn facilitates production of homogenous end-products and the preservation of the farms' competitiveness.

The network model was based on a 5-week time frame, starting from the 2nd week of August in 2007. On the basis of APSPC data, 11 producers delivered their products to 5 slaughterhouses. Using producers' information the model's data can be continually updated, so it is also readily applicable for weekly optimization. Each farm and slaughterhouse represents two nodes in the network, allowing simultaneous optimization for fattening pigs and culled sows. Thus, one can receive data on the number of pigs to be delivered from certain farms to certain slaughterhouses, the total potential maximum revenue from sales, and after breaking it down, revenues for individual farms as well.

The network model's basic data include members' information on the anticipated quality and weight, and also prices and quality deductions related to various quality categories provided by slaughterhouses. When comparing the findings of the model to the actual sales data, we took the following items into consideration:

- the number of pigs calculated in specific farm/slaughterhouse relations
- for sold mass, we used the mass which was actually transported
- instead of using farm forecasts' anticipated **quality**, we considered those provided by slaughterhouses.

These modifications allowed a realistic evaluation of the model results.

Results and discussion

Introduction of the APSPC

In 2005 19 producer groups were granted official recognition. On average they had 30 members, and they produced 85,000 t i.e. HUF 22 billion, about 20% of Hungarian pig production. In 2007 there were 21 officially recognised pig producer groups in Hungary; four of which held preliminary recognition. On 20 February 2003 the APSPC was established, and at that time it had 26 members. From June 2003 the Co-operative has performed joint pig sales. Table 2 presents sales over the past 5 years.

Based on 2005 data, one observes that 40% of the production from Hungarian producer groups derive from the APSPC. Since inception the Co-operative's share of produced domestic pigs has been increasing, improving the Co-op members' position. It is important to emphasize that the Co-op members do not sell their pigs under one name, but hand them over for distribution to the Co-operative.

Table 2

APSC Pig sales in 2003-2007

Name	2003	2004	2005	2006	2007
Number of members	32	33	36	35	40
Sold animals	152,109	288,992	273,590	290,641	350,000
Sold (t)	16,948	30,443	32,244	33,482	40,250
Revenue on sales (million HUF)	4,128	8,944	9,123	10,104	11,753

Source: APSPC, 2007

Figure 5 indicates the Co-op's growing strength. The network nodes include breeder' organizations, pig farms, and slaughterhouses. 4 different levels reflect their roles in the network. Level 0. shows the replacement of foodstuffs and breeding materials, level 1. the production of own source material for breeding, and level 2. production destined for market. Level 3. again represents slaughterhouses.

The network arcs indicate the major input and output factors branching into certain nodes. For breeding purposes, producer organizations only send their gilts or sperm breeding to the Co-operative's breeding farms. The breeding farms supply gilts to farms whose production is headed for market. The Co-operative includes two types of farms producing for the market. In the first type the entire rearing process occurs in a specialized farm, which in our model was indicated as a complete farm.. Nowadays it is very rare for specialized farms to keep breeding boars, and most often the necessary sperm volume for mating is acquired from a separate boar farm. There are also special fattening farms where weaned piglets are placed and processes occur from battery and last until the end of the fattening period. As previously mentioned, the most significant breeding farm product is the production of young pigs for breeding purposes, and cull sows or animals not suitable for further breeding are directly delivered to slaughterhouses. The complete and fattening farms' major products are fattening pigs, but of course they also have technological culls, which are sold at reduced prices. Naturally, on special fattening farms the incoming input is weaned piglet. For all three types of farms, feedingstuffs from feed mills are a major factor as foraging costs basically determine the the farm's income.

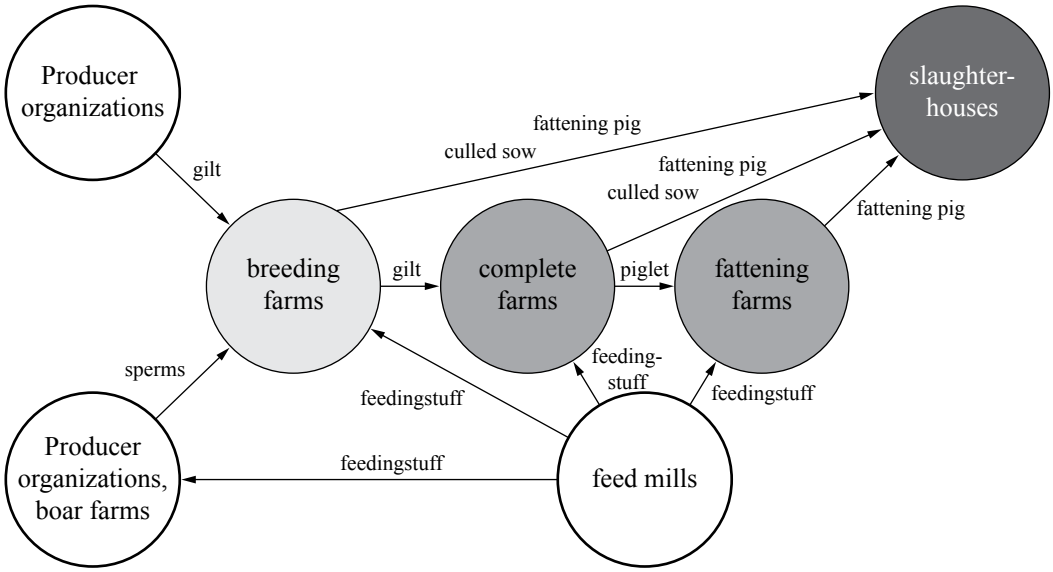

Figure 5: Schematic model of certain network nodes

Source: Authors' own creation

Figure 5 presents the network's schematic processes. In the "sample" co-operative animal stocks have varied genetic potential. As a result, the turnover between breeding animals and farms is only true for a specific breed or hybrid. Fattening farms receive their piglets from farms dealing in breeding animal production. Other than the technical reasons for breeding, this also reflects the importance of animal health and logistic considerations.

Within the current regulations, the APSPC can represent the members' interests regarding sales. The APSPC's superior bargaining position stems from the quantity of slaughter animals it produces, and can thus obtain better prices than the Hungarian average. It should be noted that slaughterhouses often offer different prices for equal quality goods at the same time. It frequently happens that slaughterhouses periodically or permanently offer more than actual market prices for animals of inferior quality or of greater body mass. The reasons for this may vary. The present study does not analyse this issue, but it includes supply and demand consumer relations, processing industry demand or existing stocks placed in cold storage. Figure 6 presents the monthly 2007 average prices of E, U and R quality categories from three (A, B, C) slaughterhouses. If one traces the price formation, one sees that in January slaughterhouse C purchased at the highest price for all three meat quality categories. In February the situation was more balanced, as slaughterhouse A offered the highest price for categories E and U, whereas slaughterhouse C offered the lowest price for category R. This price fluctuation was observable for all slaughterhouses and meat quality categories throughout the entire year. It seems natural that a given contract inherently direct goods to the slaughterhouses paying the highest price. However, it should be noted that slaughterhouses and farmers stipulate the quantities to be delivered within the framework of agreements which can only be derogated without a financial penalty when justified. However, the fundamental ethical norms of fair market behaviour must be met.

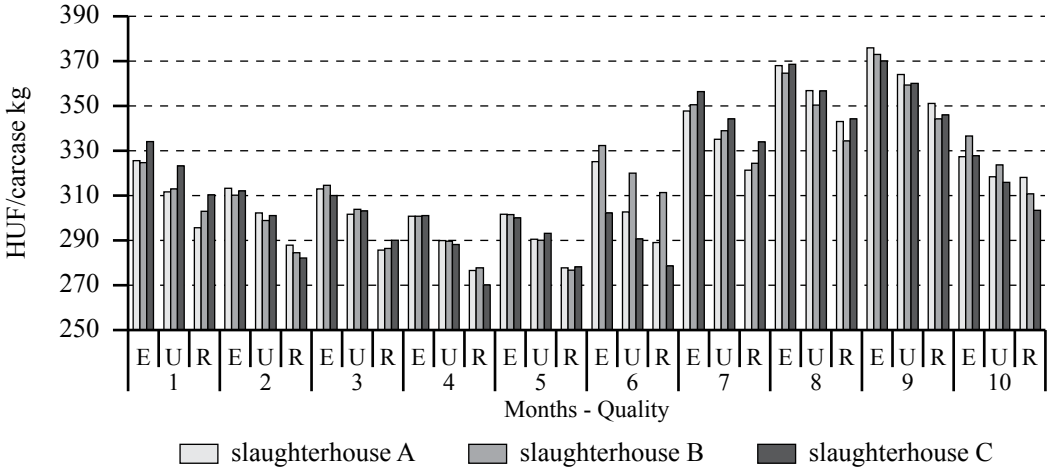

Figure 6: Formation of pig carcase prices in three slaughterhouses for E, U and R quality categories in January-November 2007

Source: Authors' own creation

How can the positive aspects of market price fluctuations serve to increase sales revenues?

For a farm the only method may be concluding exclusively short-term contracts and always selling end products to the buyer offering the highest price. In the short run this may be a useful method, but in a supply position the farm runs the risk of not finding a buyer, thus increasing risk to the point that it endangers the enterprise's existence. Long-term contracts reduce market risk; however, low volumes mean inability to capitalize on price fluctuations, which increases their vulnerability.

Table 3 indicates sales revenues during the study period, calculated on the model and the Co-operative's actual sales revenues. Sales revenue data clearly showed that for a considerable amount of sales volume applying simple network models permits the Co-op to take advantage of price fluctuations stemming from various slaughterhouse quality requirements, thus allowing surplus revenues to be gained. Moreover, further gains can be realised by more accurate meat quality forecasts, and this phenomenon explained the necessity for modifying the model data. Basically, in each case these corrections reduced the model's target function value. Unfortunately, farms lack the necessary measuring techniques and therefore mostly rely on earlier period data and their own experience.

Table 3

The development of actual sales revenue before and after optimization in the study period (million HUF)

Denomination		1. week	2. week	3. week	4. week	5. week	Total
Fattening pig	Sales revenues of optimization	93.5	78.4	114.7	90.4	123.5	500.5
	Actual sales revenues	91.2	77.0	112.6	87.9	120.2	488.9
Culled sow	Sales revenues of optimization	6.4	3.9	5.5	4.2	7.1	27.1
	Actual sales revenues	6.3	3.6	5.4	4.0	6.7	26.0
Surplus sales revenues by optimization million HUF		2.4	1.6	2.2	2.7	3.7	12.6
percent		2.4	2.0	1.8	2.9	2.8	2.4

Source: Authors' own calculation

Table 4 indicates the reduced costs of some variables and related information, which the Co-op's management emphasize, but are not included in the optimal solution. Certain relations cannot be compared in terms of calculated reduced costs because they are calculated for an individual animal. However, this comparison may be made for average carcass weight. The findings suggest that farm 10. can ship products to slaughterhouses B, C and D only when sales revenues calculated in the optimal solution decrease in the cooperative.

Table 4

Development of the reduced costs of some variables in the model of week 1.

Relation of transport	Number of pieces for transport	Final value pc	Reduced cost HUF/pc	Coefficient of target function HUF/pc	Reduced cost HUF/kg	Average price HUF/kg	Upper limit HUF/kg
Farm 1 - slaughterhouse B	0	0	-190.0	36,638.8	-1.8	355.54	357.39
Farm 3 - slaughterhouse B	0	0	-117.7	32,637.6	-1.3	359.90	361.20
Farm 5 - slaughterhouse B	0	0	-158.7	39,532.7	-1.4	357.86	359.30
Farm 7 - slaughterhouse B	0	0	-102.3	34,015.1	-1.1	361.93	363.02
Farm10 - slaughterhouse B	0	0	-225.8	40,472.7	-2.0	350.67	352.62
Farm 11 - slaughterhouse B	0	0	-105.3	35,354.1	-1.1	357.37	358.44
Farm 10 - slaughterhouse C	0	0	-260.8	40,748.5	-2.3	353.06	355.32
Farm 10 - slaughterhouse D	0	0	-221.7	41,064.3	-1.9	355.79	357.71
Farm 2 - slaughterhouse E	0	0	-109.7	38,902.0	-1.0	362.99	364.01

Source: Authors' own calculation

In Table 5 shadow prices as model solutions show the amount of money by which additional transports from certain farms increase income. The sensitivity report basically calculates this amount for one pig, but as with reduced costs, it can easily be converted into a kg/HUF unit regarding average weights. In Table 3, optimized sales revenues from pigs which have been assigned a quality category is 93.548 thousand HUF in the first week, and the marketed quantity is 2,655 pigs with a carcass weight of 257,032 kg based on the model's data, yielding an average market price of 363.96 HUF/kg.

Analysing Table 5 clearly shows that extending capacity in farms 2, 6 and 9 would increase sales revenues, as shadow prices for 1 kg of weight are higher here than current average prices; however, if farm 10's transport capacities are extended, average prices can be substantially reduced. Statements regarding reduced costs already projected the conclusions for farm 10.

Table 5

Shadow prices of net flow boundaries related to quality pig sales in the model of week 1.

Cell	Name	Final value pc	Shadow price for 1 pig	Right side of condition pc	Allowable increase pc	Allowable decrease pc	Shadow price for 1 kg weight
L9	net flow of 1. farm	-320	-36,705	-320	60	255	-356.19
L10	net flow of 2. farm	-270	-39,012	-270	40	80	-364.01
L11	net flow of 3. farm	-450	-32,632	-450	60	255	-359.84
L12	net flow of 4. farm	-100	-31,804	-100	100	255	-360.54
L13	net flow of 5. farm	-200	-39,568	-200	200	255	-358.18
L14	net flow of 6. farm	-360	-30,970	-360	40	80	-364.72
L15	net flow of 7. farm	-120	-33,994	-120	40	255	-361.71
L16	net flow of 8. farm	-250	-34,700	-250	40	80	-362.86
L17	net flow of 9. farm	-320	-31,913	-320	40	80	-365.20
L18	net flow of 10. farm	-210	-40,575	-210	210	255	-351.55
L19	net flow of 11. farm	-55	-35,336	-55	55	255	-357.19

Source: Authors' own calculations

Table 6 reveals data from a sensitivity report regarding slaughterhouse boundaries. Slaughterhouse 6's demands will be be fulfilled, while the other slaughterhouses will receive the required quantities. Comparing A, B, C, D slaughterhouse shadow prices clearly indicates that if a sequence is to be set up for potential excess or re-grouped quantities, the sequence of D – A – C – B slaughterhouses seems to be acceptable (the sequence of D – C – A – B seems unacceptable, as A shadow prices are lower than that of C; however, its allowable increase is higher).

Table 6

Shadow prices of slaughterhouse net flow boundaries related to quality pig sales in the model of week 1.

Cell	Name	Final value pc	Shadow price for 1 pig	Right side of condition pc	Allowable increase pc	Shadow price for 1 kg weight
L4	Slaughterhouse A	750	374	750	60	255
L5	Slaughterhouse B	250	124	250	40	80
L6	Slaughterhouse C	480	434	480	40	80
L7	Slaughterhouse D	550	711	550	40	80
L8	Slaughterhouse E	625	0	880	1E+30	255

Source: Authors' own calculation

Conclusions

Following the 1990 political transformation, the Hungarian pig population plummeted, and this tendency has continued ever since. The reasons for this decline were loss of export markets, outdated industrial farms, smaller plant sizes, and a halt in production integration. Today some of these factors are still in play, but since 2003 a majority of producers have joined producer groups having greater potential to further their own interests. Having to comply with environmental and animal protection requirements places an burden on pig farmers. Other significant factors are exceedingly high feedingstuff prices, coupled with low 2007 pork prices. Together these factors have driven the pig population to a historic low. In Hungary the pre-90s vertical integration level has disappeared. It does, however, still exist in highly developed European countries. Pig farmers have little bargaining clout when dealing with slaughterhouses and meat processors, who in turn have little clout when dealing with multinational commercial chains. Only a small proportion of the Hungarian pig population is processed within this closed chain which consists of: feedingstuff production – feedingstuff manufacture – pig keeping – slaughtering – processing – distributing meat and meat products, which is controlled by producers.

Based on previous statements in this paper, one can conclude that there simply isn't an integrated supply chain in the Hungarian pork product chain. The emergence of a supply chain implies-at best-only a strengthening of vertical relations or possible movement in a strategic direction. A product chain member's enhanced economic position means the member generally shapes and manages relations and, as a participant, fully comprehends the chain's mechanisms. Accepting this unilateral and informal situation as inevitable fact preserves product chain anomalies and causes low efficiency. Therefore, supply chain integration is crucial for the future competitiveness of the Hungarian pork sector.

These issues motivated us to develop a maximization of sales revenues model in order to help Hungarian pig farmers. Mathematically the model is simple and its practical application seems straightforward However, its realization is hampered by farm record deficiency as it makes calculating anticipated quality and average prices uncertain. By providing production information feedback, the APSPC permits even farmers at the lower end of the production scale to produce better quality and more homogeneous source material for slaughter, thus allowing them to achieve higher revenues. Applying the model generates more revenue, and this gives farmers the potential to survive bad years such as 2007 and to actually improve and prosper in good years.

Thus, the long-term prospects for Hungarian farming could become smoother and more balanced, improving production and profit security for members all along the chain. However, it is essential that political decision-makers create regulations ensuring that, throughout the chain, members are cognisant of quality requirements.

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Agricultural Risk Management in the European Union and in the USA

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Abstract

Risk management has become increasingly important in virtually all aspects of the economy, including agriculture. Every country that considers agriculture a strategically important economic sector strives for effective risk management in agriculture. In our study American and European Union farmers' risk management practices were, based on various surveys, compared. In terms of agricultural risk management, major differences between the USA and the EU were evident, and these derive from different farming cultures, differences in historical evolution, and economic philosophy. This study provides an overview regarding the important similarities and dissimilarities.

Key words

agriculture, risk management, risk perception, EU, USA, surveys.

Introduction

Although a universal definition of risk applicable to all disciplines is highly desirable, many research areas have a different understanding of the concept of risk. This difference stems from the fact that each discipline designs and applies a definition of risk that best fits its conceptual needs. Sometimes definitions overlap or are the same in different areas, but unfortunately this is not always the case.

Even in an restricted area like economics, there are many different approaches toward defining the concept of risk (Aven, 2003; Frame, 2003; Williams et al., 1995). To solidify our discussion of risk and risk management, precise definitions for these terms are required. In this paper risk will be defined as the potential deviation between the expected and the real outcomes resulting from an economic decision where, from a practical point of view, a negative outcome has greater importance, and constitutes the one actually considered by most decision makers. This definition relies heavily on the findings of Gallati (2003), Lugosi (1986), Chikán (1998), Baki et al. (2004) and Buzás et al. (2000). While risk may offer a positive outcome, crisis always refers to a situation with serious adverse consequences threatening the existence of economic entities (European Commission, 2005). In the worst case, the aftermath of risk and crisis is bankruptcy, meaning that the given economic entity (e.g. agricultural holding) is unable to continue its operations due to heavy losses or other negative events. According to our understanding, risk management is the range of strategies and instruments applied to avoid or minimize losses and to utilize opportunities. This approach relies heavily on works by Hardaker et al. (1997) and Moschini and Hennessy (2001).

Although risk can ultimately be measured through losses or gains in income, from a risk management point of view grouping risks offers an effective approach toward identifying similar risks and thus allows one to apply more targeted risk management tools and strategies. In terms of agriculture, the major risks are a business risk (including production, market, personal and institutional risk) and a financial risk (issues related to financing business operations). This categorization derives from works by Boehlje and Trede (1977), Fleisher (1990), USDA (1997), Burgaz (2000) and Hardaker et al. (1997).

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The growing importance of risk factors affecting agricultural production is accentuated both directly and indirectly by local, regional, and global economic and natural phenomena which can be traced back to previous decades. Agricultural producers' conventional approach is to restrict their risk management strategies to offset and alleviate problems caused by climatic and natural phenomena. However, such a practice has become obsolete and nowadays keeping abreast of professional, market, and agricultural policy developments is increasingly indispensable for successful farming.

Moreover, it is vital to determine how farmers perceive the importance of risk factors surrounding their activities as this strongly influences their risk management strategies. In this regard professional organizations and policy makers' responsibility is easily discernible because they often play an important role in the orientation and education of farmers, thus allowing farmers to properly judge the importance of risk factors so they may work out adequate risk management strategies.

Moreover, one should not underestimate the relationship in the approach taken by farmers, professional organizations and governments. Government bodies should constantly monitor and survey agricultural producers' risk management strategies and recognize their own influence on market players' applied strategies. Recognizing the best practices carried out by agricultural producers' could, for example, prove important in shaping government policies and channeling them into support schemes could better contribute to successful risk management by all producers and prompt laggards to adopt efficient practices. On the other hand, via their professional associations, producers and other market players should provide feedback regarding government policies in order to provide a viable basis for further development of regulations. Of course, much depends on governments' and producers' desire for mutual cooperation. If both sides indicate a desire to work together, their efforts could prove most fruitful.

The European Union has long been aware of the importance of risk in agriculture and has investigated creating an EU level risk management system. The "Design and economic impact of risk management tools for European agriculture" research project conducted under the aegis of the Sixth Framework Programme fits that objective. An important part of the project has been surveying farmers' from various Member States perceptions regarding risk (crisis) and risk (crisis) management. The process as well as some results are outlined in this paper[2].

To obtain a broader view of this topic regarding differences between countries, US farmers' risk perceptions and management practices were analyzed, thus allowing an international comparison. The United States has been chosen for this study because the US governmental sector, farmers and academia also consider agricultural risk management as highly important. Although the current version of this paper is limited by a lack of detailed information on the most recent US situation, published results of previous American surveys can serve as a basis for such cross-Atlantic comparison.

The current study should be considered a preliminary effort at comparing various agricultural risk issues in terms of the two agricultural super powers rather than an exhaustive analysis, which will be a subject of further studies and analyses.

[2] This paper expresses only the findings and opinion of the authors and not the views of the European Union.

Materials and methods

Following negotiations among project participants, five EU Member States were selected and agricultural producers were surveyed about their perceptions regarding the issues under investigation. Due to practical considerations and the need to include new EU Member States in the research, the following countries were selected: Germany, Hungary, Poland, Spain and the Netherlands. These countries were the most obvious choices as the partners participating in the project reside in these countries, facilitating the survey of agricultural producers' perceptions.

The applied research methodology was a questionnaire survey. The questionnaire was translated into the 5 pertinent languages, and was thus designed to be completed in all of the selected countries. The authors of this study developed the questionnaire following a series of discussions amongst project participants, and attention was paid to the relevant literature (Malhotra, 1999; Lehtonen and Pahkinen, 2004; Chambers and Skinner, 2003; Agresti, 2002; EC – DG AGRI, 2001; EC, 2005; Hardaker, Huirne and Anderson, 1997; Anderson, Dillon and Hardaker, 1977; Williams, Smith and Young, 1995; Kapronczai et al., 2005). After six drafts and a pilot survey, the final version was drawn up, ensuring the document's viability in all the target countries. It was decided that 200 farmers/producers would complete the questionnaire in each of the selected countries. In the end, each country supplied at least 200 completed questionnaires, and in some cases even more (Hungary: 204; Poland: 206; the Netherlands: 236; Spain: 200; Germany: 201).

Following a sampling plan elaborated by the authors of this document and a detailed description for selecting the farmers, the respondents were chosen. Stratified sampling with proportional allocation was used as the sampling method for the questionnaire survey. Strata applied in the sampling plan for each country were economic size of the holdings and their type of agricultural activity; both category groups were based on European Commission FADN farm typology and the data source applied for the sampling was the 2003 Farm Structure Survey, which was available for all selected countries at the time of constructing the sampling plan. Preparing the sampling plan helped establish representative samples for all the five countries under investigation. (Lohr, 1999; ATTRA, 2005; EUROSTAT, 2003a, 2003b and 2005; KSH, 2004)

Selected project partners from each country included in the survey were responsible for carrying out the survey in their respective countries. In each country final versions of the questionnaire were translated by the local project partners. In Hungary and Poland the survey was arranged through the national FADN institutions, in Spain through a survey company specialized in agriculture, in the Netherlands through an agricultural insurance company, while in Germany through a network of professionals in contact with relevant farmers. After the completion of the questionnaires the results were recorded in a computer file that was prepared by the authors. After recording the data in the file, they were sent to the authors and the data have been processed using a statistical software package. The time necessary for completing the questionnaires varied from country to country, but the predefined number of completed questionnaires was received from all selected Member States.

This paper presents some of the findings of the data statistical analysis. Statistical analysis involved the exploration of overall difference among groups (primarily countries) followed by pairwise comparisons of groups to elucidate the differences in more detail, although the length of this paper does not allow us to show all the detailed results of the statistical analyses. In tables containing and comparing proportions of answers in countries, results are based on two-sided tests with significance level 0.05. For each significant pair, the key for the category with the smaller column proportion appears under the category with the larger column proportion. Tests are adjusted for all

pair-wise comparisons within a row of each innermost sub-table using the Bonferroni correction. A similar approach applies to the comparison of interval data where overall differences among groups were revealed by the Kruskal-Wallis test at a significance level of 0.05, followed by a series of post-hoc tests, using the Mann-Whitney test, exploring differences in pair-wise comparisons of groups (using Bonferroni correction). Tables representing these results express the differences so that the key for the category with the significantly smaller mean appears under the category with the larger column mean. Data labelled "Greater than" refer to these pair-wise comparisons in tables depicting interval data.

In Table 4 of this document the notation "Valid cases" refers to the number of respondents who completed the given multiple response question correctly while "n" in each column means the number of respondents within the valid cases who answered "yes" for the given option within the set of possible responses.

Information on the US agricultural risk management situation was adopted from diverse American publications focusing primarily on the most relevant and comprehensive research in the field, the annual Agricultural Resource Management Survey (ARMS) conducted by the United States Department of Agriculture (USDA). The ARMS covers several topics that were also dealt with in our EU 6th Framework Programme research project, so comparisons to a certain extent are possible. Although ARMS is done annually, those publications best suited for comparing the American and European situation were those that present relevant findings based on the 1996 ARMS survey. The difference in the time of the studies herein may call for caution but some aspects of the US situation covered here may not have changed so much during the past years that it would invalidate the comparisons presented here.

If US raw data were not available, detailed statistical analysis was not carried out, so the comparison of the US and European situations is based on already published American findings and the results of our own statistical analyses regarding European data.

It should be added that, from a methodological point of view, measuring risk is naturally not restricted to survey studies. The other major method of measuring risk is the statistical and economic analysis of data extracted from official statistical databases from professional organizations, government bodies, national and international statistical institutions which measure the factual situation and performance of economic sectors in one or more countries. Studies with different research methodologies are not mutually exclusive, and provide equally valuable input toward drawing conclusions.

Results

Risk (crisis) perception and risk (crisis) experience

Farming activity is influenced by a variety of factors prevalent in agriculture. Some factors may be either beneficial for farmers; for example, political measures may prove positive or detrimental. Farmers' subjective judgments on these factors also determine the resources and effort devoted to offset risks. In our survey farmers were asked to subjectively rate some of these factors (Table 1). Factors could be rated from 1 (factor has no effect on farming) to 7 (factor has a major effect on farming).

Table 1

Rating sources of risk
(country averages; 1-3: No effect, 3-5: Moderate, 5-7: Large effect)

	Hungary (A) *Mean* *Greater than*	**Poland (B)** *Mean* *Greater than*	**Netherlands (C)** *Mean* *Greater than*	**Spain (D)** *Mean* *Greater than*	**Germany (E)** *Mean* *Greater than*	**Overall means**
Weather and natural disasters	6.24 CDE	6.41 CDE	5.06 -	5.74 CE	5.41 -	5.77
Animal disease and epidemic	4.91 -	5.19 -	5.98 AB	3.36 -	3.35 E	4.56
Price volatility	5.68 CE	5.55 -	5.24 -	5.48 -	5.35 -	5.46
Marketing difficulties	5.06 BDE	4.05 -	4.69 BE	4.39 E	3.95 -	4.43
Input market	3.98 BCE	2.21 -	3.27 B	3.75 B	3.47 B	3.34
Debt	2.63 -	3.42 A	4.52 ABDE	2.97 -	3.04 A	3.32
Political measures	4.15 B	3.31 -	4.89 ABD	4.07 B	5.23 ABD	4.33
Technological processes	4.22 B	3.64 -	4.31 BD	3.62 -	4.02 B	3.96

Source: Authors' own calculations

Overall averages show that weather and natural disasters are considered as the factors with the largest effect followed by price volatility. In the case of weather and natural disasters, countries fall into three identifiable groups, based on the statistically significant difference of the average rating for this factor. Polish and Hungarian farmers gave the highest ratings to this factor showing that weather and natural disasters have large effects on farming. The Spanish average rating is somewhat lower but still viewed as having a major effect. The third group consists of Germany and the Netherlands where, according to farmers, this factor's is also considered significant, but not to the same extent. Such differences are most probably explained by the different or similar climatic features in the various countries. Of the five countries, Germany and the Netherlands have the most balanced climate so there farmers are less concerned with unforeseen weather situations while in the other three countries such events are more common and make it very hard for farmers to be prepared. That is why farmers in these three countries attach higher importance to weather and natural disasters.

Regarding price volatility, farmers in all selected countries feel that it has a large impact but Hungarian farmers consider price volatility more significant than Dutch and German respondents.

Animal disease and epidemics (in livestock production) are considered as having a significant impact in Poland and the Netherlands, while the same holds true for political measures in Germany, and for marketing difficulties in Hungary.

Table 2 shows the distribution of answers regarding the question previously examined in Table 1. The results confirm some of the previous statements; for example, Hungarian, Polish and Spanish farmers worry most about weather and natural disasters due to their countries' highly

changeable weather conditions. Moreover, it is apparent that animal disease and epidemics concern Dutch farmers the most, corresponding to livestock production's importance in the Netherlands' agricultural profile.

Table 2

Distribution of ratings of risk factors in case risk factors in each country
(% of respondents)

	Effect on farming	Hungary	Poland	Netherlands	Spain	Germany
Weather and natural disasters	No	3.0%	2.0%	17.3%	10.3%	8.0%
	Moderate	16.7%	11.7%	35.1%	20.1%	39.8%
	Large	80.4%	86.4%	47.6%	69.5%	52.3%
Animal disease and epidemic	No	21.3%	16.3%	4.0%	57.8%	52.1%
	Moderate	35.9%	32.0%	24.5%	12.1%	23.7%
	Large	42.7%	51.7%	71.5%	30.1%	24.3%
Price volatility	No	4.5%	7.3%	11.9%	10.8%	2.0%
	Moderate	36.2%	36.9%	39.4%	29.7%	54.5%
	Large	59.4%	55.8%	48.6%	59.4%	43.5%
Marketing difficulties	No	12.9%	34.1%	23.7%	31.0%	39.8%
	Moderate	41.6%	37.8%	38.7%	33.7%	42.3%
	Large	45.6%	28.2%	37.7%	35.4%	18.0%
Input market	No	26.8%	74.1%	57.1%	48.6%	52.9%
	Moderate	60.6%	23.1%	29.8%	19.0%	34.6%
	Large	12.7%	3.0%	13.2%	32.4%	12.7%
Debt	No	69.6%	42.4%	20.0%	63.7%	60.5%
	Moderate	16.2%	45.2%	45.2%	17.9%	26.5%
	Large	14.0%	12.2%	34.7%	18.4%	13.0%
Political measures	No	35.4%	50.1%	14.1%	41.6%	10.5%
	Moderate	42.0%	40.3%	45.5%	26.2%	43.8%
	Large	22.5%	9.7%	40.3%	32.3%	45.8%
Technological processes	No	23.2%	37.5%	25.2%	50.3%	29.9%
	Moderate	60.6%	46.0%	52.0%	22.4%	61.5%
	Large	16.2%	16.5%	22.8%	27.4%	8.6%

Source: Authors' own calculations

Several surveys were also conducted in the United States regarding farmers' perception for different risk factors in the last two decades. The major surveys' findings are well summarized by Harwood et al. (1999). These studies encompassed diverse geographical ranges and groups of farmers when investigating which factors farmers perceived the riskiest or the most significant in terms of affecting their farming activities.

The 1996 Agricultural Resource Management Survey (ARMS) asked farmers to what extent they were concerned about certain factors influencing their farming operations. Farmers had to rate different factors on a four point scale where the value 1 meant the farmer was "not concerned" regarding the given factor and value 4 expressed that the farmer was "very concerned" about the given factor. Table 3 depicts the results based on the answers of farmers expressing the aggregate opinion of all US farmers.

Table 3

Rating sources of risk among American farmers

	Farms in the USA (mean scores*)
Decrease in crop yields or livestock production	2.95
Uncertainty in commodity prices	2.91
Ability to adopt new technology	2.23
Lawsuits	2.26
Changes in consumer preference	2.47
Changes in government laws and regulations	3.02

*1-Not concerned, 2-Slightly concerned, 3-Somewhat concerned, 4-Very concerned
Source: Perry, J. (ed.) (1997): Adaptive Management Decisions – Responding to the Risks of Farming. In Harwood et al. (1999): Managing Risk in Farming: Concepts, Research, and Analysis

When comparing European and US results, it is apparent that some factors were examined in both surveys. In the 1996 ARMS survey "changes in government laws and regulations" ranked as the major influential factor out of the six in question. According to American farmers, the second most important factor was the "decrease in crop yields or livestock production" and the third highest ranking option was "uncertainty regarding commodity prices". In our European survey the highest ranking factor was "weather and natural disasters", the second was "price volatility" and the third was "animal disease and epidemic" (in livestock production).

It is very difficult to compare the American and European results. Even when putting aside the time gap between the two surveys it remains that the rated factors were not the same and an exact match of the sets of questions could render different results. For example, "weather and natural disasters" was not included in the US set of options while it was found to be the most important factor according to European farmers.

On the other hand, it is still feasible to draw some comparisons. If we consider the European questionnaire's "weather and natural disasters" and "animal disease and epidemic" as primary factors resulting in the American questionnaire's "decrease in crop yields or livestock production," then we can see that the decline in yields and production resulting from adverse weather and/or animal disease was the major risk in European agriculture while US farmers rated it second. In the USA and the EU uncertainty surrounding prices or in other words price volatility was ranked very high, just after drop in production showing that price or market risk is of great concern in both locations.

The most surprising finding is that the effect political measures have on farming, manifested by changes in laws and regulations, got the highest rating from US farmers while it was viewed as much less important relative to other factors in Europe. However, we can see that in both surveys farmers assigned more or less the same importance to this factor. In the USA farmers described themselves as being somewhat concerned about this issue while in Europe farmers evaluated it as

only having moderate effect on farming. From the relative ranking of factors in the two surveys, it can be concluded that American farmers considered changes in agricultural policies as more important than farmers in Europe.

During the 1990s, several other studies were carried out in the USA illustrating farmers' risk perception but mostly focusing on different regions and/or different farming activities. The summarizes these findings (Table 4).

Table 4

Studies on most important sources of risk according to questioned US farmers

Authors of study	Time of survey	First 3 highest ranking risk sources	Types of farms surveyed	Surveyed area
Patrick & Musser	1993	1. Injury, illness, or death of operator. 2. Crop price variability. 3. Crop yield variability and changes in environmental regulations.	Grain and livestock farms and ranches.	Corn Belt states
Blank, Carter & McDonald	1992-1993	1. Output price volatility. 2. Input costs. 3. n.a.	Diverse crop producing farms.	California
Jose & Valluru	Mid-1990s	1. Output price fluctuations. 2. Input price fluctuations. 3. Drought.	Crop producing farms.	Midwest and Great Plains

Source: Harwood et al. (1999): Managing Risk in Farming: Concepts, Research, and Analysis

From the above table it can be seen that in general terms output price volatility proved to be of great concern to US farmers as with European producers which was explained earlier.

Risk management strategies

Besides knowing farmers' subjective perceptions on the effect of given factors and experiences related to risk or even crisis, it is highly relevant to identify specific risk reduction methods applied by farmers. In Germany and Spain crop insurance is used by 60 to 70% of farmers, which is more than in the other countries. Livestock insurance is significantly higher in the old Member States (around 40%) than in the newer Member States. Marketing contracts are important in the new Member States and Germany. German farmers are more inclined toward off-farm investments (49.8%) and off-farm employment (36.8%) than those in the other countries. Property insurance is very important in Poland (67.5%), Germany (75.1%) and the Netherlands (66.8%). Avoiding debt (maintaining a conservative debt ratio) is equally important in all countries (around 40%) while holding financial reserves is quite important in Hungary (40.5%), Poland (51.5%) and Germany (61.2%) unlike in the Netherlands (22.6%) and Spain (22.5%). When one examines individual countries, the situation is as follows. For Hungarian and Polish farmers property insurance was the most common instrument (41.5% and 67.5%) followed by financial reserves (40.5% and 51.5%). In Holland avoiding debt is a popular tool (38.1%). In Spain crop insurance was the main risk management instrument (59.2%) but took second place in Germany (68.7%) preceded by property insurance. In Spain, at 36.6% each, livestock insurance and avoiding the use of credit held second place (Table 5).

Table 5

Current use of risk management instruments
(Number and % of respondents using the instrument)

Valid cases HU – 195 PL – 206 NL – 226 SP – 191 GER – 201	**Hungary (A)** *% of cases Greater than*	**Poland (B)** *% of cases Greater than*	**Netherlands (C)** *% of cases Greater than*	**Spain (D)** *% of cases Greater than*	**Germany (E)** *% of cases Greater than*	**Average percent of farmers using the given tool**
Crop insurance	21.5% -	14.1% -	30.5% B	59.2% ABC	68.7% ABC	38.8%
Livestock insurance	4.1% -	6.8% -	37.2% AB	36.6% AB	42.8% AB	25.5%
Diversification	23.1% C	33.5% CD	11.5% -	18.8% -	28.4% C	23.1%
Marketing contracts	38.5% CD	35.4% CD	18.6% -	12.6% -	49.3% BCD	30.9%
Production contracts	15.9% D	16.0% D	20.8% D	5.8% -	16.4% D	15.0%
Off-farm investment	4.1% -	1.9% -	6.2% -	5.8% -	49.8% ABCD	13.6%
Off-farm employment	19.0% D	20.4% D	17.7% D	4.7% -	36.8% ABCD	19.7%
Property insurance	41.5% -	67.5% AD	66.8% AD	29.8% -	75.1% AD	56.1%
Vertical integration	3.6% -	5.8% -	4.4% -	12.6% AC	7.0% -	33.4%
Avoiding credit	37.9% -	40.3% -	38.1% -	36.6% -	31.3% -	36.8%
Hedging	1.5% -	2.9% -	1.3% -	1.0% -	5.0% -	2.3%
Holding financial reserves	40.5% CD	51.5% CD	22.6% -	22.5% -	61.2% ACD	39.7%

Source: Authors' own calculations

For applied risk management strategies, among US farmers the majority of studies concentrate not on the overall composition of farmers' risk management portfolios but rather on the use of specified risk management instruments, and thus compiling a table similar to Table 4 was not possible for all US farmers. In our research two surveys were identified as comprehensive for a applied set of risk management tools regarding US agriculture. The first one, dating back to 1993 (Patrick and Musser, 1997), investigated the trend toward diverse agricultural risk management instruments among large-scale farmers operating in the Corn Belt states. Table 6 indicates the findings.

Table 6

Risk management tools used by large scale Corn Belt farmers in the early 1990s

Risk management tool or strategy	% of respondents using the given strategy
Options	37%
Hedging	60%
Minimum price contracts	21%
Forward contracting	73%
Multiple Peril Crop Insurance	35%
Back-up management/labor	43%
Enterprise diversification	46%
Geographic dispersion	43%
Government program participation	73%
Hail/fire insurance for crops	49%
Off-farm employment	17%
Off-farm investment	43%
Liability insurance	73%
Financial/credit reserves	59%
Debt/leverage management	56%

Source: Patrick, G. F. and Musser, W. N. (1997): Sources and Responses to Risk: Factor Analyses of Large-Scale US Corn-belt Farmers. In OECD (2000): Income risk management in agriculture.

Table 6 shows that the most widely used risk management tools or strategies by large-scale Corn Belt farmers were forward contracting, government program participation, and liability insurance, all three ranking first then came hedging and after financial/credit reserves. These results clearly differ from the ones observed in our European study primarily due to the contents of the sample and the questionnaire.

In 1997, Farm Futures magazine conducted a survey that examined a large range of risk management instruments among US farmers, but the sample was far from representative as respondents were mostly large-scale farmers, 75% of them from the Corn Belt states. Table 7 illustrates the use of risk management strategies or tools derived from this survey.

Table 7 shows that large-scale farmers mainly from the Corn Belt relied heavily on government farm programs, diversification both in products and in time, and on forward contracting. These instruments are also very important in the European Union where EU level and national subsidies are significant sources of income for farmers while diversification and forward contracting are also widely used strategies and tools.

Table 7

Use of risk management instruments by respondents to Farm Futures magazine

Risk management tool or strategy	% of respondents using the given strategy
Used government farm program	69%
Diversified operation by raising crops and livestock	39%
Planted seed varieties with different maturity dates	39%
Contracted inputs to lock in a good price	35%
Bought crop insurance	30%
Used crop-share land rents	25%
Kept a credit line open to take advantage of attractive input prices	20%
Used multiyear leases	16%
Irrigated	13%
Shared expenses with landlord	10%
Refinanced loans to take advantage of lower interest rates	8%
Hired custom operator to reduce machinery expenses	6%
Hired custom operator to improve timeliness of crop operations	6%
Diversified by growing crops not normally grown in the area	3%
Leased equipment rather than bought	3%
Rented equipment rather than bought	2%

Source: Farm Futures magazine survey (1997) In OECD (2000): Income risk management in agriculture.

Marketing channels applied by farmers

Selling agricultural products through contracts or cooperatives is less risky due to provisional factors and conditions. Selling the products individually is probably the most risky way of marketing the products, especially when there is increased competition and the farmer lacks bargaining power. The majority of Dutch (64.9%) and Spanish (53%) farmers stated they sell their products through cooperatives, although individual sales in Spain (43.5%) are also important, as is also the case in Germany where 41.7% of the respondents stated that their primary marketing channel is individual sales. On the other hand, 40.7% of German respondents sell the majority of their products through cooperatives (Figure 1). In Hungary and Poland, which are both new EU Member States, individual sales are still the most important marketing channel with 70% and 60% of respondents applying it respectively. In this regard, there was no statistically significant difference detected between Poland and Hungary. As for selling through cooperates, the same applies to the Netherlands, Spain and Germany group regarding, with the exception for the Netherlands/Germany comparison as in the Netherlands a significantly higher proportion of farmers sell their products through cooperatives than in Germany.

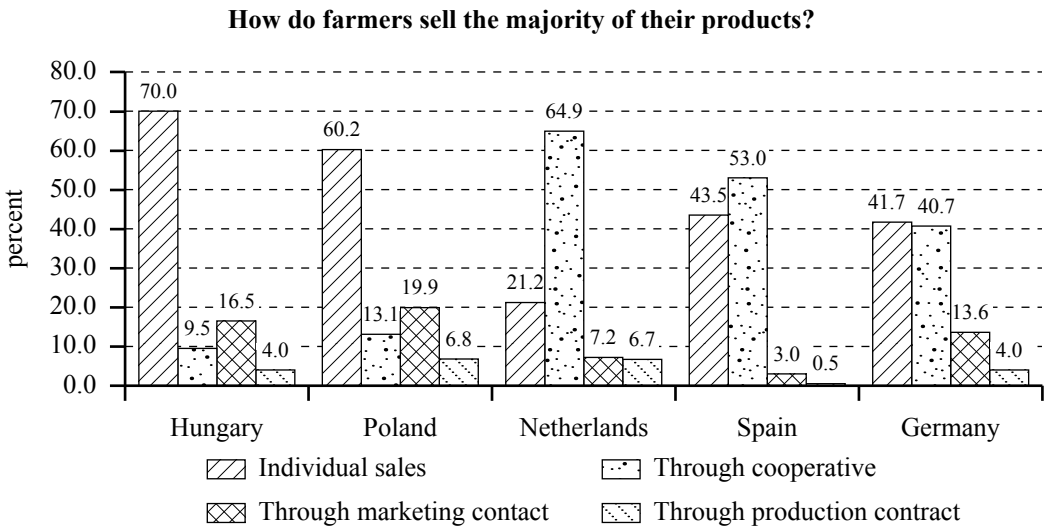

Figure 1: Marketing channels applied by farmers

Source: Authors' own calculations

According to Key and MacDonald (2006) only around 10% of all US farms used contracts (production or marketing) in 2003 which is a trend that has not changed much since the early 1990s. They indicate that larger farms tend to use contracting while smaller farms still rely mainly on cash markets. They found that only 6% of small farms (sales under 250,000 USD) used contracting in 2003 to offset price risk while more than 60% of very large farms (at least 500,000 USD in sales) took advantage of this opportunity. In Europe, however, contracting tends to be more popular (marketing and production combined) with the exception of Spain where contracting has only a marginal role.

Key and MacDonald also describe the advantages of forward contracting which also ameliorates farm operations. They argue that by reducing price risks, production and marketing contracts enable farmers to obtain credit more easily and thus expand their farming operations. Banks also prefer contracting producers to independent ones even when producers are on the same footing financially. As a result, greater financial resources allow contracting producers to increase or expand production while independent producers have to meet their goals without this advantage. However, contracting impedes producers from reacting to sudden changes, both negative and positive, which affect farming.

Financial aspects of farming

Bank loans may greatly help farmers but may also burden them. Debt entails legal and financial obligations that curtail a farmer's power to make decisions and also entails additional risks because the debt has to be repaid within a certain period and thus diverts financial resources from farming activity. Using bank debt to finance operations is widespread in Poland and the Netherlands, where 54-65% of farmers have bank debt and there is no statistically significant difference between the two countries. However, the Dutch project partners felt that the Dutch data (54.2%) are not valid because in their view it is really around 90%. The reason for this discrepancy was not revealed in our study. Germany, Poland and Hungary represent one group of countries as there was no statistically

significant difference found between them. The share of farmers with bank debt in these countries is currently between 18% and 30% (Figure 2).

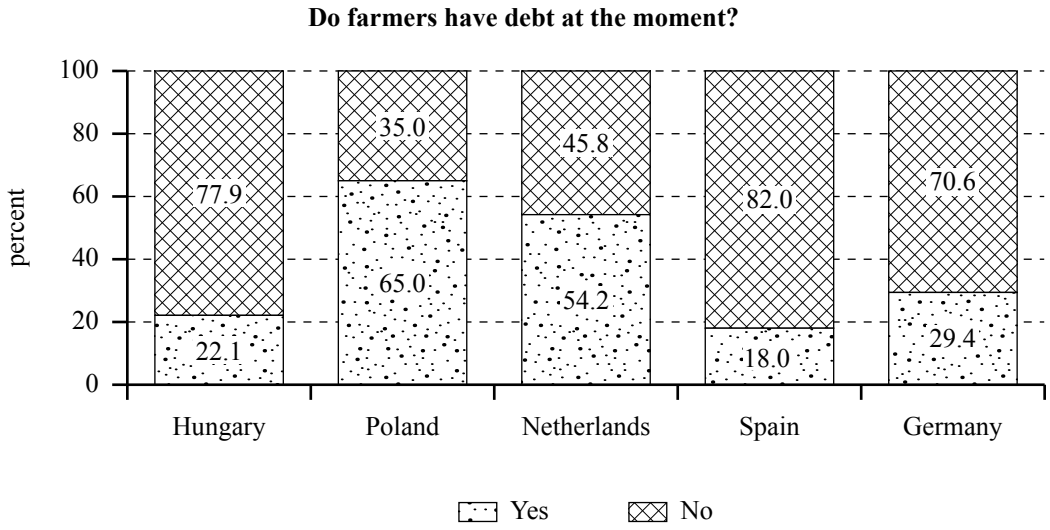

Figure 2: Existence of debt towards bank(s) at the time of completing the questionnaire
Source: Authors' own calculations

The US situation regarding the use of debt by farms was quite similar to the results shown in the above figure, and this especially held true for Germany, Hungary, and Spain as the majority (64.6%) of US farms did not have any debt in 2006 (Covey et al., 2008). The overall trend shows that the proportion of debt free US farms has risen from 57.4% in 2000 to 64.6% in 2006.

Human resources risk

Up-to-date knowledge is provided at professional educational courses and constitutes a viable method for obtaining valuable and directly applicable information. In Germany the vast majority – 76% of farmers – have recently attended such a course and it is 61.8% in the Netherlands. The situation is different in the other three EU countries where only less than 30% of farmers attend such courses with no statistically sound difference detected (Figure 3).

As for US farmers' participation in agriculture related educational programs, a survey was carried out in 1999 in Indiana, Mississippi, Nebraska and Texas with more than 1,800 crop farmers as respondents. The survey researched the participation of farmers in three different types of educational programs whose topics were as follows: using alternative pricing mechanisms (such as forward contracting, futures and options) to market agricultural commodities; use of alternative crop yield or revenue insurance programs; alternative aspects of agricultural and financial risk management. Table 8 shows the results of the survey in and rows represent the topics of the educational programs while columns show the US state to which the result corresponds.

Do farmers participate in any professional educational program related to farming recently?

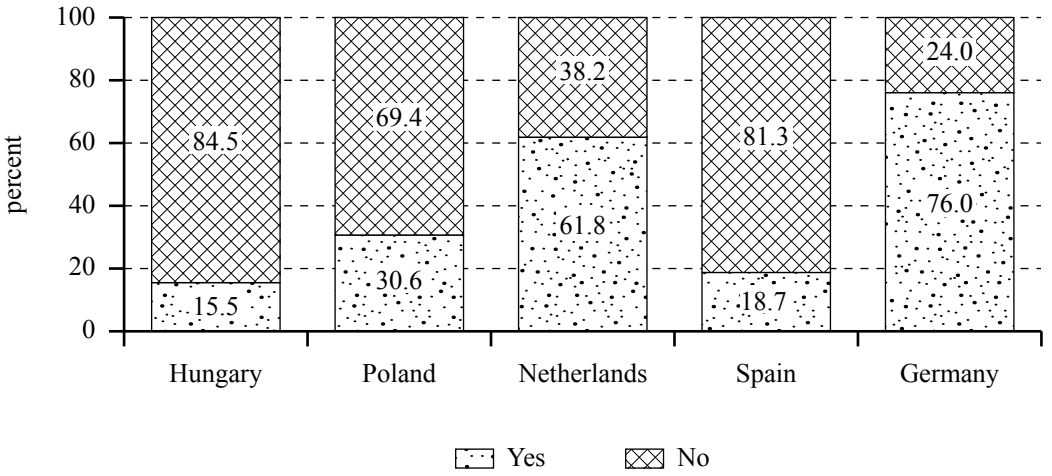

Figure 3: Recent participation in any farming related professional educational program
Source: Authors' own calculations

Table 8 illustrates that the American farmers interviewed above all seek knowledge on alternative pricing mechanisms compared to other topics. The results also show that on average around 40% of both EU and American farmers attended such courses at the time the surveys were conducted. When compared to our European survey, one observes that the American situation does not match any of the EU countries surveyed. These differences may be due to a number of reasons; for example, the different geographical areas and composition of samples rather than only due to the time the survey was completed.

Table 8

Percent of respondents participating in educational programs

	Indiana	Mississippi	Nebraska	Texas	Average
Alternative pricing mechanisms	38.8%	37.4%	49.3%	46.0%	42.9%
Alternative crop yield or revenue insurance	28.3%	23.9%	37.6%	32.1%	30.5%
Agricultural and financial risk management	26.9%	23.0%	26.4%	34.3%	27.7%

Source: Coble et al. (1999): Crop Producer Risk Management Survey: A Preliminary Summary of Selected Data. Mississippi State University.

Conclusions

In this paper we endeavoured to compare the US agricultural risk management profile and practices with the European Union, in the latter case using selected Member States.

Great differences between the USA and the EU were evident in terms of agricultural risk management. These differences derive from the different farming cultures, differences in historical evolution, and economic philosophy. Beside these differences it has to be clearly stated that the European Union cannot to be treated yet as a uniform economic formation due to the great differences in the new Member States' economic situation and farming culture. Moreover, the range of institutional instruments in risk management is greater in the USA than in the European Union as the USA has been designing and applying agricultural risk management policies for a much longer period than the EU.

One of the most important findings of this study is that American farmers considered changes in agricultural politics as being more important than their EU counterparts, although price variability is a major factor for both American and European farmers. Our study also revealed that hedging is far more popular among US farmers than with European ones. However, after viewing both the US and European situation we can conclude that participation in government programs and engaging in diversification are important risk management strategies both in the USA and in the EU. Finally, another significant finding is related to farmers' financial practices. Our study indicates that the majority of both US and European agricultural producers avoid using debt for financing their operations and try to use other solutions like having cash reserves to solve financial challenges.

As a final conclusion it can be stated that the European Union should form a agricultural risk management strategy with uniform guidelines which still take into consideration the individual characteristics and needs of Member States. To this end the US experience can only serve as comparative analysis because differences between the USA and the EU do not allow European decision makers to exactly apply US solutions in the EU.

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The Relationship between Alternative Unemployment Indicators and Agriculture in the Northern Great Plain

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Summary

By adapting the alternative unemployment indicators series (U1-U6), which has long been in use in the United States and in many European countries, the authors endeavour to create their own indicators series using the Hungarian national statistical database as a basis to evaluate the results. This is performed both on the national and regional levels, meaning the socially and economically disadvantaged Northern Great Plain Region which is compared with the developed Western Transdanubian Region. The authors also attempt to establish a relationship between problems caused by unemployment in the Eastern part of the country and agriculture.

Keywords

measurement of unemployment, alternative unemployment indicators, Hungary, Northern Great Plain, Western Transdanubia, agriculture.

Introduction

When it comes to those effects linked to the economic transition and the present day global financial crisis, clearly no area has been more vulnerable than labour. Privatization and the subsequent radical change in ownership patterns entailed profound restructuring in the economic structure and the liquidation of unprofitable companies using outdated technologies (Berde, 2003). Under such conditions – mainly in the early 90s – large numbers of workers lost their jobs. Of the three domestic economy sectors (agriculture, industry, services), the primary sector was hit hardest both in social and economic terms. In agriculture, the end of the state imposed full employment policy of the cooperatives uncovered hidden past unemployment (Szabó, 2001; Hamza et al., 2001). In 2007 among the EU-27, an average of 5.8% of the employees were employed in agriculture. On this list Hungary was ranked 14th (with Belgium the lowest at 1.9%, and Bulgaria the highest at 19.4%, which means that 4.7% of the 15-74 age range population (183 thousand persons) were employed in agriculture, whereas in 1992 the average was 11.4% (460 thousand persons) (EUROSTAT, 2008). These statistical data show that in Hungary over the past 15 years the number of people *employed full-time* by agricultural companies or cooperatives and individual farmers dropped by 277 thousand (KSH, 2008b). The labour market was only able to absorb part of these jobless persons, and this only gradually and within a narrow framework. A large proportion of the dislocated people became unemployed, or opted for early retirement. Due to a lack of alternative qualifications, and hampered by their age and health, these citizens often were reluctant to retrain and fell into pessimism and despair. Processes linked to the economic transformation had a different impact in different parts of the country, and ultimately reinforced the ever existing differences in social and economic development between the country's regions. In many respects one of the most disadvantaged regions of the country is the Northern Great Plain Region, where in 1992 16.0% (85.0 thousand persons) in the 15-74 active age bracket were employed in agriculture, but by 2007 this plummeted to 7.4% (38.8 thousand persons) (KSH, 2008b). Despite the decrease over the past 15 years, this region produced the lowest decline in terms of average agricultural employment over the four years before and

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after Accession. At the same time, the standard unemployment rate in the Eastern part of the country in 2007 reached 11.4%, which was 4% higher than the domestic average of 7.4% (KSH, 2008b). In the EU, these unemployment rates mean Hungary ranks 20th among the EU-27 countries (Holland having the lowest rate of 3.2% and Slovakia having the highest of 11.1%) (EUROSTAT, 2008). As an indirect consequence of the current financial crisis, unemployment is expected to continue to grow. In his study Gábor indicated that fluctuations in economic trends (the current recession) are strongly tied to the labour market. More specifically, they have a negative effect on the ratio between the number of employed and unemployed (especially discouraged) people (Gábor, 1998). This is the aspect that links our research to employment policy and other policies associated with it (e.g. social, economic, financial, education etc. policies). In our paper we hypothesize that besides the standard unemployment indicators used over the past years some other alternative indicators describing the Northern Great Plain Region also revealed a more negative trend than those characterizing the more developed Western Transdanubia. Regarding some alternative unemployment indicators, if possible, we will extend our research to agriculture.

Database and methods

In 1992 the Hungarian Central Statistical Office (KSH) launched the Labour Force Survey (LFS). This survey followed recommendations by the International Labour Office (ILO) and was designed to take measurements and make comparisons regarding employment and unemployment data consistent with international standards. This survey has become the principal source of information on employment and economic activity (KSH, 2006). While the *KSH uses a single indicator to describe the range of unemployment*, countries in Western Europe tend to follow the US example and apply several well-defined indicators. In 1972 the US Bureau of Labour Statistics (BLS) developed the U1-U7 series of indicators to measure alternative unemployment. In 1994 this was modified to reduce the original number of indicators to six and to assign new content to some of them (Bregger et al., 1995). These alternative indicators supplied additional information on unemployed persons likely to obtain short-term employment, and also defined the range of discouraged workers.

Since in Hungary no such measurements are taken, to develop our own domestic U1-U6 indicators we used the questionnaires and the respective annual and quarterly databases produced by KSH between the first quarter of 1994 and the fourth quarter of 2005. When processing the questionnaires, we strived to adapt the American indicators to the Hungarian practice rather than to precisely imitate them. The six indicators developed in this way (Bregger et al., 1995; ILO, 1982; Kerekes, 2007; Kerekes, 2008; KSH, 2006; Nelson, 2007; US BLS, 2008 based on literature data) are as follows:

- Indicator U1: shows the rate of the long duration unemployed population compared to the active mass of (15-74 age range) population.
- Indicator U2: shows the rate of those who lost their jobs but, for example, who wanted to keep their jobs
- Indicator U3: the standard unemployment rate calculated as recommended by the ILO. The ILO recognizes unemployment in terms of three criteria: an individual in the sample is recognized as unemployed if: (1) he/she did not do any work in the week of reference, and was not just temporarily absent from a given job, (2) he/she was actively searching for a job in the four weeks prior to sample taking, (3) he/she could start a job within two weeks should they find a suitable one (i.e. they were available).

- Indicator U4: the standard unemployment rate extended by discouraged (passive) workers. The group of *discouraged workers* is very close to that of the unemployed, meaning they wanted to keep their jobs. They satisfy three criteria: (1) they did not do any work in the week of reference, nor did have a regular job they were temporarily absent from, (2) they would have liked to work, but *were not actively searching for a job*, because they did not believe they would find one partly due to the lack of job availability (i.e. a job they were qualified for) in the job market, or due to their personal inability (they lacked the necessary qualifications, they were too young or too old for the job), (3) they could start a job within two weeks should they find a suitable one.
- Indicator U5: U4 extended to those marginally attached to the job market, and compared to the population of active workers. Marginally attached workers are those who do not have jobs at the present moment and are not looking for one, because certain conditions do not allow them to do so (family, health reasons, young children). At the same time they express their willingness to find a job, as they had done previously.
- Indicator U6: this is an indicator with the widest range, i.e. the range of U5 is expanded by those who, because of certain economic reasons, can do less work than they would like to. This indicator includes adding persons employed part-time.

Supplement 1 shows the survey's relevant questions on the questionnaire referred to when determining the individual indicators and the description of the denominators and numerators of the indicators.

Results

Below we first provide analysis of the indicators at the national level, then compare the unemployment indicators of two regions: the industrialized Western Transdanubia and the Northern Great Plain which has a strong agricultural profile.

The analysis of the indicators at the national level

OECD work science specialists indicate that it is not heresy to postulate that the drastic 1990s slump in Hungarian economic activity can substantially be attributed to feelings of hopelessness among workers. Very few Hungarian scientists have endeavoured to investigate the phenomenon of discouragement. Among those few we cite Gábor with whom we strongly concur: *"The most radical argumentation in this debate states that only the aggregate sum of the unemployed and the discouraged can truly describe the severity of the unemployment problem. Even those who hold less radical opinions agree that as a consequence of the automatic exclusion of the discouraged from the surveys, the unemployment statistics of the market economies supply the political decision makers with biased data. Furthermore, even the most moderate debaters accept the arguments (a practice followed in many developed market economies) that beside the unemployed, the number, the socio-demographic profile and economic status of those who are formally inactive in economic terms, but are "marginally attached to the labour market" ("latent unemployed" or "temporary workers") needs to be regularly monitored separate from other populations not present in the labour market."* (Gábor, 1998:370).

These reservations are backed by the fact that the inter-country dispersion of indicator U4 (which includes discouraged workers too) is significantly lower than that of the standard unemployment rate (U3) which does not include them. This suggests that the ongoing and remarkably good unemployment rates of certain countries – see Hungary as an example – is in fact erroneous, due to

a different nature in the structure of their unemployment and the higher frequency of discouragement. In a country like Hungary, where both employment and unemployment rates are low, it is equally important in terms of economic and employment policy to investigate the reliability of these reservations. If the discouragement referred to above is in fact valid, in the future it will clearly not be enough to significantly increase job availability – as follows from recent unemployment data – in order to produce a given target in unemployment rates. Special employment policy programs – urgently needed in the agricultural region of the Northern Great Plain – will need to be activated to reduce the obstacles discouraged workers face in terms of re-employment.

Between 1989-1999, Ireland, then an EU member, had to deal with similar problems. Among the problems were constant and high unemployment (especially among rural dwellers), the low profitability of farm-work, a scarcity of alternative job possibilities, the migration of skilled workers, and poorly qualified people. However, Ireland managed to extricate itself from the economic morass by shrewd allocation of funds in the production sector, economic infrastructure, human resources, and rural development. In the time periods 1989-1993 and 1994-1999 the allocated funds derived from the Community Support Framework, and from investments from international active capital. During the 1994-1999 time period, the production sector and rural development received 58.0% of the funds of which 80% was allocated to agriculture, fishery and tourism. Economic infrastructure received 19.0% and human resources 23.0%. In the period prior to that, 35.7% of the funds had been allocated to human resources development in order to reduce unemployment (Forman, 2005). This indicates that low standards of skilled work were identified as one of the major causes of unemployment, if not the most significant cause. To solve the problems of rural unemployment, one has to develop agriculture. In this regard, with a focus on local potential and constraints, they subsidized enterprise modernization, and the establishment of food processing enterprises, which contributed to higher rural living standards. This was done through raising the added value of produce and creating new jobs, further-training courses for farmers, plus the establishment of silage reservoirs, forestation of disadvantaged areas, rural tourism, etc. This was the beginning of the "Celtic Tiger".

Figure 1 shows the values of the alternative indicator series (U1-U6) at the Hungarian national level from 1994-2005.

U3, which is the KSH indicator, shows the standard unemployment rates. The range of this indicator is narrowed by U1-U2 and extended by U4-U6. One sees, with some fluctuations, that from 1994 to 2004 the lines run parallel; however, global unemployment tends to decrease. In 2004 the line begins to rise, i.e. the indicators follow the cyclic changes in the economy.

¾ of the standard unemployed (U3) in Hungary are unemployed for a long duration (U1), a population group whose rate has slowly been growing over the past years. According to US terminology statistics, long duration unemployed are persons with no job for 15 or more weeks, whereas in Hungary the KSH baseline is 12 months. We contend that, given Hungarian economic conditions, 12 months is too long a period for an individual to survive without mental, physical and intellectual suffering. The suffering is even worse if the jobless individual has to support a family. Given this fact, and utilizing indicators used in the USA, plus aspects of domestic Hungarian surveys, in our survey we categorize long duration unemployed as individuals who were without a job for more than 15 weeks in 1994 or for more than 3 months after 1995.

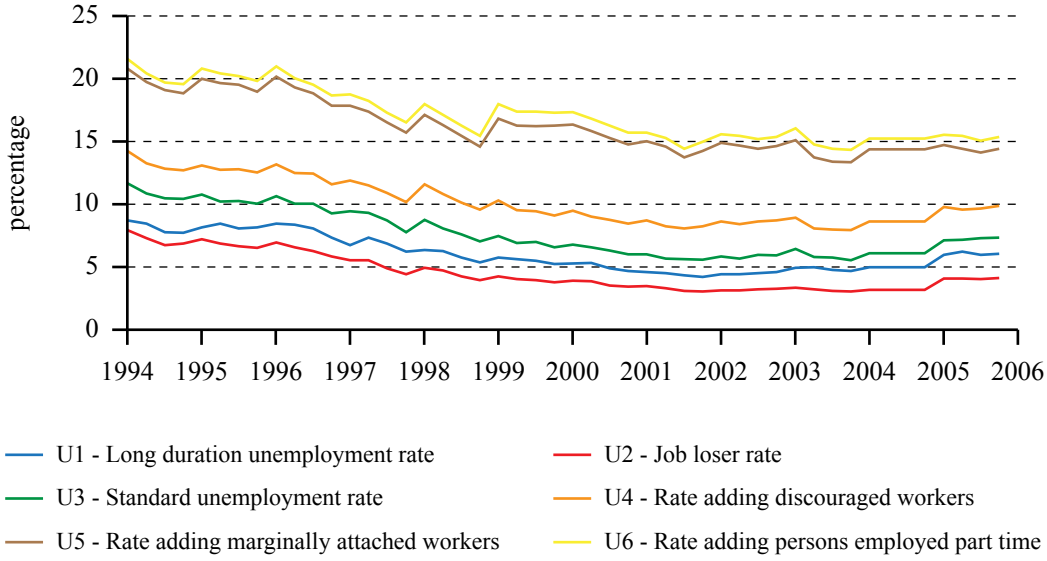

Figure 1: Alternative unemployment indicators in Hungary from 1994-2005
Source: Authors' Own development on the basis of KSH, 2008a

60-70% of the standard unemployed come from those who lost their jobs (U2). This category does not involve those who voluntarily quit their jobs, first job finders or those who became reemployed (US BLS, 2008).

Category U4 is an extended version of the standard unemployment indicator (i.e. the discouraged). This indicator **allows one to estimate the number of inactive workers. Between 1994-2005 some 100-130 thousand people annually** thought there was no hope in finding reemployment, and most of these were men. For them the negative relationship between unemployment duration and successful reemployment can originate from the degradation of their skills or from the stigma of long duration joblessness[3]. The cause could also be that the better qualified are more mobile or more determined to find a job, and are thus looking harder for work, which means they are more successful (Hughes et al., 1990).

The Institute of Economics of the Hungarian Academy of Science's research team posits that the U4 indicator rate will decline because many of the discouraged elderly unemployed will retire, and these people are fairly numerous. Among them are those who lost their jobs after the political/economic transition when demand for labour plummeted and was accompanied by a radical change in the professional-occupational-regional structure of the job market. After long periods of being unemployed, they gave up hope of finding new jobs and in economic terms became inactive. With these people gradually approaching retirement age, the rate of discouraged workers will automatically decline (Gábor ed., 2005).

Individuals in this group should be treated by current employment policy makers as potential human resources. Through retraining and realistic targets, they could reenter the work force since they are willing and ready to start work within two weeks. If these people had been provided jobs, at the end of 2005 the level of employment could have been raised by some 100-130 thousand people

[3] It originates from the stigmatizing effect, i.e. because of the discriminative attitude of the employers it is more difficult for them to get job offers which, in turn, lower the efficiency of their job finding attempts.

at the national level, which means that the employment rate could have been improved by 1.3-1.7 percentage. Of course this is purely theoretical as we do not contend that the totality of discouraged workers can serve as an additional basis for the future working population. Although there will always be discouraged people, many of them could and should be urged to take up work.

Marginally attached workers (the majority of which are women) entail 7% of the inactive category. The graph shows that on **the U5 scale,** which incorporates the **marginally attached workers,** almost equals the standard unemployed scale (U3) in the fourth quarter of 2005 (7%). The estimated number of people in this category combined with the discouraged is 260-300 thousand. While the KSH classification involves marginally attached workers in the group of the inactive population, in our indicator series we consider them alternatively unemployed workers, since an individual may be inactive at a given period for more than one reason: either because they cannot find a job or the KSH no longer lists them as unemployed.

As during the past ten years, in year 2005 **40-60 thousand people** in Hungary would have liked to work more hours than they actually did. **This small group's desire to work should be embraced so Hungary does not lose part of its available human resources.**

Regional level investigations

Among the official regional unemployment rates, there exist significant deviations in terms of counties and settlements across the country. There is a noticeable difference in social and economic development between the Western and Eastern regions (Szabó and Katona-Kovács, 2008). While the Eastern region is and has traditionally been a leading power in agriculture, in the Western part services and industry play a much more significant role. After the political/economic transition, the western part of Hungary attracted much of the foreign capital, thus increasing the share of services in the labour market. In the eastern part of Hungary, earning a living became difficult, especially for those who lived on agriculture: Soviet markets disappeared, cooperatives ceased to employ a lot of people, and there were problems due to abuses in the compensation and privatization schemes. There was little will to invest which meant few employment opportunities, causing job losses. As a member of the European Union, the Hungarian government lacks the power to allocate domestic resources for investments that specifically target social and economic upgrading of disadvantaged regions like Hungary's Eastern region. One can presume that in this region communities, enterprises or individuals have much less chance of obtaining EU resources than those in western Hungary since they lack their own private capital, skilled workers, and expertise.

Below, we continue to demonstrate the alternative unemployment indicators of two regions (Figure 2), the less developed Northern Great Plain Region and the most developed Western Transdanubia, stressing the sharp differences between the data. When analyzing these indicators at the regional levels, it is necessary to gauge the role of the three national economic sectors (agriculture, industry, services) in the economy and employment. The first thing that strikes the eye when examining the graphs is that all of the unemployment indicators in Western Transdanubia are sharply lower than in the Northern Great Plain Region. The differences are especially striking between the respective rates of standard unemployment (U3), of those adding discouraged (U4) and marginally attached workers (U5).

The graph also shows that following the national tendency, **90-95% of the standard unemployed** (U3) in both regions **are long duration unemployed** (U1), whereas **60-65% come from those who have lost their job** (U2).

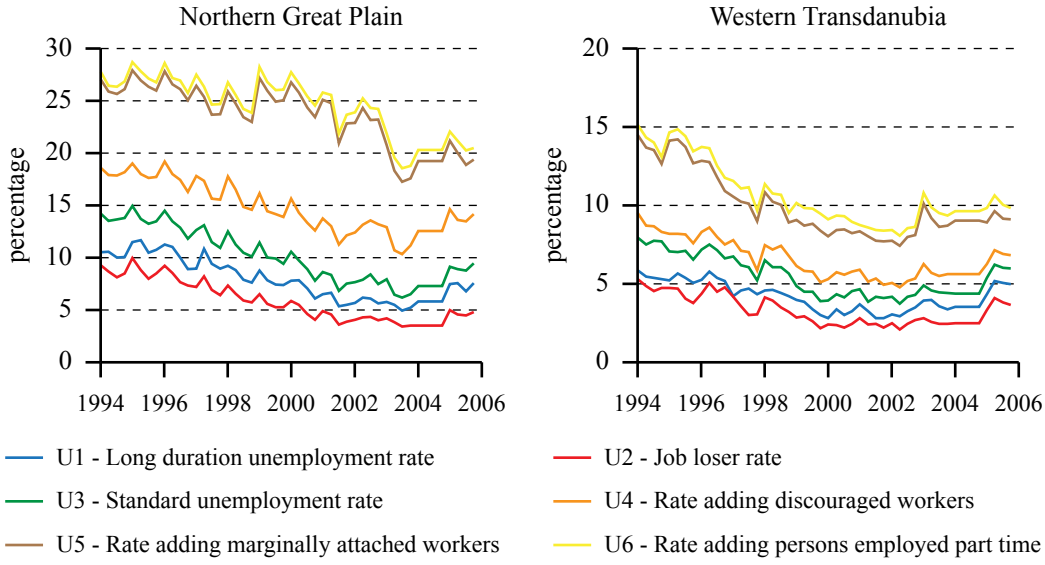

Figure 2: Alternative unemployment indicators in the Northern Great Plain and in Western Transdanubia between 1994-2005

Source: Authors' Own creation on the basis of KSH, 2008a

The discouraged workers rates (U4), however, differ significantly between the two regions. While **in the Northern Great Plain Region it approximates 15% (cca. 25-28 thousand persons), in Western Transdanubia the rate is half that magnitude.** As early as 2003, the rate of discouraged workers in the Northern Great Plain Region shot up, and EU Accession accelerated this trend. This was because Accession not only failed to lift existing industries, but many factories in fact closed and ended production. And not only industries suffered; those working in small agricultural enterprises, or as individual farmers, or involved in part-time farming to boost their incomes, all saw their livelihood dwindle. In animal production, quotas were introduced; labour-intensive activities like animal husbandry, crop, fruit and vegetable production were not subsidized by Community funds or merely received minimal funding. As they lack their own capital and economy of scale, competition as a means of generating subsidization is not a viable alternative for small and medium-size farm owners. As a result, many – especially individual poultry and pig farmers-abandoned farming. This process, unfortunately, is far from over. The reduction in agricultural activities and the radical decline of associated processing industries (e.g. A sugar factory in Kaba, and the HAJDÚ-BÉT poultry processing stock share company) affected the region very adversely. These people suffer not only mental or emotional damage, but their physical conditions are also badly affected, leaving them with health problems, depression and poverty. These problems escalate and feed on each other, and problems that were once "simple" employment issues accumulate into problems that cry for social and health care intervention. *The documented consequences of the high rate unemployment in the Northern Great Plain Region are evident:* resulting in a worse than the national average health status and a shorter life expectancy. It is not just an indicator we should see, but people, their lives, potential, constraints, and health. This indicator is much more than a measurement, it outlines a multitude of unemployment-related problems which need to be solved.

The marginally attachment worker rate (U5) **in the Northern Great Plain Region is also twice as high as elsewhere,** which is understandable given that their average life conditions are worse than in western Hungary. Because of this health problems will render many people unemployed, but perhaps only temporarily. However, unemployment will mean that others will take to relying on child care allowances and other types of allowances, the latter especially common in Roma families. This indicates that, in the region, **the estimated number of potential job takers from the total number of the active age population is some 25-29 thousand.** We contend that a significant proportion of this group should be reintegrated into the labour market through various attractive training or retraining programs.

There were recurrent overlaps over the past ten years between indicators incorporating persons employed part-time (U6) and indicator U5 in the Northern Great Plain Region. The presumption is that due to scarcity of work and high unemployment in the region people do not typically consider part-time jobs a real alternative. This, of course, is not true for those who do farming as an additional activity to make extra income or for those whose aim is to provide self-sufficiency. This category incorporates "primary producers" and that part of individual farmers who also have full-time jobs.

Conclusions

The cluster of alternative unemployment indicators is substantially more informative than only the standard unemployment indicators published by the KSH. Our hypothesis that in recent years alternative unemployment indicator rates produced a more negative picture in the Northern Great Plain Region than in Western Transdanubia has undoubtedly been proven. One of the underlying causes is the significance of the geographical situation and the industrial or agrarian character of the two regions. As it was pointed out by Béres-Mártha, the higher the unemployment rate in a given region, the higher the number of those unemployed. In this regard, our study paid special attention to the discouraged who farm primarily to survive rather than for market aims (Béres-Mártha, 2008). Additional information would enable KSH analysts to define the magnitude of these alternative indicators (U1-U6) at both regional and national levels. This would prove especially useful for employment policy makers since they must have access to all relevant data when they are preparing their quarterly unemployment surveys. Since the indicators can be further specified (gender, education, type of aids received), this would allow specifying the nature of employment instruments required and to fine-tune the allocation of related sources among Hungary's regions. This would permit more efficient development in those areas where unemployment problems are extremely severe. **We believe that the practical application of the information expressed by the indicators would not only support decision making at regional and national levels in human employment issues and in the allocation of rural development resources, but could also serve as a database of reference for the modernization of our educational system, which is to be closely integrated with employment policy. We recommend that alternative unemployment rates should be regularly calculated and published.**

Supplement 1

Summary table of Hungarian U1-U6 alternative unemployment indicators

Indicator		
category	**numerator**	**denominator**
U1 – Long duration unemployment rate	Those of ILO unemployed who: 1994: were seeking for a job for more than 15 weeks; 1995-2005: were seeking for a job for more than 3 months	ILO employed + ILO unemployed
U2 – Job loser rate	Those of ILO unemployed who: 1994-2005: lost their jobs (lost work place, position, or other reasons), own enterprise bankrupt, seasonal, preliminary job finished	ILO employed + ILO unemployed
U3 – Standard unemployment rate	**1.** The previous week did not do at least 1 hour paying work. **2.** does not have a job he was away from the previous week; **3.** was looking for a job during the past 4 weeks; **4.** was enquiring at the job agency, with a private job agent, personally contacted employers, advertised, responded to job ads, read job ads, enquired with relatives, acquaintances, applied for public servants jobs, was busy doing official/bank paperwork to start an own business, was looking to buy land, plot, shop, was writing tests, gave exams, went to an interview; **5**. could start a job within 2 weeks.	ILO employed + ILO unemployed
U4 – Rate adding discouraged workers	ILO unemployed + **1.** would like to work; **2.** Does not think can find a job in his trade in the neighbourhood, there are too many unemployed, does not have the necessary skills, is too young, too old.	Numerator + ILO employed
U5 – Rate adding marginally attached workers	First two criteria of ILO unemployed + would like to work.	Numerator + ILO employed
U6 – Rate adding persons employed part time	First two criteria of ILO unemployed + **1.** Would like to work; **2**. 1994-1998:No full time job, lack of vacancy; 1999-2005: Yes, would like to have a parallel second job, or one to replace the current full time job to make more money, or in the frames of current job, or in any one way.	Numerator + ILO employed

Source: Bregger et al., 1995; US BLS, 2008; Kerekes, 2008; KSH, 2008a

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A wine market and marketing analysis of Wine Specialities from the Tokaj-Hegyalja Wine District

Szakál, Zoltán[1]

Abstract

Tokaj Wine Specialities have few competitors and enjoy a rare niche among natural dessert wines since traditions surrounding their preparation, their specific microclimate, and unique taste enable one to utilise marketing tools for branding and market placement. To elaborate the marketing strategy, one needs market information that adequately shows the current situation and trends. During my research, I carried out segmentation for Tokaj Wine Specialities consumers and illustrated the correlations with statistical methods. My research covered the North-Alföld Region and Budapest. I performed a reliability test on the research databases and demonstrated that the areal data set can be integrated. My hypotheses findings also constitute new research.

Keywords

wine marketing, dessert wine market, market segmentation, consumer behaviour

Introduction, objective

Some of the world's wine-growing regions have a special microclimate and other individual traits which create wines of special quality and offer dessert wines of a unique taste and flavour. The **origin-protected name of "Tokaj"** means production of a superb and unparalleled product called **Hungarica**. The product holds a special place in Hungarian national wine mythology and Hungarian wine-growing. The national anthem also refers to this national treasure which can be produced only in the historic wine district of Tokaj-hegyalja thanks to that location's microclimate and special technology. Tokaj Wine Specialities are: Tokaj Aszú, Tokaj Szamorodni, "Máslás"[2], "Fordítás"[3], Late Harvest Tokaj Wine Speciality. Tokaj wine's value stems from the harmony of its rare quality, the limited quantity and its historic roots. Carrying the nation's reputation on its shoulders, these products should be marketed not only in Hungary but also abroad. It is no longer feasible to think that over the long run that a single product can carry the load so the purpose is to develop and sell several products or services with maximal customer satisfaction. Hungarian producers and investors have also found their feet and are now able to compete.

The **purpose of this study** is to provide an overall picture of **the Hungarian wine specialities' market position**. The direct purpose is to outline the market of Tokaj Wine Specialities, and study (verify or refute) the statements of the hypotheses. The indirect purpose is that the efficiency of the scientific methods is proved again in the theoretical and practical application.

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[2] This Tokaj Wine Speciality is produced from must poured onto the lees of szamorodni or aszú, or from wine of the same year through alcoholic fermentation, and has a characteristic aging scent and taste, and is aged for a minimum two years prior to the distribution, one year of which in wooden barrels.

[3] This Tokaj Wine Speciality is made from must poured onto mashed aszú grapes and originating from a certain habitat, or from wine of the same year through alcoholic fermentation, and is aged for a minimum two years prior to the distribution, one year of which in wooden barrels, and has a characteristic aging scent and taste.

Hypotheses:

H1 **Method relevance**. The practical applicability of the cluster analysis may be verified by subsequent focus group tests. Providing a certain framework, the qualitative procedures preceding the research and the latter-mentioned procedure underlie the concrete results.

H2 **Integrating regional research.** The wine consumption and wine purchasing habits of Budapest and North-Alföld Region are different concerning Tokaj Wine Specialities, so the samples taken in two locations cannot be integrated.

H3 **Studies of interrelations.** The purchasing and consumption of Tokaj Wine Specialities is related to the age, sex, income, educational background, and the consumer's expertise when it comes to wine.

H4 **Inclination to determine the price.** During purchasing, the price is the most important aspect, where there is no difference between the admitted and the actual reference price.

H5 **Market segmentation**. The sample (n = 1,179) is suitable for segmenting. Therefore, there are criteria that enable the creation of a target group.

With proper marketing techniques, naturally made dessert wine specialities can be sold anywhere in the world, and fetch even a higher price. And Tokaj Wine Specialities are no exception to this. In the technical literature, there is hardly any market research on Tokaj Wine Specialities. Five years have passed since I published my own research dealing with Tokaji Aszú, in which the wine speciality's market properties were studied. This research shows that those who love Tokaji Aszú as well as other wines, are split in half. In the latter case, Egri Bikavér is among the leaders. It can be established that the majority (85%) only occasionally purchases aszú. Regular customers are in minority, their proportion approaching 15% (Szakál, 2002).

61% of the sample buy aszú primarily as a gift, while 39% for their personal consumption. Tokaji Aszú is particularly popular during the Christmas holidays, but it is also a popular during family celebrations (23%). These family celebrations include birthdays, namedays, and other gatherings. Only 12% of the consumers purchase wine at Easter and on New Year's Eve. Only 4% of the sample drink Tokaji Aszú on Whitsun (Szakál, 2003).

The majority (47%) shop at shopping centres, and supermarkets; 22% at wine shops and 16% in discount stores. Fewer customers go to mini supermarkets, convenience stores and wineries. The former rates 10%, the latter about 5%.

Most people spend an average amount of HUF 1,500-4,000 annually on Tokaji Aszú (44%). 17% of the sample spend less then HUF 1,500 for this purpose. Customers spending between HUF 4,000 and 8,000, and more than HUF 8,000 represent nearly the same proportion, some 20-20%. Clearly, the wine speciality in question is primarily sold at shopping centres. Most people spend less than HUF 4,000 annually on Tokaji Aszú wines (Szakál, 2002, 2003).

According to Piskóti (2002), in Hungary it is possible to summarise the consumption of sweet wines, especially Tokaj wines, in the following points.

- Consumers purchase these wines for special occasions, and consume it with dessert.
- The Tokaji Aszús, created by new, leading Tokaj wineries and producers, is capable of winning over wine devotees.
- Tokaji Aszú entails a rich cultural and historical tradition for most Hungarian consumers.
- The great majority of Tokaji Aszú has always been consumed abroad.

Around the world Tokaj Wine specialities have several competitors, but only some of them constitute a genuine competitive threat. In the Hungarian domestic market, Tokaj Wine Specialities have no real competitors owing to the price-sensitive wine consumer and the developing wine culture. Nevertheless, it is only a question of time and marketing work before replacement products will enter the internal market. It is the geographical location, the marketing work, and historic roots that will determine whether aszú wine will be a market leader. The closest relatives to Tokaj Wine Specialities are the so-called "Predikät" and "Ausbruch" wines produced by the **Austrians**. Other similar well-known dessert wines are made in **Germany** (Mosel-Saar-Ruwer region), **France** (in Sauternes), **Slovakia** (from the vineyards of three villages), **South Africa**, **the USA** (Napa Valley, California), **Canada** (primarily the ice wine category), **Australia** (Hunter Valley, Barossa Valley). Moreover, aszú wines and ice wines can be produced in a number of countries, but they rarely are, and they basically have the world market cornered. The challenge Tokaj Wine Specialities face is holding their ground in this field and achieving the best market share and recognition possible using an appropriate market policy (Knoll, 2000).

Hajdu (2004) establishes that wine marketing is a combination of marketing and wine science, where the marketing methods, attitudes, and concepts are vital, and basic oenology also essential. According to Lehota – Fehér (2007), this means enterprises dealing with oenology and distribution to the market environment must learn to adapt. The technical literature divides this material into two parts: marketing as a descriptive discipline and marketing management focusing on planning and execution.

The field of wine marketing covers the following main issues:

- needs and demand,
- products, goods, services and ideas,
- the exchange, transactions, market actors, and the relations between them (power, confidence, conflict, common value, commitment, etc.),
- performance indexes (cost, profit, value, satisfaction, etc.),
- marketing means, the elements of the marketing-mix
  (Lehota and Fehér, 2007; Gosch, 2003).

According to Szakály (2007), the domestic food economy faces no problems that cannot be solved by creative marketing. This can apply to an entire sector, including the wine sector. Research carried out by Fowler (2000), Lockshin (2003) shows that income drives the wine purchaser's behaviour. Reisezenstein et al. (1980) point out that the consumer's decision is primarily related to price and oral advertising. Cox – Rich (1967), Dodds – Monroe (1985), Monroe – Krishnan (1985) used price when analysing Australian wine consumers as a segmentation criterion. According to Rekettye (1999), it is the proportion of the perceived value,which is especially important concerning Tokaj Wine Specialities, the perceived utility of the product, and the perceived consumer expenditures. The accurate specification of perception and sensation would largely promote the consumer's value perception. Consumers generally assess the actual price by comparing it to other prices directly available and their recollection of prices related to the given product.

Lakner-Sass (1997) contend that in export markets it is not enough to merely advertise certain products, but one should also ensure that Hungary and Hungarian agriculture conjure up positive sensations, and only then can one start promoting the product's image. The key to a sector's competitiveness is quick and efficient communication.

Szabó (2007) supposes that during wine marketing research it is essential to conduct a detailed study of the marketing-mix elements. The distribution channel is a decisive criterion when selecting the correct marketing activities. According to Heijbroek's (2001) data, in most EU Members States chains entail 40-70% of the wine trade, and this figure is expected to increase. Löffer-Scherfke (2000) and Holland (2004) state that the significance of direct marketing will grow.

A bibliographical survey shows that the technical literature on wine marketing concordantly discusses, proves and supports certain marketing – mix elements, but in practical terms companies cannot take full advantage of these possibilities. Such a study would fill a void, as no such comprehensive research material specifically focusing on Tokaj Wine Specialities has been written and the consumer segments have not so far been defined.

The research methodology

During our research, we applied random sampling techniques, and anyone could enter the sample. In the questionnaire, taking all question combinations into consideration, the types of survey levels were the following: 62 nominal, 23 ordinal, and 20 scale samples. We used open and yes-no questions, combination tables, and multiple choice questions. In several cases, an order of ranking aided the research work. Several of the questions are linked to each other, and I checked these to ascertain the reliability of the given questionnaire.

The consumer research primarily aims to outline the consumption habits concerning the Tokaj Wine Specialities in the region under survey. This research was conducted in the North-Alföld Region and Budapest. The surveys were compiled in early 2006, based on the following venues: hypermarkets in Debrecen, Nyíregyháza and Szolnok (Tesco, Interspar, Cora), busy public areas in the county seat and other areas of the region, educational institutions, at the West End City, Pólus Center, and busy public areas, plus educational institutions in Budapest.

Representativeness in the statistical sense means that by random sampling the rate of the basic criteria of the population must be equal to the rates of the sample. The high number of elements (n = 1,179) guarantees that each customer group purchasing Tokaj Wine Specialities took part in the survey with an assessable rate of participation.

As for the sexes, the sample corresponded to the portion of the statistical population, so it has met with the expectations. There was no quota sampling; it is a simple coincidence that the sample corresponded to the desired rates concerning the area.

Considering the age of respondents, young people (18-25) were overrepresented, while the 36-45 group was well represented. On the other hand, people over 46 were under represented. The 26-35 group was also slightly overrepresented.

Weighting was performed on the basis of educational background and income, but the chance of being part of the sample is quite high owing to the high number of elements in this case. This is shown by the fact that an assessable number of elements made it into the sample for each category. During the sampling, I carried out a questionnaire survey at various times and in basically six different places over 6 months. It had to be established whether the **samples** coming from various areas **could be integrated.** First I studied whether it was possible to integrate the sample areas. One of my hypotheses was that the responses collected in Budapest would largely differ from the country data. To prove this, I applied the **paired t-test** method.

We highlighted three fundamental properties typical of the purchasing power: net income per capita, expenditure on wines and Tokaj Wine Specialities in HUF. Only the results obtained in Budapest and Szolnok region suggested that location results cannot be integrated; however, the difference could be observed only for one aspect (expenditure on wines) and, to a small extent, dealing separately with the samples would be unreasonable. **During the survey, it was established that the samples obtained in various places can be integrated**. The paired two-sample t-tests showed no difference in the purchasing power at a 5% significance level in the given regions. Therefore, the samples can originate from a population of common average.

I tested the reliability of the data set with the "reliability" analysis. The analysis forms a Chronbach alpha index[4] , which is determinant regarding reliability. The value of this index is higher than the necessary minimum value of 0.6. Consequently, I considered the data suitable for further tests.

During my own research, the methods applied to study the consumer's side were as follows: Partition ratios, Mean calculations, averages, standard deviation, Analysis of reliability, Paired t-test analysis, Pearson-type Chi-square test, Mann-Whitney-Wilcoxon test, principal component analysis, factor analysis, Cluster analysis, Focus group tests.

During the research, I conducted statistical analyses with three key programs and software. The applied programs: MS Excel, SPSS, Surveyz.

Generally, the focus group tests precede the questionnaire survey. During my research I did the opposite so I could verify whether the invited focus group members meeting certain fundamental criteria really belonged to one segment. Another aim was that if the former were attained, then we could discover things about the segments that would be more difficult to learn with other methods. The main purpose of the focus group test is that the researcher gains insight into an issue of interest to him or her by conversing with members of the appropriate target market.

According to Veres and co. (2006), audio and video recording must also be performed during the focus group tests. During my own research, the members of the focus group did not approve the making of such a recording, but did not offer any reasons for this. Nevertheless, they permitted the presence of a psychologist. However, this reluctance was not palpable during the discussions in which the psychologist took part.

During my research two focus group interviews were carried out. The main features are summarised by Table 1 as follows.

According to the psychologist, the participants were generally open and honest. The specialist analysed the participants' behaviour during and after the study. It was established that both focus groups supplied information whose veracity cannot be questioned on the basis of psychological analyses. The second phase consisted of 7+1 tasks for the group members.

[4] The Chronbach alpha index equals the arithmetic average of the coefficients obtained from all possible split-halves. It shows the appropriate inner consistency of the questions.

Table 1

General characteristics of the focus group test

	Group analysis of cluster 3	Group analysis of cluster 5
Time	19 July 2007	20 July 2007
	10.00-12.00 am	10.00-12.00 am
Venue	A winery in Tokaj	
Number of participants	7 persons	
Moderator	1 person	
Clinical Psychologist	1 person	
Total participants	9 persons	
Main purpose	Verification of the cluster results of the quantitative test for two target groups.	

Source: Author's own research, 2007

Study findings

The findings of the questionnaire study conducted in the North-Alföld Region and Budapest on the consumption habits of Tokaj Wine Specialities reveal a special tendency regarding wine consumption.

54% of the respondents specified Tokaji Aszú as their favourite wine, 13% Egri Bikavér, and 31% mentioned other sorts of wine (e.g. Balatoni, Merlot, Soproni Kékfrankos). Rather heterogeneous, this latter group could not be categorised. Only 2% of the interviewees could not name or had no favourite wine. The interviewees who regularly purchase wines were entered in the sample. 2% claimed to purchase wine but not for personal consumption but as gifts. Most (37%) know Tokaji Aszú, 33% Tokaji Szamorodni; these two Tokaji Wine Specialities are the most widely known.

Tokaji Aszú is purchased one or two times per year among 50% of the sample; 24% of the respondents buy their favourite type of wine on a quarterly basis. No daily purchasing has been observed for any Tokaji Wine Speciality.

For the purpose of personal consumption, the respondents buy on average 4-5 bottles of szamorodni per year and 4 bottles of Tokaji Aszú. If the Tokaji Wine Specialities are bought as a gift, we obtain nearly the same results, but the averages are slightly lower as compared with personal consumption. As for szamorodni, the average amounts to 3 bottles/year, and with 'máslás' (this wine is made by pouring must on the lees of aszú) 2 bottles/year, and for essences 2 bottles/year.

Those who do not buy Tokaji Wine Specialities have financial reasons for not doing so. A quarter of the non-purchasers do not know or have not tasted Tokaji Wine Specialities and another quarter simply do not like them. 2-2% have specified the following as the reason for not purchasing: "because they are detrimental to health" or any other reason, but their distribution and occurrence is insignificant. The customers buying szamorodni once or twice a year make up 42%, while those purchasing szamorodni quarterly total 22%.

31% of the respondents purchase Tokaji Wine Specialities for birthdays, 24% for namedays, and 18% for Christmas. 45% drink Tokaji Wine Specialities the most frequently. 37% of the interviewees primarily consume these special drinks at parties, while 18% in catering units.

46% of the Tokaji Wine Specialities are sold in shopping centres and hypermarkets. 13% of the respondents purchase the surveyed wine specialities in discount stores (e.g. Profi, Penny), 13% in supermarkets (e.g. Heliker, CBA) and 15% in wine stores. Only 6% of the quantity is sold by Tokaj producers. During the wine purchasing process, influence plays an important role.

A consumer's previous experience has a big impact on his/her decisions. Regarding the total sample, the respondent's partner (girlfriend, common-law wife, wife), friends and parents also comprise a significant factor. Diagram 16 illustrates how much the interviewees spend on wines on average per year.

28% spend 10-20,000 forints, 27% 5-10,000 forints and 23% spend 20-50,000 forints on wines. Only 8% spend over 50,000 forints on wines. Furthermore, 14% spend below 5,000 forints annually. In the sample the average annual amount spent on wine totalled 18,676 forints. Tokaji Wine Specialities comprise 61.74% of wine expenditures, and the distribution for the percentages was 25.7. On average, 10,161 forints are spent on Tokaji Wine Specialities annually (calculated with class averages); the distribution having a value of 8,658.

73% of the sample attended no lectures on grapes, wine, or oenology. 27% had already encountered in some form such information and learning materials. 34% admitted not knowing the aszú making process, 29% were entirely aware of it, while 37% responded that were uncertain about specific aspects of it.

To sum up, the factors affecting purchase for personal consumption is as follows: previous experience (24%), price (24%) and quality (14%). For gift giving, the order is: price (23%), design (17%), quality (14%) and previous experience (14%).

The answers to the question on inner reference price reveal that the respondents have rated essences quite highly, going as high as 7,300 forints. The interesting thing is that they would also pay a relatively high price for a szamorodni (2,374 forints). As for fordítás, máslás, the respondents would spend a maximum of 3,383 forints, and 3,859 forints on Tokaji Aszú. The data illustrate clearly that the money theoretically spent on Tokaji Wine Specialities is far higher than the actual spending. The value of the mode (the most frequently occurring element) and the median (the middle element) is 2,000-2,000 forints for both szamorodni and fordítás, máslás. Regarding essences, the mode amounts to 2,000 forints and the median is 4,000 forints.

It can be stated that the majority, 71%, has not responded correctly to the question "With what meals would you consume Tokaji Wine Specialities?" 35% of the respondents obtain wine-related information mainly from friends. 26% from family, relatives, 14% via Internet and 10% via the media. Only 8% inquire in wine stores, 2% in Tourinform offices and 5% in other places.

39% would be ready to purchase wine specialities over the Internet, while 61% wouldn't 56% of the interviewees buy only Hungarian wines, while 44% occasionally purchases foreign wines. No-one in the survey claimed to purchase only foreign wines.

12% of the sample has a large wine stock, and the majority (64%) usually keep 2-3 bottles of wine at home. 24% keep no wine at home.

It can be observed that presently numerous oenological communication sources are available and the sample population often monitors these media

Relying on the basic statistics, the database will be analysed in more detail. Regarding the sex, age, educational background and income, I will apply cross-table analyses. For most of the questions, it is possible to use correlations with the Chi-square test. For the following section, cross-table analyses conducted on the basis of these key criteria [a) sex, b) income] will be presented.

a) Gender-based cross-table analyses using the Pearson-type Chi-square test with respect to Tokaji Wine Specialities

Gender-based cross-table analyses highlight whether there is a difference between the two genders regarding the answers to each question. I performed the analyses with the Pearson Chi-square (bilateral significance) test and also created cross-tables for them for each question. I separated the values below $p = 0.005$ (the so-called 5% significance level), since here there is a difference between the sexes.

The following list indicates the statements where there is a difference between the sexes.

For women:

- Women purchase Tokaji Wine Specialities for Christmas, birthdays, namedays relatively more often.
- At filling stations, women refuse to purchase Tokaji Wine Specialities somewhat more often.
- Women are influenced more by their friends, partner and the salesperson when purchasing wine.
- Women tended to more often indicate their family as their source of information on wine.

For men (where there is a difference between the sexes):

Men tended to more often know fordítás, máslás, essence and aszú essence. The difference could be observed with a significance of $p = 0.0000$ for each Tokaji Wine Speciality. Therefore, men were more familiar with Tokaji Wine Specialities.

- Men prefer drinking Tokaji Wine Specialities at home.
- Men are more inclined to listen to strangers, journalists and Internet sources when purchasing wine.
- Men tend to know the aszú-making process better.
- Men gather more information from Tourinform offices and the Internet than women.
- Men are more inclined to store wines at home (especially larger stocks) than women.

b) Income-based Cross-table analyses using the Pearson-type Chi-square test regarding Tokaji Wine Specialities

Income-based cross-table analyses highlight whether there is a difference between the answers to each question in terms of the interviewees' income status.

The following indicate the differences between the income categories (families' monthly net income).

- Respondents with an income of less than 100,000 forints do not tend to keep wines at home.
- Respondents with an income of over 300,000 forints are relatively more familiar with szamorodni, tokaji essence.

- Those earning 200-300,000 forints. are usually more familiar with Máslás and fordítás
- Tokaji Wine Specialities are purchased for Christmas by those earning 300-500,000 forints.
- For interviewees earning 300-500,000 forints, a wine stock of 2-3 bottles is the most typical.
- People with a salary of 300-500,000 forints tend to have several favourite wine homepages.
- Only the wealthier respondents tend to have a larger wine stock at home, the largest wine stocks usually held by those earning more than 500,000 thousand forints.
- The higher their income, the more familiar they are with television programmes about wines.

My hypothesis that women tend to prefer sweeter wines has been proven since 60% of them specified Tokaji sweet wine, Tokaji Aszú as their favourite wine. It is also the favourite among men, but at a lower percentage. Among them, Egri Bikavér is relatively more popular. The Pearson-type Chi-square totals 0.000, so a difference can be observed between the sexes and their favourite wines. Studying the wine consumption habits of the two sexes, I have found that there is a difference between the sexes on certain issues.

In the questionnaire only in 3 cases did the respondents have to rank something. In the first two, they had to assign an order of importance regarding aspects behind their purchase decision, first for their personal consumption and then for gift giving. In the third case, it was in order to establish the aim for determining the inner reference price of Tokaji Wine Speciality. Although the respondents were not required to make a ranking, the supplied data could be placed in order.

When it came to the two sexes, a significant difference is observable for the primary and secondary aspects behind the purchase decision regarding Tokaji Wine Specialities when bought for personal consumption. In the former case, high values mean that there is an absolute difference between men and women related to aspects when purchasing Tokaji Wine Specialities for personal consumption. Basically, there is a striking difference for the first two aspects.

Among respondent groups between 18-25 and over 60, a significant difference only exists in the secondary purchasing aspect of Tokaji Wine Specialities for personal consumption. People over 46 assigned a similar ranking, and the reference price was the same, too – noteworthy in all cases, $p < 0.05$. As for personal consumption, the survey comparing age groups 36-45 and 46-60 revealed a value of $p = 0.22$ for the primary purchasing aspect. Another significant difference is apparent regarding the maximum amounts of money offered for szamorodni. The 18-25 and 26-35 age groups would pay different amounts for fordítás and máslás.

Regarding respondents with a university degree or secondary-school degree, there is a significant difference considering how much they would pay for a bottle of Tokaji Aszú, máslás, fordítás and tokaji essence. Based upon their technical qualifications, a significant difference is apparent in nearly each surveyed factor.

For households with a total monthly income below net 60,000 forints/family and 60-100,000 forints, a significant difference is only discernible for the primary aspect of personal consumption. As for low-income and high-income categories, there is obviously a significant difference regarding the maximum amount allocated for Tokaji Wine Specialities ($p > 0.05$). for the white and blue-collar workers in all three aspects.

In all three aspects, there is a significant difference between white and blue-collar workers. Students and blue-collar workers' decisions derive from different aspects ($p > 0.05$). The Mann-Whitney U test indicates that there is a significant difference between the studied factors and whether the respondent has encountered information and undergone training pertaining to wines.

The factoring method is used for measuring the effect of several independent variables. The questionnaire covers numerous questions that may include criteria belonging to one factor, meaning we can simplify the characterisation of each target group. The Kaiser-Mayer-Olkin (KMO) criterion amounted to 0.696 for their own sample, which can be deemed as appropriate. The KMO value is one of the major index-numbers for judging how adequate variables are for the factor analysis.

I applied several methods to determine how many factors can be established The Scree-test (elbow-rule; takes into consideration the full variance), the maximum likelihood method (it examines the adjustment of the model with the observed data, and calculates an adjustment index for the factor number determined by us) and the variance proportion method (it specifies the factor number based upon the aggregate percentage of variance) also verified that the 8-factor application was the most reliable choice.

Based on the measuring level, 45 of the 70 variances were suitable for the factor analysis, of which the 25 variances were involved in the factor analysis as the others abated the factor analysis. I could establish assessable factors for these based on the communalities, which exceeded the value of 0.7 for most of the variables. The primary purpose was to maximise the variance of the principle components, which resulted in the rotated factor matrix. The factor weights demonstrate the correlation between the original variable and the given factor – whose value varies from -1 to 1. Table 2 shows the explained variance, which I calculated with the principal component analysis, applying the SPSS programme.

Table 2

Explained variance – with principal component analysis

Factor	Calculated extraction			Rotated calculated value		
	Total	Variance %	Cumulated %	Total	Variance %	Cumulated %
1	6.4	23.8	23.8	5.2	19.1	19.1
2	3.0	11.1	34.9	2.4	8.9	28.0
3	2.5	9.4	44.3	2.3	8.5	36.5
4	1.7	6.3	50.6	2.1	7.8	44.3
5	1.5	5.5	56.1	2.0	7.4	51.7
6	1.3	4.6	60.1	1.7	6.4	58.1
7	1.2	4.3	65.0	1.5	5.7	63.8
8	1.1	4.0	69.0	1.4	5.1	68.9

Source: Own resource, 2007

The accepted 8 factors explain 68.9% of the variance. I didn't involve a 9th factor, as in this case the eigenvalue fell below 1, which was not acceptable.

Factor 1 (f1) is related to the frequency of purchasing exclusive wine specialities (essence, fordítás, máslás) while factor 2 (f2) is related to the two most widely known Tokaj Wine Specialities (aszú and szamorodni). Factor 3 (f3) shows the number of bottles of purchased exclusive wine specialities – whether for personal consumption or as a gift. Factor 4 (f4) is similar to the previous, but here the focus is on more widely known Tokaj Wine Specialities. Factor 5 (f5) covers the external influencing factors, while factor 6 (f6) includes the elements influencing the consumer's direct

environment. The former refers to the journalists, the strangers, the Internet, the salespersons, while the friends, parents, partner and previous experience belong to the latter category. As for (f6), previous experience as a factor is indicated with an opposite sign. Factor 7 (f7) is the internal reference price, and factor 8 (f8) refers to money spent on wine specialities. The interesting point of (f8) is that the more one spends on wine, the less one spends on Tokaj Wine Specialities, so the proportion is inversed.

The **cluster analysis** fundamentally aims to illustrate, regarding the surveyed regions, what consumer groups can be identified among the purchasers of Tokaji Wine Specialities. Here the basic task is to pinpoint the variables behind the differences among the groups. During the analysis I applied the Ward-process, which is based upon the variance. The centroid method led to a similar result. I performed a run-off with the K-means process, too, which created only two clusters, one of which had a low number of elements. Table 3 demonstrates the factors' impacts in each cluster.

Table 3

The impacts of factors in each cluster

Factor / Clusters and rank numbers	f1	f2	f3	f4	f5	f6	f7	f8
Cluster 1	0.140	-0.054	-0.068	-0.192	0.070	0.378	-0.063	-0.207
rank number	*4*	*8*	*6*	*3*	*5*	*1*	*7*	*2*
Cluster 2	0.100	0.118	-0.095	-0.027	-0.028	-0.190	-0.143	-0.159
rank number	*5*	*4*	*6*	*8*	*7*	*1*	*3*	*2*
Cluster 3	-0.181	0.052	-0.094	0.028	0.083	-0.025	-0.095	0.313
rank number	*2*	*6*	*4*	*7*	*5*	*8*	*3*	*1*
Cluster 4	0.147	-0.079	0.035	-0.094	0.011	0.554	0.097	-0.197
rank number	*3*	*6*	*7*	*5*	*8*	*1*	*4*	*2*
Cluster 5	0.053	-0.199	0.041	0.197	-0.073	0.040	0.097	0.133
rank number	*6*	*1*	*7*	*2*	*5*	*8*	*4*	*3*

Source: Author's own research, 2007

The groups' description were derived from Table 3 data and the cross table analyses – which had been previously asked.

The data in the table demonstrate that the principal components show a heterogeneous picture. (f1) is represented with nearly the same weight in each cluster. In group 3 it shows a negative relation, and in group 5 it plays a role below the average (f2). The standard Tokaj Wine Speciality frequency factor has assmumed the largest positive value in cluster 2 and the largest negative value in cluster 5. Considering (f3) the correlation is negative in the first three groups, and positive in clusters 4 and 5. The largest positive value of (f4) can be observed in segment 5, while the largest negative-signed value is typical to cluster 1. Principal component (f5) has very low values in all of the clusters. The highest positive value of direct influence factor (f6) is located in segments 1 and 4, while the lowest negative value is typical of group 2. Factor (f7) is negative in the first three clusters, and positive in groups 4 and 5, and entail very low values. The highest activity is within the last (f8) principal component. It assumes its largest value (0.313) in cluster 3. The largest negative correlation appears in cluster 1.

In marketing terms, clusters can be considered consumer segments, so henceforth they will be called segments.

Clusters for the North-Alföld Region and Budapest, and their main characteristics for purchasers of Tokaji Wine Specialities in 2007 (n = 1,179) (Source: Author's own resource, 2007)

Segments:

1. "Low-income Survivors"
   Price interval: < 800 forints
   - price-sensitive
   - place of purchasing: discount stores, hypermarkets
   - usually semi-sweet wines are preferred
   - do not take risks
   - conservative
   - over 18
   - wine culture is not typical
   - undemanding towards themselves, demanding regarding packaging
   - estimated share: 75%

2. "Normal-income middlebrow"
   Price interval: 600-1,500 forints
   - the family's monthly net income totals 150-300,000 forints
   - born between 1940 and 1970, over 35
   - hypermarkets
   - brand loyalty
   - price-sensitive, but think in a closed price interval
   - estimated share: 12%

3. "New normal-income generation"
   Price interval: 800-3,000 forints
   - the family's monthly net income totals 150-300,000 forints
   - fans of wine culture
   - born after 1970, age between 18 and 30
   - purchase wines everywhere
   - often go on trips in wine districts
   - brand loyalty
   - their closed price interval is broader
   - estimated share: 6%

4. "The high-income *wine-smart* rich"
   Price interval: 1,100 forints <
   - the family's monthly net income is over 300,000 forints
   - fans of wine culture
   - age over 30
   - decision tends to be more logical
   - open to everything, innovative group
   - often go on trips in wine districts, on wine festivals
   - mildly snobbish consumer behaviour

- brand loyalty
- their closed price interval is broader
- estimated share: 3%

5. "The high-income rich elite"
   Price interval: 1,500 forints <
   - the family's monthly net income is over 300,000 forints
   - blatantly snobbish consumer behaviour
   - brand-orientation
   - high price and packaging are decisive
   - the wine must comply with social expectations
   - sometimes go on trips in wine districts, but visit the top wineries
   - brand loyalty
   - their closed price interval is broader
   - estimated share: 4%

During the survey, 5 clusters could be clearly identified. When characterising each group, I used not only the principal components but also other invariables to obtain a more comprehensive picture.

The analysis and main statements of the study hypotheses

When preparing the study, I examined the wine market position of Tokaj Wine Specialities and its features applying several scientific methods. The research fulfilled its purpose by outlining a general wine market picture with respect to Tokaj Wine Specialities.

H1 Method relevance

The practical applicability of the cluster analysis may be verified by subsequent focus group tests. Providing a certain framework, the qualitative procedures preceding the research and the latter-mentioned procedure underlie the realistic results.

The first methodological hypothesis refers to the applicability of an extra research step in the research process. The technical literature suggests that the focus group tests occur prior to the actual research; nevertheless, it is conceivable that it is ill-advised to apply it following the research. The practical relevance of the cluster analysis result can in this way be controlled. When compiling the focus group, I *filtered* the participants several times to determine whether they were actually members of the theoretical clusters produced from a scientific method. The *filter* question process was undertaken before the participants were approached and this, combined with the topics and tasks which were tackled during the focus group test, served to verify the cluster analysis results. Therefore, **Hypothesis H1 can be defended**.

H2 Potential integration of the regional research

The wine consumption and wine purchasing habits of Budapest and North-Alföld Region are different when it comes to Tokaj Wine Specialities.

During the market research, two methods were used to study H2: the paired t-test and cluster analysis. In principle, both methods should have verified the assumption; however, the very opposite occurred and, in fact, both procedures refuted the statement. During the t-tests there was only one

index indicative of difference, but its proportion and extent did not justify the separate examination of the data queues surveyed in Budapest and the North-Alföld Region. Therefore, **hypothesis H2 can be refuted in relation to the research.**

H3 Studies of interrelations

The purchasing and consumption of Tokaj Wine Specialities is related to age, sex, income, educational background, and to possessing special, wine-related knowledge.

Discussion of hypothesis H4 involves various aspects. During the purchasing process numerous factors determine which product the consumer eventually buys. This is especially true for wines, since the vintage and thus the wine supply varies from year to year. When purchasing Tokaj Wine Specialities, the fact that the product is costlier than average wines entails further risk factors for the customer. The main criteria determined in the hypothesis indicate that there is sometimes a difference in customer habits. However, their life circumstances vary so sometimes there is a difference among consumers belonging to various age groups, sexes, education and income brackets. Moreover, it has also been declared that, using the Khi-square test method and the cross-table analyses, in certain cases there is no difference. To summarize, it can be established that **Hypothesis H3 is defendable,** though only with certain qualifications**.** Cluster analysis is appropriate for highlighting the major differences. As for age groups, further clarification is necessary as this is a segment criterion that is life cycle related and reflects generational differences. The cluster analysis result indicates that there really is such a "new generation" segment with totally different purchasing habits concerning Tokaj Wine Specialities. They represent the consumer group of the future.

H4 Inclination to determine the price

During purchasing, price predominates when there is no difference between the admitted and the actual reference price.

When it comes to market research and marketing, it is noteworthy that when not hindered by constraints, people would pay more for a Tokaj Wine Speciality than they actually do. When purchasing Tokaj Wine Specialities, the major consideration is not price but rather previous experience and quality. These are followed by price, particularly the price interval, which depends on the monthly net income of the given consumer's family. The statement is true when purchasing for both personal consumption and for gift giving. **Therefore, Hypothesis H4 can be refuted.** If the consumer is knowledgeable about wine, he or she can choose more wisely and will notice the price-value ratio, which sometimes signifies cheaper wines. In the various clusters different price interval categories emerged, an income-related phenomenon. If the customer is not knowledgeable, he or she will be drawn by the design and appearance, and other people's recommendations assume greater importance in the purchasing decision process.

H5 Market segmentation

The Hungarian consumer sample is suitable for segmenting. Therefore, there are criteria that enable the creation of a target group.

During the cluster analysis, groups could be clearly distinguished. We were able to demonstrate characteristics enabling us to create and define separate segments and target groups. Clusters can be clearly defined and have individual features and style. Thus, marketing means can be efficiently applied, and a marketing mix can be compiled and effectively applied for each segment separately. **Therefore, hypothesis H5 is defendable.**

Conclusions regarding the consumer groups

In Hungary the level of wine culture is still low, but a a positive change is underway, and a new generation of moderate wine drinkers has emerged that appreciates oenology, and viniculture. If the consumer has already attained a certain level of wine sophistication, one observes rational consumer behaviours in terms of price-value-quality ratio.

Also available are Tokaj Wine Specialities referred to as "late vintage." This name can be confusing for the consumer as some do not understand how they differ from other Tokaj Wine Specialities, given that all Tokaj Wine Specialities are late vintage wines, meaning grapes which are harvested later than usual, sometimes in October or November.

The research findings can also be put into practice. Based on the results and conclusions, I have several practical suggestions.

My methodological suggestion is that the cluster analysis result, which was calculated using numerous representative samples, **should be back-checked using focus group tests;** moreover**,** upon justification and verification, a detailed analysis of the given segments could also be more effectively performed using this method. It would also be worthwhile to study the exact reasons for the popularity of wines with the name "**late vintage**". This type of Tokaj Wine Specialities should be more vigorously marketed. I contend that a type of wine which is appreciated by consumers should be officially recognised as **Tokaj Wine Specialities**.

The **wine district Community marketing** strategy should adapt itself to the national wine marketing strategy. Moreover, high level wine officials should listen to their wine district colleagues' ideas. This will entail discussions and, based on consensus, the **wine district ideas should be harmonised** and **validated**.

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The multifunctionality of agriculture and risk management as seen by Hungarian farmers involved in diversified farming

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Abstract

Studying the multifunctional nature of agriculture requires a multi-level, multi-dimensional and multi-actor approach. In any given country analysis starts at the national economy level then descends to the farm and farm household level. In our study we analysed the life histories of nineteen non-representatively selected Hungarian family farms. In doing so, we determined that, to understand new initiatives undertaken by farmers, it was better to examine their motivation than merely examining the initiatives themselves. At the farm household level, multifunctionality is strongly related to achieving livelihood strategies and constitutes a possible risk management solution. The analysis has revealed farmers' motivations for undertaking multifunctional agriculture, the interrelationship between multifunctionality and risk management, and the interpretation of multifunctional agriculture by various groups of farmers regarding their own farm activities.

Keywords

Multifunctional agriculture, rural economy, risk management, farmers' motivation, life history

The multifunctionality of agriculture and the rural economy

In a general sense, the rural economy's[3] multifunctionality can be understood as a response to marginalization and the economic impotence of the rural areas and the agricultural sector. Despite numerous attempts at the international level, there is still no uniformly accepted definition for multifunctional agriculture. To our knowledge, the term *multifunctionality*, as a guiding principle, was officially conceptualised at the United Nations Conference on Environment and Development in Rio de Janeiro in 1992. At the conference plenary it was stated that (De Vries, 2000): "Multifunctional aspect of agriculture particularly regards food security and sustainable development"

Since the second half of the 1990s, the European Union (EU), the Food and Agriculture Organization of the United Nations (FAO), and the Organization for Economic Co-operation and Development (OECD) have also been actively dealing with multifunctionality. At the FAO Conference between 12-17 September 1999, it was declared that *"agriculture has multiple objectives and functions within the framework of sustainable agriculture and rural development which through appropriate policies can all foster sustainable agriculture and rural development and which should be targeted, cost-effective, transparent and do not distort production and trade"* (Mulvany, 1999).

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[3] Fehér (2005) defines rural economy as regional economy in rural areas, with emphasis mainly on land use. Rural economy includes economic actors carrying out economic activities (production, services, management) in the given area and consumers of outputs of these activities; the resources available in the area and used for the above activities; the enterprises, companies, households, civil and official organisations and institutions providing the organisational framework of the economy; the network of relationships between actors and organisations within and outside the area; and the structures (related to sectors, land use, resources, co-operation, coordination, etc.) representing the general framework for economic activities. An important aspect of rural economy is that they are based mainly on resources that originate from the area itself and to a lesser extent on external resources.

According to a 2001 OECD study, "*multifunctionality refers to an economic activity may have multiple outputs and, by virtue of this, may contribute to several societal objectives at once."* Consistent with the OECD definition, multifunctionality is an activity-oriented concept referring to multiple results and to production process characteristics. The OECD "working definition" encompasses multifunctionality's core elements, which have been recognised by Member Countries. According to the OECD (2001) multifunctionality's key elements are:

- the existence of multiple commodity and non-commodity outputs that are joint agricultural products; and the
- fact that some of the non-commodity outputs exhibit characteristics of *externalities* or *public goods*, so that markets for these goods do not exist or function poorly.

There are several elements that still impede a uniformly accepted definition for multifunctionality in agriculture. Some of these are:

- political interests (for example reforming agricultural payments and its approval by all countries and country-groups). Here, we are firstly referring to the World Trade Organization (WTO) negotiations, which, in our opinion, have been pivotal toward the concept of multifunctional agriculture;
- lack of scientific systematization and evaluation of the externalities and non-commodity public goods produced by agriculture;
- externalities and non-commodity public goods are valued differently in the various countries and
- the different approach to multifunctionality spanning scientific disciplines.

There has been a noteworthy attempt at systematizing notions attached to multifunctionality which span different scientific disciplines and exist in different countries. We are referring to the elaboration of the Concept Oriented Research Clusters (CORCs) by the international MultiAgri Project (Caron, 2008).

With a view toward WTO negotiations, the EU has embraced agriculture multifunctionality as a long-term objective. Already in its 1999 CAP reform, the EU had already begun to pay heed to multifunctionality-related ideas when the European Model of Agriculture concept was officially approved at the Berlin European Council (24-25 March 1999). According to the European Commission's October 1999 publication *"Apart from its production function, agriculture encompasses other functions such as the preservation, the management and enhancement of the rural landscape, the protection of the environment, including against natural hazards, and a contribution to the viability of the rural areas. Agriculture must also be able to respond to consumer concerns for example those regarding food quality and safety. These functions are not simply externalities of the agricultural production function, i.e. undirected side-effects, not embedded into an institutional and political context"* (European Commission, 1999).

In the scientific literature multifunctional agriculture emerges as a kind of agricultural policy paradigm (Josling, 2002; Mészáros, 2006).

Agriculture has an important role in balanced land development, which can be fulfilled through maintaining rural areas' viability and on- and off-farm economic diversification. A prosperous agricultural sector is indispensable to sustaining the rural economy and a rural society in which farmers can provide diverse products and services going beyond their basic agricultural activities, including the production of high-quality food products that meet consumer demand, and safeguarding the environment and the cultural heritage.

Multifunctionality as an activity-oriented concept and, in a narrow sense, shares several common features with farm diversification. Both are strongly connected to agriculture therefore they refer to on-farm activities; furthermore they both aim to enhance rural employment and improve farmers' livelihood. Moreover, while farm diversification refers to farming activities differing from the traditional, multifunctionality also embraces traditional agriculture. The multifunctional model of agriculture's political nature which spans both the international and regional level, combined with its environmental and public service commitment, further differentiates the two concepts. Multifunctionality can therefore be considered a wider and more general concept.

In the Hungarian context, Szabó and Fehér (2004), Fehér (2005, 2006) and Petrics (2008) studied agricultural multifunctionality in detail. It is pertinent to stress that the research has been conducted related to Hungarian agriculture's agri-environmental issues (Katona-Kovács, 2007) and energy production functions (Popp, 2006).

Multifunctionality at the farm level

Due to the strong relationship between rural development and the European Model of Agriculture, it is practical to follow a multi-level, multi-dimensional and multi-actor approach when agricultural multifunctionality constitutes the subject of study. (Van der Ploeg and Long, 2002; Van der Ploeg and Roep, 2003; Van der Ploeg, 2006). Regarding the different levels of analysis, the following classification has been used in related scientific works:

- global interrelations between agriculture and society,
- the agricultural sector (as part of the national economy),
- the rural economy and its actors (including farms and farm households),
- policies and institutions, and
- the farm (farm enterprise and farm household).

As for the focus of our study, analysis has been carried out at the farm (enterprise and farm household) levels. Figure 1 illustrates the farm level approach to multifunctionality.

At farm level rural development emerges as a redefinition of identities, strategies, practices, interrelations and networks (Van der Ploeg and Long, 2002:11). At farm level, the concept of multifunctionality contrasts the structuring principles of conventional farms with those of multifunctional farms (Van der Ploeg and Long, 2002; Van der Ploeg and Roep, 2003). It describes multifunctionality based on the relationship between the farm and the three external contexts they relate with. The first context is the agro-food supply chain that is the farm enterprise's production side. The second is the rural economy in which the farm is situated and it contains the ways the farm interacts within the rural context. The third entails the different resources at the disposal of the farm of which the utilisation allows the farm household to develop various livelihood strategies.

On the agro-food side the conventional farm tends to specialise and this includes reducing the number of activities it is involved in. Production is characterised by scale economy. Regarding the rural side, the conventional farm has limited relations with the rest of the rural context: acting nearly exclusively at the land market level (Belletti, Brunori et al., 2003). On the resources side, a conventional farm uses mainly external resources and disregards internal resources. Conventional farms' network resources are essentially limited to market relations and are not seriously embedded in the local, economic, social, and cultural context.

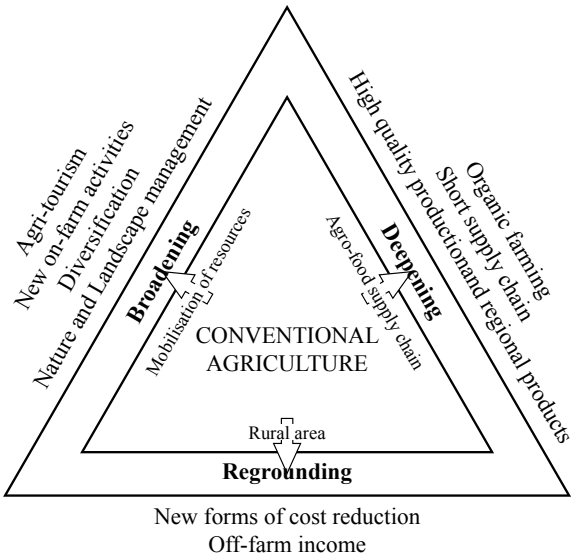
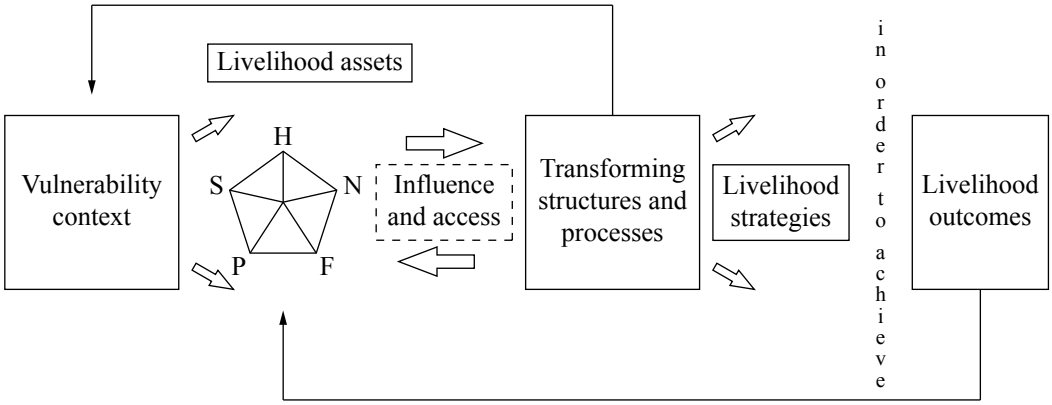


Figure 1: Farm level approach to rural development and multifunctionality
Source : Van der Ploeg and Roep, 2003

On the contrary, the multifunctional farm enterprise leaps over the conventional farm boundaries, deepening and broadening its activities (diversification occurs both in agricultural and in non-agricultural terms) and interrelations. The latter means the households' involvement in different networks. It is essential for the multifunctional farm to broaden its activities network involvement through which it can enlarge its knowledge and information base and create a basis for cooperation. Broadening also implies a more intensive use of the available natural, social and cultural capital that the specific area offers to its farm enterprises. This requires that families follow a sustainable livelihood strategy that also includes the use of household labour or the integration of on-farm labour with off-farm one. Regarding the production base, the multifunctional farm enterprise opts for internal inputs (its own savings, grassland manure) which contribute to the savings and environmental safeguarding.

According to the Department for International Development of London (DFID), a sustainable livelihood strategy is as in Figure 2.

The concept of livelihood has been defined in various ways. However, each definition emphasises meeting basic needs. The World Commission on Environment and Development (WCED) defined sustainable household livelihood as adequate reserves and supplies of food and cash to meet basic needs (Niehof and Price, 2001). Livelihood strategies are pursued by employing a range of available livelihood resources (human, natural, financial, physical and social) in order to undertake different activities. Activities connected to the realisation of a livelihood strategy are, on the one hand, influenced by the actors' values and priorities; on the other hand, by the wider socio-economic context in which the livelihood strategy operates. This wider context includes trends (economic, demographic, etc.), shocks (natural, economic, etc.) and seasonal phenomena (prices, production, health, employment). In the wider context, encouraging or hindering households' activities also represents a risk for achieving strategies and hence for the household's livelihood. The extent to which households are vulnerable depends on their risk management capacity, adaptation to challenges, and the success of adaptation strategies.



Key: H = Human Capital; N = Natural Capital; F = Financial Capital; S = Social Capital; P = Physical Capital

Figure 2: The Sustainable Livelihoods Framework
Source: DFID Sustainable Livelihoods Guidelines 1. (1999)

Building on the concept of livelihood strategies and adapting Kostov and Lingard's work on rural development and risk management, Petrics (2008) considered risk management behaviour as one of the most decisive elements of farm level multifunctionality.

Risk management and multifunctionality

Kostov and Lingard base their risk management and rural development theory on research which indicates that human behaviour in general and economic behaviour in particular is better thought of as a process for reducing uncertainty through risk defusing operators, meaning risk management where comparison is more widely used as a decision making tool rather than probability calculus (Kostov and Lingard, 2004).

Kostov and Lingard distinguish between uncertainty and risk. In order to explain the concept of risk management they apply the definition of risk and uncertainty elaborated by Knight (1992) who defined risk as "the case in which there exists an underlying (objective) probability distribution of possible outcomes, and uncertainty as the case where no such distribution exists" (Kostov and Lingard, 2003:464). Kostov and Lingard consider this distinction significant and meaningful mainly because they contend that absolute uncertainty renders human action, particularly economic action, impossible. They claim that in order to act, we need a subjective perception of uncertainty, a vision of the world and an idea of its structure. Therefore, they define uncertainty as a environmental characteristic and risk as the subjective perception of this uncertainty.

Thus, an important determinant of risk management is awareness. Awareness can contribute to the transformation of uncertainty and to the avoidance of risk. Risk therefore can be avoided or mitigated only if risk itself is perceived, meaning the existing uncertainty becomes internalised and perceived as a subjective threat. Subjective perception of risk then leads to the subjective alteration of reality and this represents risk management. Risk management compels the actors to act economically. Thus, the concept of risk management is based on the actors' behaviour, their reaction to risk, rather than on the probability of risk occurring.

In adapting risk management to rural development, (Van der Ploeg and Renting, 2004:233) argue that rural development "diminishes, both symbolically and materially, the dependency on financial capital, agro-industry, the global commodity markets and big retailers, while regrounding agricultural production again on ecological, social and cultural capital".[4]

Petrics (2008), while analysing life stories[5] by using episodic-narrative interviews conducted with nineteen Hungarian farm households with significantly diversified farm enterprises, found that multifunctionality emerges as a possible risk management solution. She highlighted that farmers' behaviour and motivation better explained the introduction of new farm activities for risk reduction purposes (why they do something) rather than if one sought an explanation in the activities themselves (what they do). Figure 3 shows the county distribution for the analysed farm enterprises.

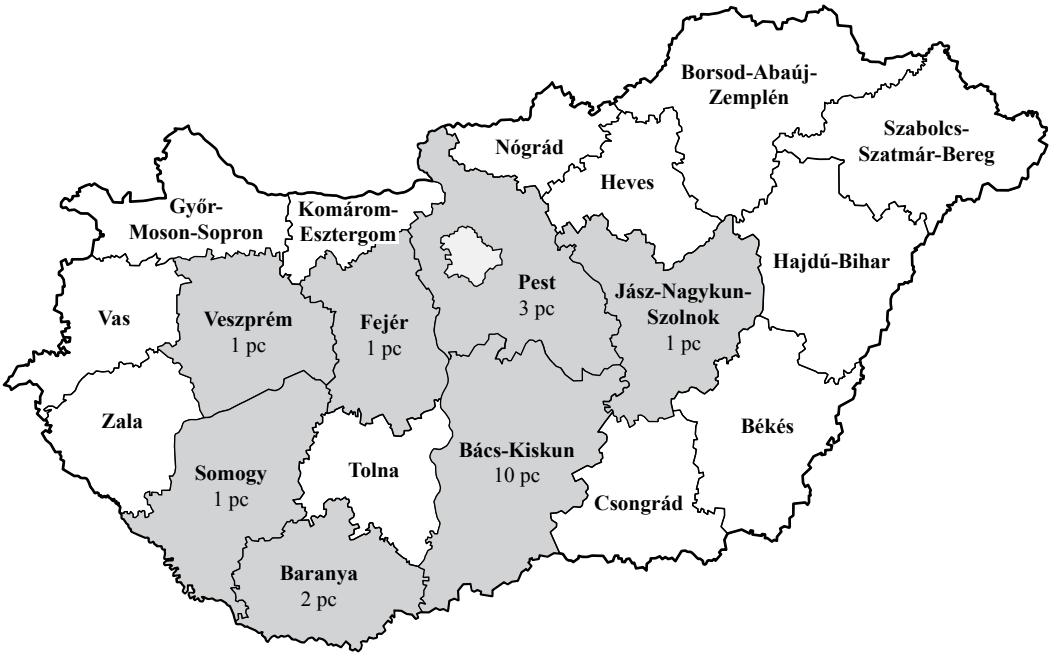


Figure 3: Distribution of analysed farm enterprises by county

The selection of farm households did not follow representative methodology. The final composition was determined by those farm types having demonstrated availability and willingness for collaboration. Consequently, conclusions drawn from the interviews and life histories refer only to the analysed population.

Besides the basic and comparable information regarding the farms and farmers, interviews also covered other aspects such as the circumstances governing the establishment of the farm and the farmers' motivation for starting farming. The "when", "why" and "how" questions shed light on the farm enterprise's diversity and on the introduction of new agricultural activities and functions Also taken into account are the directions and categories which are illustrated in Figure 1. Farm diversification encompassed ecological agriculture (organic and bio-dynamic farming), on-farm food processing, direct selling, provision of tourism and recreation services, biodiversity conservation, some form of extensive livestock breeding, or a combination of these.

[4] In the same article authors mentioned the limited autonomy of specialized farms had mainly been produced raw material for the agro-industrial chains. The real control of these farms got out of the producer's hand).

[5] The use of life stories in classifying Hungarian farmers was carried out also by Kovács (2008).

With the introduction of new farm activities and with the achievement of new agricultural functions, farmers intended to respond to the following challenges:

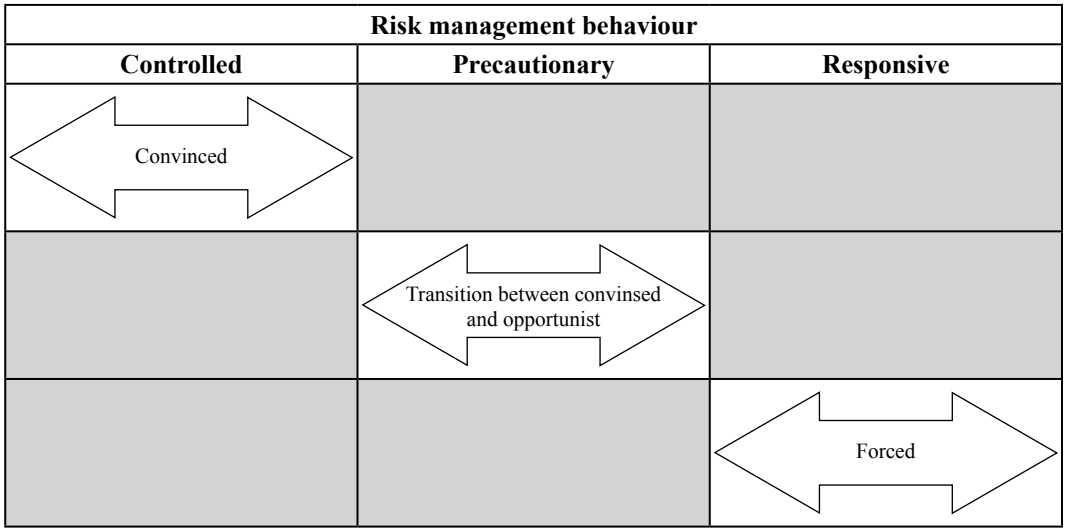
- the instability of wholesale prices for traditional agricultural commodities,
- the increasing monopolistic nature of the processing industry,
- growing production costs due to climate change and food safety and environmental requirements,
- unfavourable production and market conditions for agriculture.

Using information gleaned from interviews and applying Kostov and Lingard's work on risk management and rural development, the farmers can be characterised according to the following criteria:

- relation to tradition,
- awareness of the objective reality (reality that includes risks),
- values,
- degree of control and autonomy ,
- readiness for dialogue and dynamics,
- readiness to change
- mental account
- risk threshold.

The above traits allow one to divide farmers into categories both in terms of their risk management behaviour and approach to multifunctionality:

The Figure 4 header illustrates risk management behaviour categories, and the inner part of the arrows indicate categories for farmers' approach to multifunctionality. Figure 4 also shows the relationship between risk management behaviour and the approach to multifunctionality.



*We argue that purely opportunist group can also be formed.

Figure 4: Categories of farm households in terms of risk management behaviour and approach to multifunctionality

Member's position within the above categories can be summarised as follows:

Farmers committed to multifunctionality exercising control over risks (six farmers): They break with "tradition". This is also the reason why, since the outset, they they have been aware of their objective reality. Since they began farming, they have shown a strong measure of control over their circumstances. They strive for the utmost autonomy. Their version of events is influenced by personal values. They enjoy what they do, and act from personal conviction. They have strong values, and are passionate about their farming, and about the variety of activities they are involved in (MFA). MFA reinforces their existing values and beliefs. Since the outset, they have been involved in an ongoing and dynamic dialogue. Their risk threshold is the lowest. They are the most flexible of farmers.

Farmers *partially committed to multifunctionality and partially opportunistic with a prudent approach towards risk* (six farmers of which two can be viewed as totally opportunistic): They predict and avoid drastic problems. They are involved in MFA because for them it is a profitable thing to do; they are not value-driven. Tradition plays an important role in their strategies. They are less flexible than committed farmers but more than those who are obliged to act. This limited level of flexibility allows them to introduce changes in their livelihood strategy when the appropriate moment comes but not before. Their risk threshold is higher than that of the committed farmers, but they are also aware of the objective reality. At a certain point they perceive potential risks and become cognisant of them. Up until this point they display lack of control. Their autonomy increases after they have gone beyond the risk threshold, where they happen to establish dialogue and dynamics.

Farmers obliged to respond to risk (seven farmers): They are compelled to respond to ongoing events. They strive to alleviate the consequences of what is happening, and of what has already happened. They are not sure they are doing the right thing, but can't think of anything better. Their strategies and version of events are completely in sync with tradition. Thus, they are unaware of objective reality and its inherent risks. They display a complete lack of control and display dependence. Their risk threshold is the highest. In fact, they perceive risk only after it has hammered them on the head. Perception of risk is completely due to external reasons (shock, crisis), not because they recognise potential opportunities. Dialogue and dynamics arrive after the fact. They make choices because they have to, not because they want to. They exercised no control over potential risks, and they did not perceive potential risk until it hammered them on the head.

In the following paragraphs, we describe the farmers' motivation towards multifunctionality and how they interpret multifunctional agriculture regarding their own farm.

Farm level multifunctionality – through the eyes of farmers

Farmers' motivation toward multifunctionality and their interpretation are sharply defined by the categories which they fall in.

When analysing motivations toward multifunctionality among committed *farmers exercising control over risks,* it is important to underline their social- and family background, their childhood experiences and memories, and their personal desire to live a healthy life-style. These farmers' risk management approach is characterised by a state of control and they are as self-reliant as possible. Therefore, they have diversified into organic farming, on-farm food processing, and direct selling. They posses important moral principles and values and they are cognisant of objective reality, which includes risks.

Farmers who are partially committed and partially opportunistic with a prudent approach toward risks also exhibited a strong motivation to protect the environment and practise a healthy diet. These farmers have diversified into ecological farming; however their decision was driven not only by their personal ambitions but also by external factors, such as inherent perceived advantages They learnt about the opportunity from organic farming associations. Thus, personal conviction was not their motivating factor.

For farmers obliged to react to risk, economic hardships constituted the most important driving force toward multifunctionality and, in the end, provided their real motivation. Their reasons for farming were divided between family tradition and the personal desire to live in a rural area and cultivate land. There was, however, no discernible link between their social origin and personal motivation for farming and opting for multifunctionality. Prior to diversification, members of this group sold their products exclusively to wholesalers, and were not involved in on-farm food processing. Fluctuation of wholesale prices thus directly drove them towards multifunctionality.

At farm level, analysis of the respondents' answers as to how they understand and interpret multifunctionality has allowed a more detailed categorisation of agricultural functions than the widely accepted division into social, economic, and environmental functions. Functions, for example ethical, cultural, personal and household are stressed. Annex 1 summarises the functions referring to the different categories for farmers.

Conclusions

Multifunctional agriculture can be interpreted at different levels (national economy, regional economy, farm, meaning farm enterprise and farm household) levels. Our analyses have revealed that at the farm enterprise and farm household level there is further differentiation regarding the interpretation of multifunctionality. These particularities and differences should not be overlooked while formulating policy which favours the European Agricultural Model.

At the farm enterprise/household level multifunctionality entails one possible risk management tool. Farmers are not motivated exclusively by economic factors. Moreover, in the analysed population, there were farmers committed to multifunctionality and exercising control over risks. And their decision derived from motivations other than obvious short-term economic gains, allowing them to achieve a higher level of and more effective risk management. Short-term obvious economic benefits are the major driving force for those farmers obliged to respond to risks. One shouldn't expect that introducing incentives will automatically lead tofarm diversification and new agricultural functions.

A regional approach toward the study of multifunctional agriculture which encompasses cooperation among different scientific disciplines and their representatives demands a knowledge of farmers' behaviour and motivations.

Troubled disadvantaged rural areas are characterised by a high number of farmers in an emergency situation (farmers obliged to respond to risk). One can thus presume that their motivation for change will be determined primarily by obvious short-term economic gain. However, given that they believe in tradition, their willingness to take risks is minimal so one shouldn't expect subsidies to radically alter their short-term farming strategies.

Annex 1

Interpretation of multifunctionality at farm level by respondents' categories

<table>
<tr><th rowspan="2">Type of farmer</th><th colspan="6">Interpretation of multifunctionality at farm level</th></tr>
<tr><th>Environmental function</th><th>Economic function</th><th>Social function</th><th>Cultural function</th><th>Ethical function</th><th>Personal and household function</th></tr>
<tr><td rowspan="6">Convinced</td><td>Preservation of biological diversity</td><td>Farm is diversified toward new activities (processing, services, trading) that help rendering the farm less defenceless</td><td>Supply of societal services</td><td>Conservation and protection of the old peasant traditions and customs</td><td rowspan="6">Providing safe and healthy food and environment</td><td>Contribution to the conservation and improvement of the social cohesion of the family</td></tr>
<tr><td>Landscape conservation</td><td>Improving the employment</td><td colspan="2">Offering experience to visitors and at the same time conserving local cultural heritage</td><td>Enhancing the interdependence of the farm and the farmer family</td></tr>
<tr><td>Contribution to creating and maintaining a healthy environment</td><td></td><td>Contribution to supply of healthy and safe food</td><td>Conservation of the local typical gastronomic heritage</td><td>Contribution to rendering households less vulnerable on food and energy supply</td></tr>
<tr><td>Soil conservation</td><td>Improvement of population retaining in the rural areas</td><td>Contribution to strengthening women's role and as a result keeping youngsters in the rural areas</td><td></td><td></td></tr>
<tr><td></td><td></td><td>Contribution to the conservation and improvement of the social cohesion in rural areas</td><td></td><td></td></tr>
</table>

Type of farmer	Interpretation of multifunctionality at farm level					
	Environmental function	**Economic function**	**Social function**	**Cultural function**	**Ethical function**	**Personal and household function**
Partly convinced, partly opportunist	Environment protection	Standing on several lags	Contribution to supply of healthy and safe food		Provision of healthy food and environment	Possibility to realise own ideas
		Improvement of population retaining in the rural areas				
		Production of public goods subject to compensation				
		Creation of added value.				
Forced		Standing on several legs			Provision of safe and healthy food and environment	
		Safety for business				
		Disadvantage in the sense that it renders difficult to concentrate investments				
		Better use of farm and farm household endowments				
		Higher profit				

Source: Petrics, 2008.

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An analysis of food-economy companies' environmental behaviour in North-East Hungary

Odor, Kinga[1]

Abstract

After outlining environmental problems regarding food-economy[2] companies and clarifying the concept of environmental behaviour, I will present the results of my questionnaire survey which focussed on food-economy companies in the Northern Great Plain region (Region). Based on solid data, the survey was designed to evaluate the companies' commitment toward environmental protection.

Sometimes the observed value systems conformed with the results of other national surveys (e.g. environmental behaviour factors; environmental protection's rank among business aims), but at times I observed that in certain areas they truly lagged behind: for example, this held true for . the number of companies with a certified environmental-management system (EMS) and also for companies which were producing environmental reports and publishing them. It can be concluded that in the Region companies with higher revenues – and thus higher capability – do not try to do better at environmental management than companies with small or medium revenues.

Keywords

food-economy, environmental challenges, environmental behaviour, environmental-conscious management.

Introduction

One of the most important conditions for companies' long-term viability and competitive position is embracing environmental-social responsibility, and, over the last three decades, this has significantly improved among numerous companies. These days the moral approach toward environmental problems is drawing increasing attention because people neglect their responsibility by destroying the environment, thus endangering their own living conditions. Companies must not try to shirk or transfer their responsibility toward their environment and the society.

Numerous company directors have realized that the world of business is not a hermetically closed area but linked to its immediate and wider environment, its society and natural environment. Everywhere, but most notably in developed countries, they have been increasingly attentive to understanding environmental protection and the field of sustainability, incorporating it and the vital practical tasks related to the subject.

Rather than only profit maximization, ecological aspects and social norms have also been incorporated, which has meant that maximum profit no longer remains the be all and end all as environmental and social responsibly are considered an equally important duty (Frederick, 1986; O'Toole, 1991; Pataki, 2000; Chikán, 2002).

Based on international surveys (Kolk et al., 2001; KPMG, 2005, Daub, 2007), we can state that environmental protection's value is now apparent among companies and a number of companies are implementing environmental measures for reasons other than their corporate image. But

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[2] This includes agriculture, food industry and food-trade.

based on national Hungarian studies (Szolnokiné, 2005; Harkai et al., 2003; Nemcsicsné, 2005; Málovics – Rácz, 2005), one sees that in Hungary environmental protection and environmentally conscious management are only rare and random in Hungarian business practices.

The reasons for choosing the food-economic sector is that there are few similar studies of this field and nowadays environmental protection and a healthy lifestyle overlap, and hold special importance when it comes to food.

Environmental problems in the food economy

Environmental protection requirements impact on business management in different ways. One way is when *the government* changes market conditions by setting legal restrictions (e.g. hazardous waste) or introducing incentives (e.g. supporting bio-production). Another major motivation for companies is the activities of *special interest groups, environmental protection groups, and green movements,* which observe and publicly evaluate the companies' environmental performance. These groups strive to know about the companies' environmental protection objectives, activities, and results. These groups' opinion impacts on the firms' market position and helps shape the company image. Through their environmentally conscious behaviour and changes in their shopping habits, *customers* directly encourage the spread of environmentally-friendly products and anti-pollution technologies. M*edia* coverage of environmental catastrophes draws attention to environmental hazards and to the importance of protection practices.

It is particularly difficult to measure the environmental effects and involvement of different sectors. The food economy needs to be handled with special care due to its remarkable consumption of raw material and energy and its role regarding global problems. (Szolnokiné, 2005) There are several ways of measuring environmental utilization. In the 90s in Switzerland experts worked out *the environmental utilization matrix* and *the ecological demand matrix*. Using the environmental utilization matrix combined with a three-grade scale (Dyllick – Belz, 1996), the environmental effects of various food-economy sector elements were evaluated; these were agriculture, the food industry, trade, and consumption. Environmental effects encompass air, water and soil pollution, as well as material and energy consumption. They also encompass the effect on the ecosystem and health, and the amount of waste produced (Szolnokiné, 1999). The study of environmental problems can be extended to the mapping of ecological demands. Based on these criteria, we can examine to what extent the exploration and elimination of environmental problems is in the interest of different social groups, meaning market players, the government, public opinion, and movements. Szolnokiné (2005) found the following:

- Agricultural production may most seriously damage water, soil, and the ecosystem. To reduce environmental damage politicians and the government are the most effective.
- In the food industry, the main problem is the demand for water and energy. In this regard, the market players make their environmental priorities clear.
- The environmental hazard related to food-consumption is significant in the area of air and water-pollution with the production of waste material constituting a growing problem. In this regard, the enforcement of environmental protection imperatives is now rather weak.

Analysis of the matrixes supports the effectiveness of confronting food-economy companies with the environmental effects of their activities, and publicising the need for fostering environmentally conscious behaviour.

Defining "environmentally conscious behaviour"

Defining environmental consciousness and an environmentally conscious attitude is highly relevant for both individual and organization-level studies. In both cases, however, it is rendered difficult because the studied factors entail a subtle system, typical of environmental consciousness, influenced by researchers' subjective views.

Interpreting environmental consciousness is difficult without knowing the underlying attitude behind it. It is pertinent to distinguish between environmental consciousness and environmentally conscious attitude because consciousness often appears as an attitude influenced by external effects. I therefore dispute literary definitions that identify environmental consciousness with the attitude towards environmental protection.

Although a great deal of studies are concerned with business environmental consciousness (Banerjee – McKeage, 1994; Dudás, 2006; Nemcsicsné, 2008; Odor, 2008), and an exact definition is often absent. Its elements and multidimensional construction is surrounded with uncertainty, and empirical studies fail to encompass its dimensions and components.

I define *environmental consciousness* as a specific value and belief system, the manifestation of which is environmentally conscious behaviour. An organization's ecological behaviour is influenced by several components, which can be divided into individual and organizational dimensions. It can also be divided into many groups entailing an individual's environmental consciousness factors, and factors independent of the organization relating to the organization's members' behaviour. There are also factors which filter through the organization which impact on the members, and eventually on the entire organization.

We can define an *environmentally conscious attitude at the individual level* as an activity where environmental values are placed at the forefront of an individual's personal priorities.

At a company level, t*he concept of an environmentally conscious attitude* entails an environmental way of thinking that matures into concrete activities and reforms, according to which management operates an organization or a company, regardless of whether this reform was driven by a market mechanism or an administrative regulation.

Database and methods

When I examined the environmentally conscious attitude of the Region's companies, my aim was to gather the biggest possible number of samples.

I first tested my questionnaire at the 2007. Farmer-Expo. I used the observations and advice that I got from company representatives in personal interviews to create the questionnaire's final form.

In my study the company data refer to the Northern Great Plain region's top 200 food-economy companies in terms of revenue, and the data were provided by the Central Statistics Office. After phoning the companies, I discovered that several did not meet my study's criteria (activities, number of employees**,** revenue category), and I thus undertook only 134 questionnaire surveys and 22, or 38% of the questionnaires (30 unit) were completed.

There are 29 nominal, 50 ordinal (of which 2 are group forming variables: revenue and number of people categories) and 5 scale type questions. I tested the inner reliability of the questionnaire on each group of questions with Reliability analysis. (Malhotra, 2001; Spiegel, 1995) My result for all questions was 0.895, according to which I found the samples reliable for data analysis.

In choosing the methods to evaluate the questionnaire, I indicated that there was no high level of measurement in the questionnaire, only ordinal and nominal levels; instead of parametrical attempts I chose non-parametrical tests to examine the relationships.

Throughout the analysis I applied the following methods:

1. Descriptive statistics: mean, scatter, distribution ratio;
2. Mann-Whitney (M-W) test (in other words U test or rank sum test);
3. Spearman rank correlation.

The presentation of empirical results

Regarding the analysis of companies' distribution according to the number of employees, this sample is representative of this group's defining criterion. In the case of 46% of the companies, the number of employees falls between 20-49 while 27% employ 50-99 people, and another 27% employ over 100 workers (Figure 1).

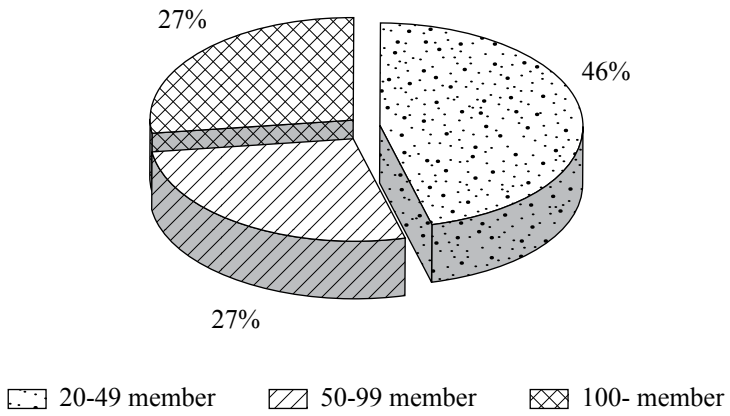

Figure 1: The distribution of companies according to the number of employees
Source: author's own edition

Figure 2 shows the distribution of companies according to revenue categories. 33% of the companies belong to the small revenue category; meaning their annual revenue doesn't exceed 100 million forints. 27% have revenue between 101 million and 1 billion forints and 40% of them make over 1 billion forints annually.

78% of the companies function as limited companies. 15% are joint-stock companies and 7% conduct economic activities as deposit companies.

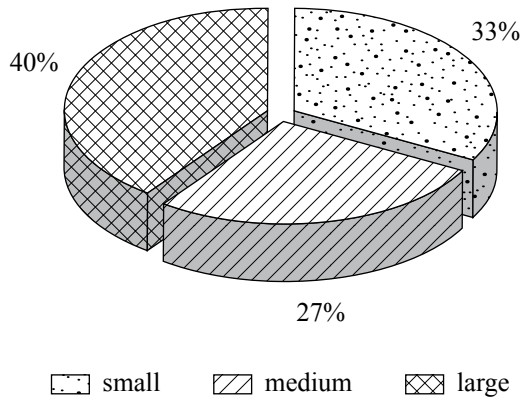

Figure 2: The distribution of companies according to revenue categories
Source: author's own edition

20 of the companies focus on 1 activity: 2 with agriculture, 9 with food-industry activities and 9 with food-trade. 10 companies are diverse: 2 of them with agriculture and trade, 3 with food-industry and trade, and 5 companies deal with all three activities.

In the survey I first examined how the respondent viewed the effect of environmental protection in terms of the company's success rate (Figure 3).

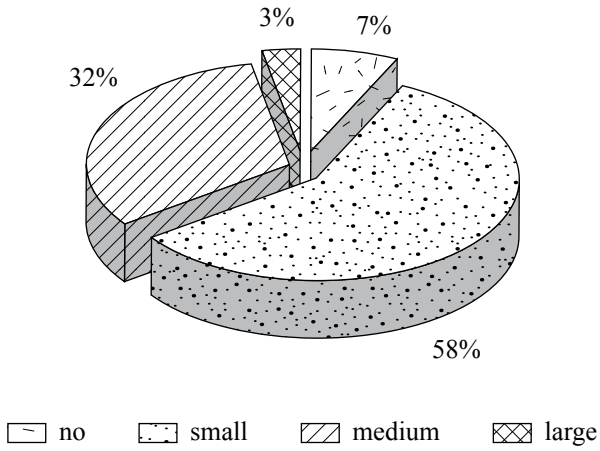

Figure 3: Views regarding the beneficial effects environmental protection has on a company's success
Source: author's own edition

It is significant that, according to 7% of them, environmental protection had no effect, while 58% thought it had little effect on the company's success rate. However, 35% considered this effect medium or considerable, but nobody attributed extraordinary significance to environmental protec-

tion. Nearly two-thirds of the respondents regarded environmental protection's beneficial effects as small, which is clearly reflected in the following findings.

Moreover, similar nation-wide research findings also support it (Málovics – Rácz, 2005; Nemcsicsné, 2005), and claim that around 40-50% of the company representatives from different economic sectors think that environmental protection has little impact on a company's success.

Based on a 5-grade scale (1-5), company management had to gauge *what emphasis each objective is given at the company* (Figure 4).

The figure clearly shows that most of the company's managers considered long-term profit growth the most important followed by finding new markets, then cutting down on expenses and short-term profit growth. As for environmental protection and improving the corporate image, it can be said that companies are less sensitive in this regard.

The reasons for the low values in the figure is that I transformed the data so that the Figure 4 and 5 findings could be clearly compared. Namely, in Figure 4 the evaluation scale was between 1 and 5, while in Figure 5 this scale was between -3 and +3.

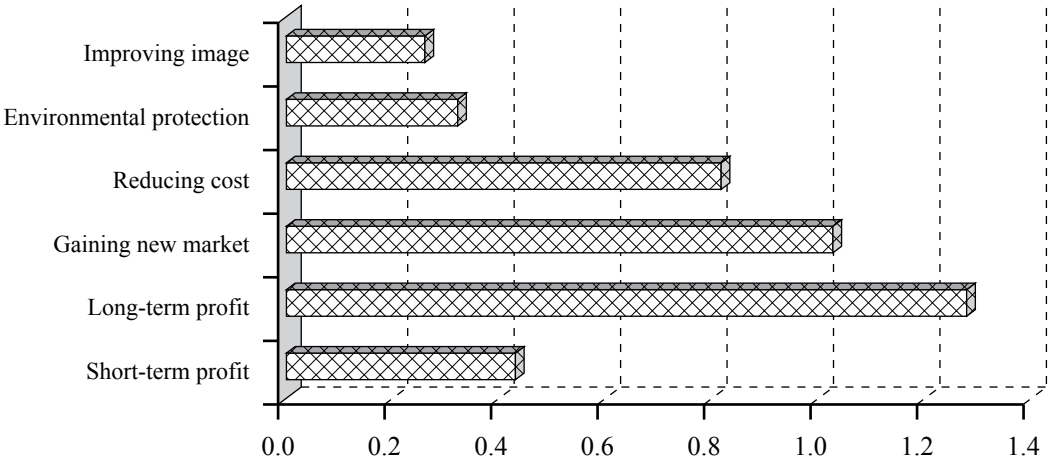

Figure 4: Gauging the importance of various business objectives
Source: author's own edition

The answers correspond to those in Szolnokiné's 2003 survey which was conducted in the region for food- economy companies. Then environmental protection ranked near the bottom among company priorities and we can see that companies' attitudes toward environmental protection have not changed since then.

Regarding the previous question, the respondents had to grade on a scale of 1 to 7 (-3, +3) the following matter: "*if your company paid more attention to environmental protection (decreasing emissions, developing environmental-friendly products, etc.), how would it affect your company's objectives?"* (Figure 5).

Throughout the evaluation period, it emerged that the presumed measure would firstly improve the environmental-protection conditions and the image of the company, which management did not previously rate as highly important. They contended that it would facilitate finding new

markets and long-term profit growth to a moderate extent; however, it would technically have no effect in terms of cost cutting and would adversely impact short-term profit growth.

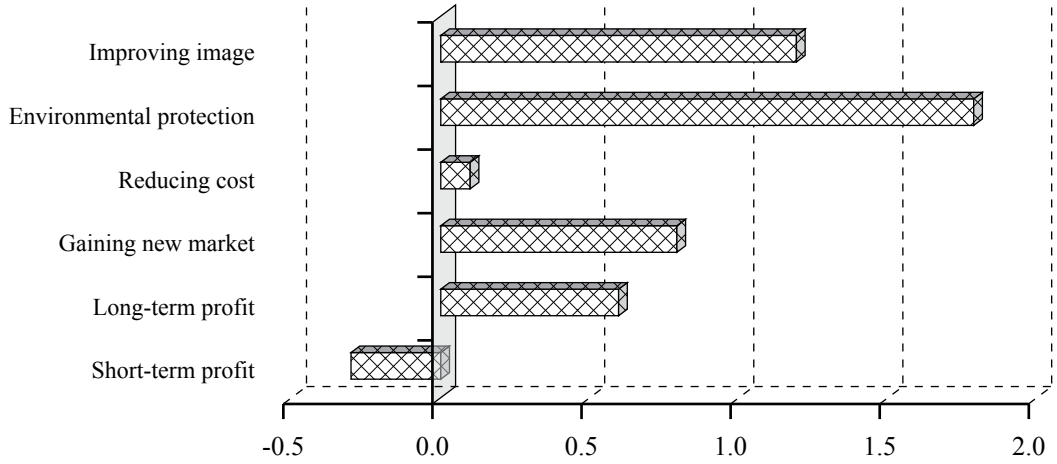

Figure 5: The importance of business objectives regarding more restrictive environmental protection provisions

Source: author's own edition

On the basis of revenue categories, I examined to what extent each factor prompts companies to introduce environmental management (Figure 6).

The figure clearly indicates that, when it comes to the factor related to companies' judgement, for each revenue category a significant difference only arises a in terms of the owners' and partners' expectations, while the respondents had roughly the same view for other factors.

Low-revenue companies are mainly motivated by owner expectations, meaning the wish to conform to formal provisions and to introduce environmentally conscious management. They probably find the above factors more important than others because through them they hope to gain new markets, new customer segments, and economic advantage, and also to corporate image improvement. They regarded the other factors about equally.

Medium-revenue companies highlighted tenders and the wish to conform to provisions as significant motivating factors while rating the other factors as about equally important – except for owner expectations, which are considered much less important than the others.

High-revenue companies are motivated mainly by tenders and the wish to conform to provisions when it comes to introducing environmental management probably because they are multinational companies, and have a business model linked to their international connections and the custom-system of their foreign partners. Foreign countries with stricter regulations and more developed environmental consciousness expect the same from their partner companies, mirroring their own commitment towards the public. In Hungary such processes only appear among companies with international relations.

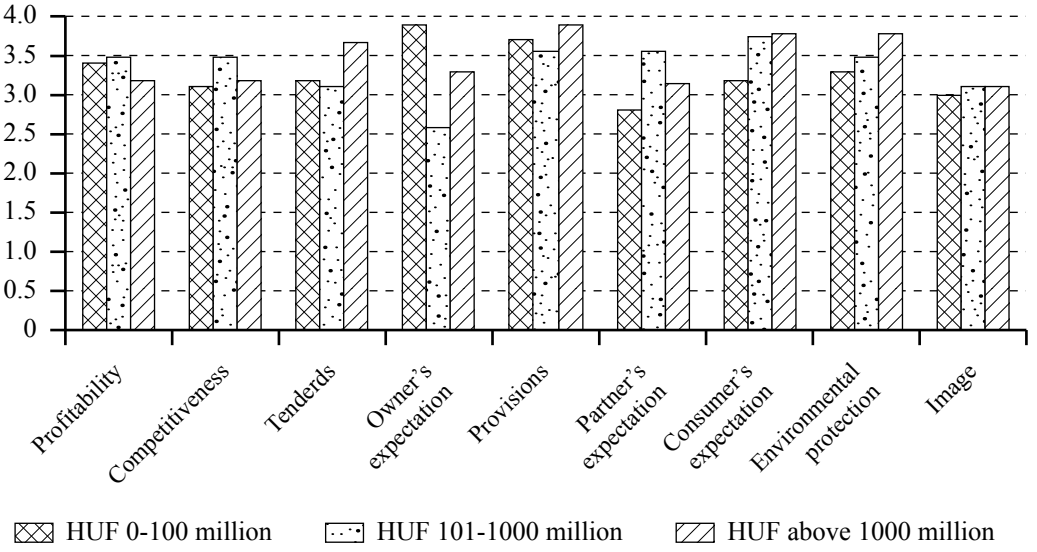

Figure 6: The rate of environmental business management factors in revenue categories
Source: author's own composition

My results only partially correspond with the results of the *In Competition with the World* (Harkai et al., 2003) national research program, which says that companies are mainly motivated to introduce EMS by strict regulations and the partners' and the customers' expectations. In her 2005 PhD dissertation, Nemcsicsné uses her national survey as a basis to assert that stricter governmental intervention and improving corporate image are motivating factors. In Málovics – Rácz's 2005 national survey, interviewed companies rated as most important corporate image, partners' expectations, and tenders.

Evaluating the companies' factor judgement was rendered more difficult because, in the survey, there were not only single-profile companies and because companies' activities are not identical in certain revenue-categories.

Figure 7 illustrates to what extent certain factors motivate companies to introduce environmental-friendly management., using as a basis 18 food-industry and food-trade single-profile companies.

The figure clearly shows that *food-trade companies* rate all factors – except for tenders – as more significant than food-industry companies, and it appears clear that the mostly multinational food-trade companies place greater stress on environmentalism as a motivating factor because of their foreign partners' expectations.

An overlap is apparent between customers' concerns for environmental protection and a healthy lifestyle, both of which have assumed greater importance, especially given that food is regarded as a vital product. If companies wish to remain competitive, it is not enough to meet existing customer needs, but also to predict and act on customer demands. They also have to satisfy more enlightened customers.

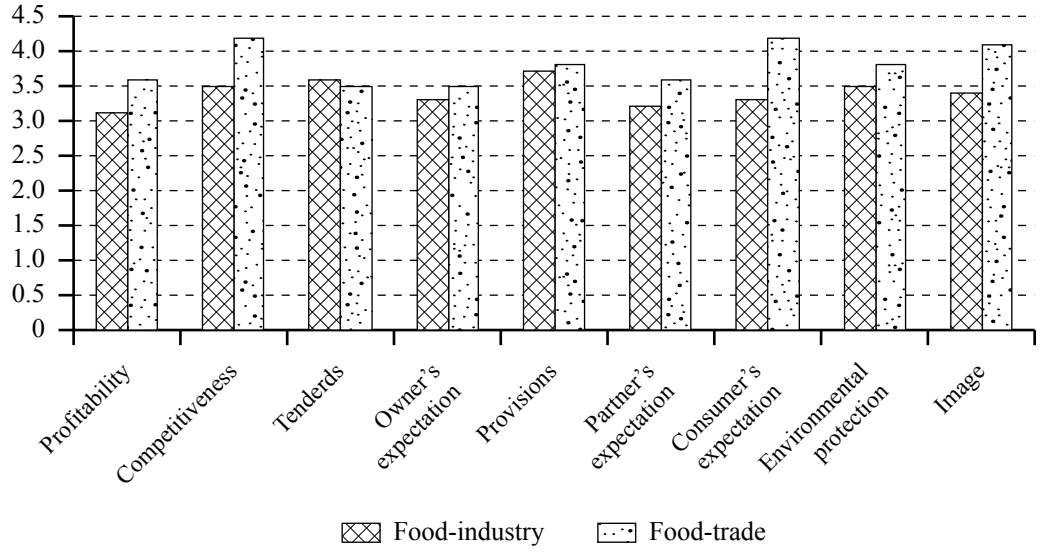

Figure 7: The judgement of environmental attitude factors in food-industry and food-trade companies

Source: author's own edition

The figure indicates that regulations, tenders, and environmental protection were granted an extraordinary role. I suppose that companies dedicated to environmental protection firstly use tenders to try to implement technological development, forcing them to agree to stricter and stricter regulations (1995. LVII. Law on sewage storage, 1996 and 2000 government edict on waste material storage, 2007 government edict on the introduction of Environmental Basic Registration System).

For *food-industry companies* my results partly correspond to Szolnokiné's 2003 regional results, showing that legal regulations especially influence companies, but customer expectations and competitors also serve as motivating factors.

In her 2005 study, Szolnokiné reaffirms that in the *food-industry it is mainly the market players who put environmental interests at the forefront* (Szolnokiné, 2005). Moreover, in 2008 it was also apparent that companies focus on customer and their partners' expectations.

A parallel can be found between the judgement regarding factors in food-trade and food-industry companies, as the latter also highlighted customer and partner expectations, agreement with regulations and environmental protection, which were probably due to the above mentioned reasons.

Using Spearman's rank correlation, I again examined the connection between the commitment to environmental protection and other factors for the whole sample. Based on the rank correlation co-efficient, it was concluded that commitment to environmental protection is in a weak-medium strong correlation with owners' expectations ($r = 0.495$) and correlates weakly to image ($r = 0.415$). No relation can be established between other factors.

With M-W test I was striving to discover if there is a relationship between companies whose owners are committed to environmental protection and similar attitudes in partner companies. The results showed a significant difference as $p = 0.011$ (Table 1). Companies where environmental protection is highly important for their owners also require more from their partners in this field.

Table 1

The importance of environmental-conscious attitude at partner companies

Owner's expectation	Average	Group size
Significant (4-5 answers)	3.78	8
Insignificant (1-2-3 answers)	2.88	22
Altogether	3.12	30

Source: author's own edition

Then I studied *whether companies in the survey have a formalized environmental-management system (ISO 14001, EMAS) and if they will be introduced in the near future*.

Out of the 30 companies, only 8 have a certificate and only 2 reported that the ISO 14001 system was in the process of being introduced. Among the 8 companies, 7 were concerned with food-trade and 1 with food-industry. Of the companies with ISO 14001 standard, 2 belong to the small, 1 to the medium, and 5 to the high-revenue categories. It is sobering that of the 12 companies in the high-revenue category, only 5 have a certificate and only 1 medium-revenue company is planning to introduce EMS. The answers in the questionnaire do not clearly indicate why the other companies are not concerned with establishing EMS.

Of the examined companies, none owns an EMAS certificate and none plans to establish it. If companies do not meet obligations under the ISO 14001 certificate, they are not likely to introduce an EMAS system, which subjects them to even stricter constraints.

The number of food-economy companies with EMS is also low regionally and nationally. In 2006 in Hungary about 1000 companies possessed EMS, meaning nearly 5% of agricultural sector enterprises, and about 3% of beverage, and tobacco-production companies. These rates are rather low compared to other sectors as, for example, 12-13% of companies in the service or construction-sectors have a certificate (Juhász, 2006).

In light of international and national results, it seemed relevant to examine the question of *whether companies are concerned with publishing their environmental impact and/or in other environmental data* (Figure 8).

40% of the small-revenue companies do not publish their environmental data; 20% publish them in their annual report and 40% publish a separate environmental report. 38% of the medium-revenue companies simply do not publish their environmental data; 62% of the group inform the public through their annual report. For large-revenue companies this rate is 43% and 57%.

It is noteworthy that the high-revenue multinational companies do not follow the international trend in independently publishing environmental data. Presumably small-revenue companies publish independent environmental reports to illustrate their strong commitment towards environmental protection, thus hoping to gain new markets and economic advantages. 2 are food-industry companies, 2 agriculture, food-industry and food-trade.

The results do not conform with national and international tendencies. Several studies (Kolk et al., 2001; KPMG, 2005; Daub, 2007) indicate that over the past decade the number of companies concerned with the environmental effects of their activities has increased, and they publish various reports (annual report, environmental protection statement, environmental report, sustainability report). In Hungary, based on data published in KÖVET – INEM HUNGÁRIA, one observes that,

in 2008, the number of environmental reports published has reduced, while the number of environmental statements has increased. Moreover, the number of sustainability reports shot up, then dropped slightly (KÖVET, 2008).

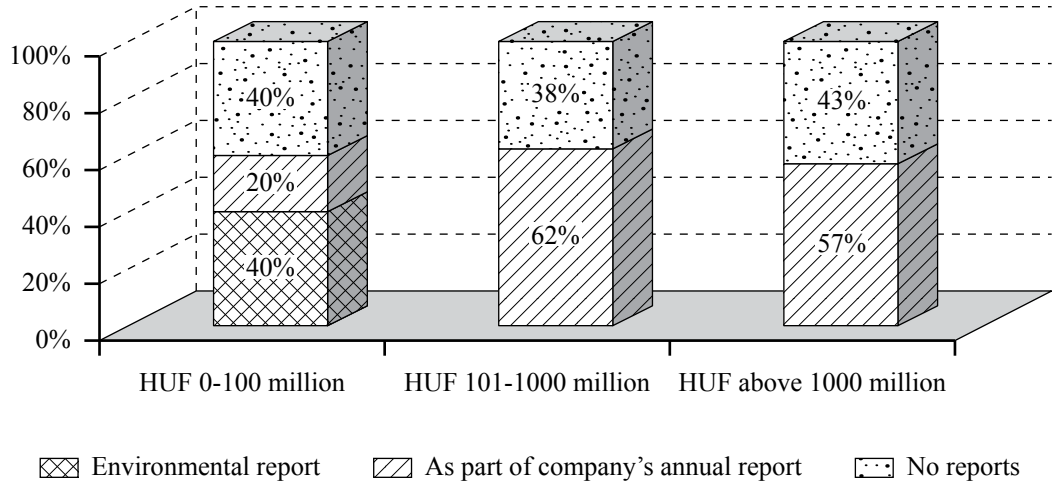

Figure 8: The publication of the effects of business activities on the environment

Source: author's own composition

Each area's level pertaining to environmental problems and the importance granted to environmental protection had to be assessed by the respondents on a 1-5 scale. After that I checked the correlation between the two areas. Most companies considered repair-maintenance as the cause behind major environmental problems, while transportation and distribution were in last place. (What makes companies think transportation doesn't pollute the environment?) In the other fields environmental impact is estimated at about equal levels. Environmental protection was considered most important when it came to wrapping materials and managing waste, but in all areas the significance of environmental protection was estimated to be higher than the scale of environmental problems. The rate is almost double when it comes to these areas, and is also related to the use of raw materials and energy carriers.

Using a Spearman rank correlation test, I calculated a correlation co-efficient for certain areas between the rate of environmental problems and the role of environmental protection (Figure 9). Regarding repair-maintenance processes, there was not even a weak correlation ($r < 0.3$), but for the other factors a medium ($r = 0.5$-0.7), or a medium-strong ($r > 0.7$) correlation were found.

The extent to which a company's management recognizes environmental challenges and its ability to implement environmental business management could be crucial to a company's future. The environmental management system may influence business management's tilt toward toward sustainability and the protection of environmental values (Kerekes – Szlávik, 1996). When it comes to publication and customers' attitude, marketing may have the most important role. Companies' environmental attitude in itself is not enough to capitalize on the competitive advantages derived from positive environmental behaviour. For this they need dynamic communication and a "greening" of their entire marketing activities

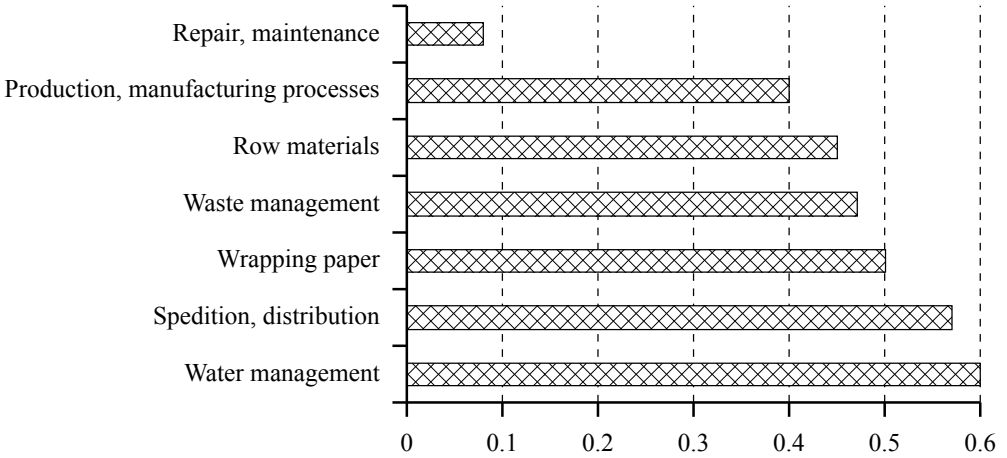

Figure 9: Correlation co-efficient for estimating the rate of environmental problems and the importance of environmental protection in each area

Source: author's own composition

In light of the above, a question was created regarding how the respondents estimated (1-5) potential obstacles to eco-marketing (Figure 10) and its advantages (Figure 11) in the company's life.

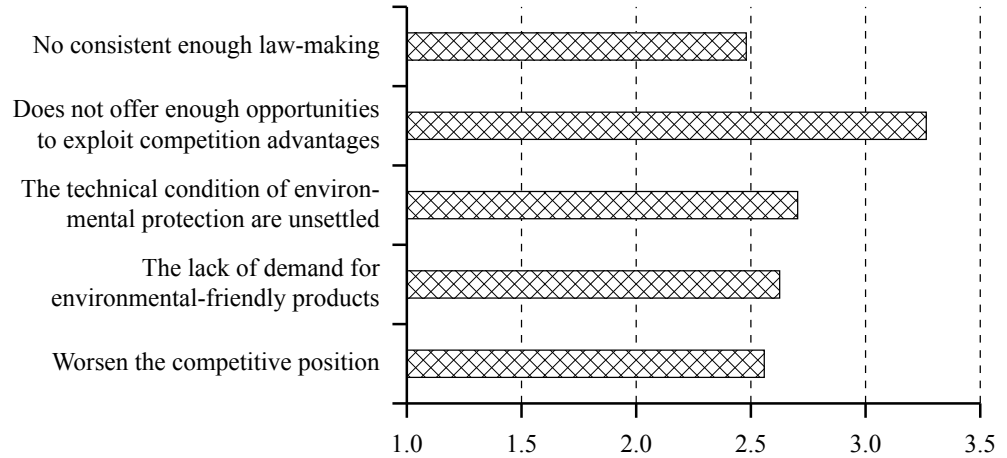

Figure 10: Obstacles to eco-marketing

Source: author's own composition

Respondents especially perceived obstacles to eco-marketing because it does not offer ample opportunities for exploiting competitive advantages, plus the technical conditions for environmental protection are unsettled. They considered as equally disadvantageous ambiguous government edicts and legal constraints regarding environmentally-friendly products, and unfortunately they think that introducing eco-marketing would seriously worsen their competitive position.

Respondents regarded accessing new markets and shaping business image as the greatest benefit of establishing eco-marketing. The results show that the potential for long-term profit and conquering new customer segments are not negligible.

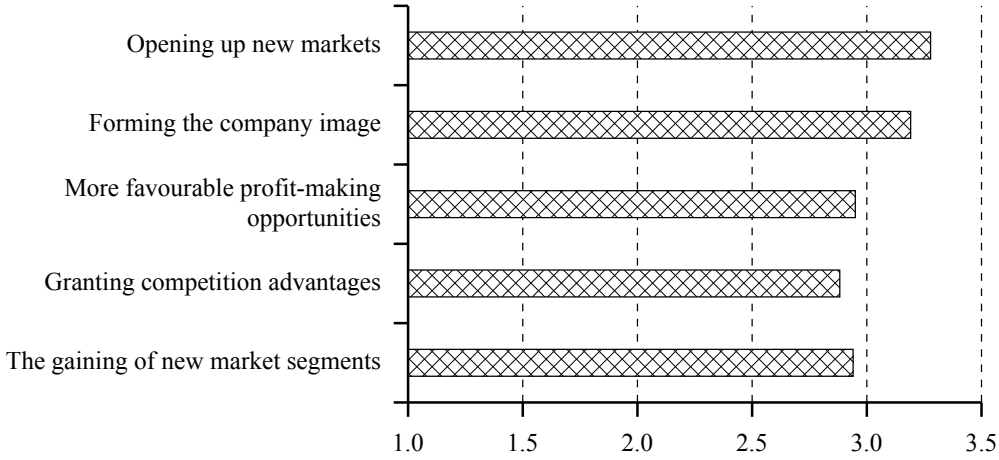

Figure 11: The advantages of more widespread eco-marketing
Source: author's own edition

Conclusion

In studying the environmental behaviour of food-economy companies in the North-Plain Region, one can conclude that, because of low environmental consciousness at the management level, companies do not regard environmental-conscious management as very significant. This is partially proven true as two-thirds of the companies surveyed felt that environmental protection had very little effect on their enterprise's success. However, long-term profit growth ranks first among company objectives as do accessing new markets and reducing costs. They also think that paying more attention to environmental protection would only serve to improve their environmental protection activities and their corporate image while hindering other corporate objectives.

When comparing results in this paper with the regional results in Szolnokiné's 2003 analysis (Szolnokiné, 2005), it is clear that during the last 5 years basically no changes have occurred in company directors' attitude toward environmental protection.

My value-systems sometimes correspond to others such as national survey results gauging environmentalism factors, and the place of environmental protection in business aims. However, I observed some noticeable shortcomings in the Region (e.g.: the number of EMS certified companies, making and publishing environmental reports). Despite greater resources, it is possible to state that the higher-revenue companies do not pay more attention to achieving environmental management than small and medium-revenue companies.

In this study the most fundamental message is that it is necessary for all socio-economic players to devote more attention to enhance environmental protection. Developing environmental consciousness among customers, increasing non-governmental organizations' and movements' activities, and strengthening the state's regulating role in sustainability can only encourage company management and companies to develop their environmental consciousness, attitudes, and related activities,

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