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COMPARING THE LEVELS OF EXPECTATION AND SATISFACTION OF INDIAN AND FOREIGN ADVENTURE TOURISTS VISITING INDIA

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Abstract: **Purpose** – The present study is undertaken to explore the difference between expectation and satisfaction level of Indian and foreign adventure tourists and the relationship between the levels of expectation and satisfaction of Indian and foreign adventure tourists.
Methodology – The data has been gathered from a sample of 300 adventure tourists comprising of 150 Indians and 150 foreigners. A principal component analysis with varimax rotation has identified 28 relevant items, which are broadly clustered into 6 significant factors. They are labeled as Aesthetic Appeal, Facilities, Accommodation, Information, Food and Safety and Security.
Findings – The findings of this study revealed significant differences between the levels of expectation and satisfaction of adventure tourists of Indian and foreign origin. The level of expectation among the Indian and foreign adventure tourist is higher and, comparatively, the level of satisfaction is lower. The level of expectation and the level of satisfaction of Indian adventure tourists are positively and significantly correlated with respect to variables such as Aesthetic Appeal, Facilities, Safety and Security and Accommodation. For the foreign adventure tourist, the level of expectation and level of satisfaction are positively and significantly correlated with respect to variables such as Information, Aesthetic Appeal, Facilities and Food.
Practical Implications – The research findings will help in the promotion of adventure tourism in India.
Originality/ Value – The identified factors can be used for similar kinds of studies at different destinations. The results of the study would be instrumental in developing strategies for ensuring more satisfied tourists.

Keywords: Marketing, Expectation, Satisfaction, Perception, Adventure Tourists

Increasing lust for *adventure and world culture* and *pure nature* are generally considered to be the factors supporting India's tourist allure. Since India is strategically located and has fabulous natural and cultural tourist resource wealth, it is now high time that the country prepares to favorably meet the tourist influx. This, in turn, would demand a thoroughly professional attitude and efforts on part of tourism planners, public and private sector tourism enterprises, researchers and academicians. Appropriate strategies to penetrate the desired micro and macro tourist market segments must be taken up on a priority basis. Likewise, facilities, amenities and services need to be created which take into consideration the generic expectation levels of the potential tourist, but in the manner that the tourist does not act parasitically on the destination environment or which would lead to the dilution or distortion of the *'local value'* or country's image. So far, the practice has been to identify tourist demand on the basis of simple perceptions and not on authentic research.

The study of the levels of expectation and satisfaction has paramount significance in so far as sustained development of tourism at the given destination is concerned. While the level of expectation of the potential tourist acts as a deciding factor in his/her decision to visit a particular destination, the satisfaction level speaks about the quality of the composition of tourist product (attraction + services + socio-cultural status + economics + ecological environment) experienced. (Singh, 2004).

As such, the expectation level of tourist is, in a way, the cumulative expression of the degree of his/her awareness level with regard to the given destination vis – a – vis his/her socio / cultural / economic background. Quite often, the information available to the potential tourist about the destination, i.e., about the prevailing tourist appeal, tourist plant service and quality of overall environment, is considerably different from the realities on the ground, as it may be incomplete, insufficient or confusing, resulting in

indecision or a reluctance to visit the given destination in which the tourist would have otherwise been keenly interested, had the information been closer to the experienced realities. Yet another implication could be that the resulting dream image perceived by the tourist owing to overenthusiastic marketing efforts may lead to his/her actual visit to the destination, in which he/she would have been otherwise uninterested. If, the right person does not visit the right place, it is bound to create chaos which would neither be to the benefit of the customers, the industry or the destination environment. Tourist access to correct information, in turn, depends on a variety of factors, i.e. the degree of professionalism of the destination promoters, effectively of the media /style/design/design opted by them to create awareness in the market, the personal whims of word of mouth (publicity) and any misinterpretation of the message by the tourist himself/herself. Evidently, if the potential customers are not aware, less aware or wrongly aware about the prospective destination, the marketing efforts / strategies need urgent review. In such circumstances, tourist expectation studies provide vital clues to the marketers and developers to take appropriate courses of action. (Singh, 2004)

The significance of tourist satisfaction does not need any justification; less satisfaction is bound to have far reaching impacts on the image of the destination, due to negative word of mouth publicity.

Thus, if the areas of tourist dissatisfaction are realistically explored and well planned actions are taken accordingly, the symbolic downfall of the destination because of the distorted image can be realistically translated into its progressive prosperity. Furthermore, too high expectations seldom lead to high satisfaction, even though the actual overall experience of the customer may be close to what is expected. Therefore, efforts should always be directed towards not raising too high expectation, all the same taking into consideration that expectations below a certain level may not translate a potential demand into an effective one.

Since perspectives of satisfaction and expectation are also based on the individual perception and aptitudes; as the same set of suppliers cannot satisfy even two individuals of same age, income, occupation and social group, it becomes challenging to create an ideal situation where the expectation and satisfaction levels of more than one person can be ensured. Of course, if the generic factors responsible in this regard vis-à-vis broad market segments (age, income, occupation, place of residence, motivation) are carefully researched, appropriate marketing strategies and also the provision of the proper mix of facilities and services can be developed at the destination. It is to this end that the present study has been undertaken.

Literature review

Researchers do not agree on how to define the terms Tourist Expectation, Tourist Perception and Tourist Satisfaction.. Akama and Kieti (2003) argue that tourists usually have initial expectations on a service before they consume it. According to Tribe and Snaith (1998), expectations are what people anticipate regarding their experience. Akama and Kieti (2003) hold that such expectations are formed through information from advertisements and word of mouth perceptions from other consumers during past experience. Expectations of a frequent consumer of service would rely more on the influence of past experience than sources of information. The four levels of customer expectations are the ideal, predicted, deserved and minimum tolerance. Expectations are always changing because consumers are aware of alternative service providers in the ever-growing industry. Hence, increased competition suggests a need for an improved standard of service. Rodriguez del Bosque, Martin and Collado (2006) add four similar factors to those by Akama and Kieti (2003). These are: past experience, the tourist's level of previous satisfaction with the service, communication from the service provider such as promises and the tourist's perceived image of the service.

Williams and Buswell (2003:65) define perceptions as "a comparison to excellence in service by the customer" and argue that perceptions are made at the end of a service encounter. However, Zeithaml (1988) believe that a process of judgment is performed during the service delivery process and then once more at the post-consumption stage. The nature of judgment can be subjective, for example two consumers can formulate totally different perceptions of an identical service experience. Customer perceptions of a service are complex judgments and can be modified by factors such as the consumer's mood and/or importance of the encounter. On another note, Bennett (2000) believes that expectations and perceptions can form a basis for travel.

Qu and Ping (1999) also argue that tourist satisfaction can be affected by tourists' initial expectations concerning a destination. Such expectations are influenced by several factors. Firstly, the advertising strategy applied by service providers is important because, if not well developed, it can create expectations that can be difficult to satisfy. Advertisements include brochures, media and informal interactions from friends and relatives (word of mouth advertising). Secondly, experience with similar services and their personnel can cause tourists to compare and make judgment regarding quality. Added to this is the fact that some tourists simply expect more service and are therefore likely to set high expectation standards.

Simpson (2000) point out that expectation may determine experiences tourists will enjoy because every tourist has a unique agenda prior to visit. Akama and Kieti (2003) add that the extent to which tourists' initial expectations are met or exceeded determines the level of satisfaction. In situations where the overall performance by the tourism service provider meets or exceeds initial expectation, the tourist is considered satisfied. Where performance is below the tourists' initial expectation, satisfaction level is considered low or non-existent. In order to emphasize the importance of

perceptions in contributing to satisfaction, Saleh and Ryan (1993:107) state: *"Satisfaction is determined by the consumers' perceptions of the service and attention they receive from the representative of the service company with whom they are dealing."*

In addition, Heung *et al.* (2001) argue that people's perceptions can be influenced by internal factors such as values, motives, socio-demographics and external factors such as media and past experience. They also argue that tourists make decisions on satisfaction based on how they perceive services; hence it is crucial that they perceive that a service will satisfy them. Following the arguments on expectations and perceptions in the literature, it becomes obvious that the key to improving tourist satisfaction is to reduce the gap between tourist expectation and the perception on the services consumed at a destination. This is important because good service quality is likely to result in tourist satisfaction since satisfaction is an affective concept based on the individual's needs and desires (Qu & Ping, 1999). Arguments by the cited authors suggest that expectations and perceptions play an important role in determining satisfaction.

Tourist satisfaction is important to successful destination marketing because it influences the choice of destination, the consumption of products and services, and the decision to return (Kozak & Rimmington, 2000). Several researchers have studied customer satisfaction and provided theories about tourism (Bramwell, 1998; Bowen, 2001). For example, Parasiraman, Zeithaml, and Berry's (1985) expectation-perception gap model, Oliver's expectancy–disconfirmation theory (Pizam and Milman, 1993), Sirgy's congruity model (Sirgy, 1984 ; Chon and Olsen, 1991), and the performance – only model.(Pizam, Neumann, and Reichel, 1978) have been used to used to measure tourist satisfaction with specific tourism destinations. In particular, expectancy-disconfirmation has received the widest acceptance among these theories, because it is broadly applicable.

Pizam and Milman (1993) utilized Oliver's (1980) expectancy-disconfirmation model to improve the predictive power of travelers' satisfaction. They introduced the basic dynamic nature of the disconfirmation model into hospitality research, while testing part of the original model in a modified form. In order to assess the causal relationship between two different disconfirmation methods, they employed a regression model with a single "expectation – met" measure as the dependent variable, and 21 difference–score measures as the independent variables. Some studies on customer satisfaction are also notable in tourism behavior research. For example, Pizam, Neumann and Reichel (1978) investigated the factor structure of tourist satisfaction with their destination areas. The authors showed eight distinguishable dimensions of tourist satisfaction.

Barsky and Labagh (1992) introduced the expectancy – disconfirmation paradigm into lodging research. Basically, the proposed model in these studies was that customer satisfaction was the function of disconfirmation, measured by nine "expectations met" factors that were weighted by

attribute – specific importance. The model was tested with data collected from 100 random subjects via guest comment cards. As a result, customer satisfaction was found to be correlated with a customer's willingness to return.

Chon and Olsen (1991) discovered a goodness of fit correlation between tourist expectations about a destination, and tourist satisfaction. Then, after tourists have bought the travel service and products, if the evaluation of their experience of the travel product is better than their expectations, they will be satisfied with their travel experience. Furthermore, Chon and Olsen (1991) provided an intensive literature review of tourist satisfaction. One thing to be noted, however, is that although the posited social cognition theory offers an alternative way of explaining satisfaction processes, its methodological mechanism is analogous to that of expectancy–disconfirmation theory. In other words, the concepts of congruity and incongruity can be interpreted similarly to the concepts of confirmation and disconfirmation, both of which can result in either positive or negative directions.

Kozak and Rimington (2000) reported the findings of a study to determine destination attributes critical to the overall satisfaction levels of tourists. Pizam, Neumann, and Reichel (1978) stated that it is important to measure consumer satisfaction with each attribute of the destination, because consumer dis/satisfaction with one of the attributes leads to dis/satisfaction with the overall destination. Furthermore, Rust, Zahorik, and Keiningham (1993) explained that the relative importance of each attribute to the overall impression should be investigated because dis/satisfaction can be the result of evaluating various positive and negative experiences.

Oliver's (1980) expectancy-disconfirmation model has been used in the present study. Tourist expectation and satisfaction with respect to six attributes namely: Information, Aesthetic Appeal, Facilities, Safety and Security, Accommodation and Food have been measured in the present study.

Research model
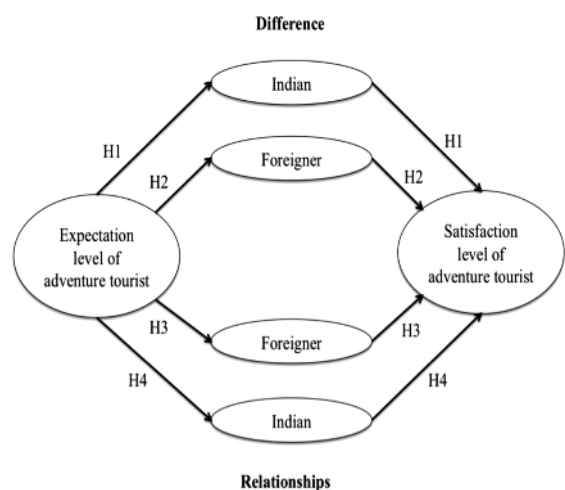
The aims of this research are to:
- To identify the gap between level of expectation and level of satisfaction of an adventure tourist of Indian and foreign origin
- To understand the relationship between level of expectation and level of satisfaction of an adventure tourist of Indian and foreign origin

Consequently, on the basis of review of literature we hypotheses;

H1 There would be significant difference between the expectation and the satisfaction level of an adventure tourist of Indian origin.
H2 There would be significant difference between the expectation and the satisfaction level of a foreign adventure tourist visiting India.
H3 There would be significant relationship between expectation and satisfaction level of an India adventure tourist.
H4 There would be significant relationship between expectation and satisfaction level of foreign adventure tourist visiting India.

Research methodology

To test the above hypotheses, comparison was done between the level of expectation and level of satisfaction of adventure tourists of Indian and foreign origin and the relationship between the level of expectation and level of satisfaction of adventure tourists of Indian and foreign origin was studied.

The information on expectation and satisfaction level of Indian and foreign adventure tourists in India have been collected using a questionnaire developed by the authors.

The first two hypotheses (H1 and H2) of significance of mean differences were tested by using t-test. The other two hypotheses (H3 and H4) of relationship were tested by using correlation analysis.

Sample

On thoroughly reviewing the filled questionnaires, 300 tourist questionnaires comprising of 150 Indian and 150 foreign adventure tourists belonging to the age group 25 – 55 years were found appropriate for data analysis.

Tools Used

The questionnaire on tourist expectation and satisfaction was developed by taking feedback from multiple focused group interviews with adventure tourists. The focused group interview data was analyzed by adopting content analysis technique. The content analysis has helped to develop a list of attributes for tourist expectation and tourist satisfaction.

A pilot study was conducted with 50 adventure tourists interested in diverse adventure sports.

A 5 point scale ranging from strongly disagrees to strongly agree was used to study participants assessment of individual attributes. On an average the survey took about 5-10 minutes to complete. All the questionnaires were personally administered by a researcher.

Factor Analysis

The conceptual scheme of the study consists of tourist expectation and tourist satisfaction attributes to understand the level expectation and level of satisfaction of adventure tourists of Indian and foreign origin, with respect to each attribute. In order to conduct analysis it was important to reduce the data to a manageable size. Data collected was loaded into SPSS and preliminary analysis began with reducing the data set into factor. Detailed results of factor analysis and varimax rotations are summarized in *Table 1*. (Factor Analysis is a technique for identifying groups and clusters of variable. Principal component analysis is concerned only with establishing which linear component exists within the data and how a particular variable might contribute to that component.)

The following table provides a brief description of factors extracted by factor analysis according to the criterion of factor loading greater than or equal to 0.6 and Cronbach's alpha reliability coefficient greater than or equal to 0.75.

A summary for ready reference is presented in *Table 2,* which shows
a) the major constructs used in the study
b) their factor analytically derived dimensions
c) the number of items constituting the factors

Thus, 28 out of 39 items of the questionnaire on tourist satisfaction were found to be factor analytically meaningful.

The result of factor analysis has yielded 6 factors upon principal component analysis with varimax rotation. These factors were named as follows: Aesthetic Appeal, Facilities, Accommodation, Information, Food and Safety and Security. Furthermore the significance of difference of mean and significance of relationship was tested on a sample of adventure tourist.

Factors of tourist expectations and satisfactions

Information – The structure of this factor indicates the importance of information in attracting, making aware and holding the adventure tourist. Appropriate information, at the right time and at the right place helps in converting the potential tourist into an actual adventure tourist for a specific destination. Information factor includes the aspects such as quality, quantity, variety, availability, reliability and technicality. This factor has an important implication on the levels of expectation and satisfaction of adventure tourists.

Aesthetic Appeal – This factor is related with the beauty and appeal of the destination. Natural beauty and its

Table 1: Summary of factor analysis results

Factors	Variables	Loadings					
		1	2	3	4	5	6
Factor 1	**Facilities**						
1	I expect the adventure recreation facilities to be ample in India	.732					
2	I expect the availability of equipment for adventure sports to be adequate	.803					
3	I expect the expertise of the instructors to be good	.794					
4	I expect the variety of adventure sports options to be ample	.832					
5	I expect the adventure sports options for amateurs to be good	.852					
6	I expect the adventure sports options for experienced seasoned adventurers to be good	.795					
7	I expect the porter facilities to be available in abundance	.802					
8	I expect the pony facilities to be available in abundance	.807					
9	I expect the price – value equation of the adventure sports packages to be adequate	.705					
Factor 2	**Aesthetic Appeal**						
1	I expect the natural beauty of the destination to be impressive		.713				
2	I expect that the places generally would be less polluted and refreshing in India		.822				
3	I expect that the eco – friendly tourist practices are adopted		.839				
4	I expect the Adventure tourist destinations not to be overcrowded		.809				
5	I expect that the places are exotic and worth visiting		.743				
Factor 3	**Information**						
1	I expect the information about the adventure sports options in India to be adequate			.788			
2	I expect the promotional literature regarding adventure tourism in India is impressive			.891			
3	I expect the information on trekking routes to be up to the mark			.805			
4	I expect the availability and reliability of counter maps to be high			.702			
Factor 4	**Safety and Security**						
1	I expect the safety and security measures for adventure sports to be good				.793		
2	I expect the quality of equipments used for adventure sports to be good as per the safety standards				.831		
3	I expect the rescue operations to be good in India				.692		
4	I expect that the crime rate is not high				.626		
Factor 5	**Food**						
1	I expect the availability of food at adventure destinations to be adequate					.685	
2	I expect the quality of food to be good					.790	
3	I expect the food to be hygienic					.813	
Factor 6	**Accommodation**						
1	I expect the number of accommodation units at the adventure tourist destinations to be adequate						.821
2	I expect the accommodation facilities to be comfortable						.843
3	I expect the quality of the tents and its accessories such as mattresses and sleeping bags to be good						.825

Table 2. Table showing Cronbach's alpha coefficients indicating the internal consistency for the respective factors

S.No	Factors	Mean values	No. of items	Eigen value	% Variance	Cronbach's alpha
1	Aesthetic appeal	4.26	5	3.889	10.48	.868
2	Accommodation	3.96	3	1.37	3.71	.859
3	Facilities	3.79	9	8.86	23.95	.934
4	Information	3.77	4	3.59	9.71	.850
5	Safety and security	3.64	4	2.69	7.26	.858
6	Food	3.59	3	1.93	5.20	.849

uniqueness is a major pull factor for any destination. This factor comprises of attributes such as the natural beauty of a destination, the exoticness of a destination, eco-friendly practices adopted at the destination and level of pollution and level of congestion at the destination. The hygienic, neat and clean and refreshing surroundings adds up to the natural beauty and appeal of the destination. Aesthetic appeal is a strong determinant of tourist expectation and satisfaction level as the tourist is not only interested in the activity itself but also with the exoticness of the surrounding in which the activity takes places, it sharply enhances the overall experience.

Facilities – The structure of this factor indicates the importance of making adventure sports activities smooth, and comfortable besides being thrilling and exciting. This factor consists of attributes such as availability of equipment,

expertise of instructors, and variety of adventure sports options for amateurs and experienced, seasoned adventurers, support of porters and ponies and price-value equation of adventure sports packages. Facilities and services at the destination form the major essence of a destination. The success or failure or popularity or non-popularity of the destination depends on this factor irrespective of the natural beauty of that destination. Hence, it is a major factor which plays a key role in formulation of expectation and leads to tourist satisfaction or dissatisfaction.

Safety And Security – The factor structure demonstrates the importance of secured feeling at the destination. This factor is not only related with the safety of a tourist while participating in adventure sports with respect to the quality of equipment, rescue operations and safety measures taken for adventure sports, but also safety in the destination with respect to any crime, such as theft, physical assault, or any kind of harassment. This factor has a far reaching effect on the level of expectation and on the final level of satisfaction.

Accommodation – This factor demonstrates the importance of place of stay at the destination. To feel comfortable and at peace the place of rest and relaxation where one spends more than half a day should be good. This factor comprises of attributes such as availability, variety and comfort of accom-modation facilities. This factor not only includes the built accommodation (e.g., hotels, motel, resorts and guest houses) but also movable accommodation units, such as tents and accessories such as mattresses or sleeping bags. As the present area of study is adventure sports, there are a number of sports and destinations where permanent accom-modation is neither possible nor feasible, e.g., trekking, mountaineering, river water sports. The tourist ventures into the naïve, fragile areas and select their own camp site in accordance with the accompanying guide after judging the surrounding area (often close to a water body). After a thrilling and activity prone day, the place of accom-modation, its quality and ambience plays a very important role in overall satisfaction with the destination/activity as a whole. If the stay is not comfortable and relaxing, this has a bearing on the activities of the ensuing day and on the days to come.

Food – This factor indicates the importance of food so much so that it is covered as a separate factor and is not integrated with accommodation. This factor comprises of attributes such as availability, quality and hygiene of food. Availability includes not only existence of something to eat at the destination/ activity area, but also the multiplicity of cuisines; the cuisines that the tourist are used to, the cuisines that are

unique to the destinations, the cuisines that are globally accepted. Food is one of the basic needs and hence has to be provided with great caution. Food again is one of the major factors leading tow satisfaction or dissatisfaction with a destination. Expectations with regard to food further lead to satisfaction or dissatisfaction with food.

All the above mentioned six factors are responsible for the overall satisfaction level of the adventure tourist. Tourism industry is a complex industry and forms a complete whole by the amalgamation of many things. If any one component is missing, the phenomenon cannot take place. Similarly, tourist expectations and satisfactions are dependent on all these factors and dissatisfaction with any one of the factors can lead to overall dissatisfactory experience of the tourist.

Findings of the study

A comparison of the mean of the level of expectation and the level of satisfaction of adventure tourists of Indian and foreign origin was done using t-test option in SPSS. The results of the test are summarized in the following *Table 3* and *Table 4*.

Table 3: Significance of Difference in Mean Scores on Expectation and Satisfaction of Indian Adventure Tourists in India using the t-test

	Expectation		Satisfaction		Df	t	p	Sig
	Mean	SD	Mean	SD				
Information	3.87	0.42	3.11	0.56	149	14.11	< 0.001	S
Aesthetic Appeal	4.28	0.51	4.48	0.65	149	3.53	< 0.001	S
Facilities	3.76	0.57	3.24	0.48	149	9.96	< 0.001	S
Safety and Security	3.53	0.59	2.49	0.73	149	14.98	< 0.001	S
Accommodation	4.04	0.51	3.35	0.53	149	13.61	< 0.001	S
Food	3.61	0.58	3.03	0.51	149	9.23	< 0.001	S
Total	3.86	0.34	3.33	0.37	149	14.68	< 0.001	S

S – Significant

Table 4: Difference in Mean Scores on Expectation and Satisfaction of Foreign Adventure Tourists in India

	Mean		Mean		Mean	SD	Mean	SD
	Mean	SD	Mean	SD				
Information	3.68	0.43	2.78	0.51	149	19.29	< 0.001	S
Aesthetic Appeal	4.41	0.48	4.22	0.70	149	4.05	< 0.001	S
Facilities	3.83	0.42	2.90	0.44	149	20.72	< 0.001	S
Safety and Security	3.75	0.40	2.21	0.65	149	23.72	< 0.001	S
Accommodation	3.89	0.39	2.58	0.78	149	18.9	< 0.001	S
Food	3.59	0.47	2.31	0.77	149	20.77	< 0.001	S
Total	3.86	0.26	2.92	0.28	149	32.52	< 0.001	S

S – Significant

H1: There would be significant differences in the levels of expectation and satisfaction of Indian adventure tourists in India

First, a comparison of mean ratings of the levels of expectation and satisfaction of India adventure tourists was done for all the variables. There is a significant difference in the levels of expectation and satisfaction of Indian adventure tourists in India with respect to all the variables: Information, Aesthetic Appeal, facilities, safety and security, accommodation and Food. It is observed from Table 3 that the mean values of level of expectation of Indian adventure tourists for all the variables is high, as compared to the level of satisfaction for all the variables, with the exception of aesthetic appeal, where the mean value of level of satisfaction is higher (4.48) than that of the level of expectation (4.28). The table reveals that the level of expectation among Indian tourists is higher and the level of satisfaction is comparatively less. The mean difference between the levels of expectation and satisfaction is statistically significant at $p < 0.001$ in the case of all the variables. (Table 3). Thus the hypotheses H1: There would be significant difference in the levels of expectation and satisfaction of Indian adventure tourists in India is accepted.

H2: There would be significant difference in the levels of expectation and satisfaction of foreign adventure tourists in India

Next, a comparison of the mean ratings of the levels of expectation and satisfaction of foreign adventure tourists was done. The results in Table 4 indicate that mean values of the level of expectation were much higher than thaose of the level of satisfaction of foreign adventure tourist for all the variables. The mean difference between the level of expectation and level of satisfaction is statistically significant at $p < 0.001$ in case of all the variables. The level of expectation of the foreign tourist is high and comparatively the level of satisfaction of the foreign tourist is low. Thus the hypotheses H2: There would be significant difference in expectation and satisfaction level of foreign adventure tourists in India is accepted.

The relationship between the level of expectation and level of satisfaction of adventure tourists of Indian and foreign origin was checked using the correlation option in SPSS. The results of the tests are summarized in *Table 5* and *Table 6.*

H3 There would be significant relationship between the levels of expectation and satisfaction of Indian adventure tourists in India.

Table 5 shows that the levels of expectation and the levels of satisfaction of Indian adventure tourists are positively and significantly correlated with respect to variables such as Aesthetic Appeal, Facilities, safety and security and Accommodation. For the variables such as Information and Food, the level of expectation and the level of satisfaction of foreign adventure tourists are not significantly correlated. Although the correlation is significant and positive between

Table 5: Correlation between the Levels of Expectation and Satisfaction of Indian Adventure Tourists in India

	Expectation	Satisfaction	Correlation	p	Sig
	Mean	Mean			
Information	3.87	3.11	0.106	NS	NS
Aesthetic Appeal	4.28	4.48	0.313	< .001	S
Facilities	3.76	3.24	0.272	< .001	S
Safety and Security	3.53	2.49	0.188	< .021	S
Accommodation	4.04	3.35	0.284	< .001	S
Food	3.61	3.03	0.017	NS	NS
Total	3.85	3.33	0.246	< .05	S

S – Significant
NS – Non Significant

Table 6: Correlation between the Levels of Expectation and Satisfaction of Foreign Adventure tourists in India

	Expectation	Satisfaction	Correlation	p	Sig
	Mean	Mean			
Information	3.68	2.78	0.267	< .001	S
Aesthetic Appeal	4.41	4.22	0.555	< .001	S
Facilities	3.83	2.90	0.174	< .05	S
Safety and Security	3.75	2.21	–0.104	NS	NS
Accommodation	3.89	2.58	0.061	NS	NS
Food	3.59	2.31	0.339	< .001	S
Total	3.86	2.92	0.107	NS	NS

S – Significant
NS – Non Significant

the levels of expectation and satisfaction of Indian adventure tourists for variables: Aesthetic Appeal, Facilities, Safety and Security, and Accommodation; the correlation is low, ranging between 0.2 to 0.3. The overall relationship between the level of expectation and the level of satisfaction of Indian adventure tourists, taking all the variables together, is positive and significant ($p < 0.05$). The value of correlation coefficient is 0.246 which is positive and significant but low.

Thus, the hypotheses: There would be a significant relationship between the levels of expectation and satisfaction of Indian adventure tourists with respect to variables such as Aesthetic Appeal, Facilities, Safety and Security and Accommodation in India is accepted, and

the Hypotheses: There would be a significant relationship between the levels of expectation and satisfaction of Indian adventure tourists with respect to variables such as Information and Food in India is rejected.

H4: There would be a significant relationship between the levels of expectation and satisfaction of foreign adventure tourists in India.

Table 6 shows that the level of expectation and the level of satisfaction of foreign adventure tourists are positively and significantly correlated with respect to variables such as Information, Aesthetic Appeal, Facilities and Food. For variables such as Safety and Security and Accommodation, the correlation is not significant. The highest significant correlation between level of expectation and level of satisfaction of foreign adventure tourists is for the variable Aesthetic Appeal ($r=0.555$) and the lowest significant correlation between the levels of expectation and signification of foreign adventure tourists is for the variable Facilities ($r=0.174$). The variance in the values of correlation for different variables is more in the case of foreign adventure tourists; it ranges from low to moderate positive significant correlation.

The second observation of the study is that there is a significant and a positive correlation between levels of expectation and satisfaction of both Indian and foreign tourists, i.e. with changes in expectation level there are going to be changes in the satisfaction level of adventure tourists. For the Indian adventure tourist, the relationship between expectation level and satisfaction level is significant and positive for Aesthetic Appeal, Facilities, Safety and Security and Accommodation. For the foreign tourist, the relationship between expectation level and satisfaction level is significant and positive for Information, Aesthetic Appeal, Facilities and Food.

Thus, the Hypotheses: There would be a significant relationship between the levels of expectation and satisfaction of the foreign adventure tourists, with respect to variables such as Information, Aesthetic Appeal, Facilities, and Food in India is accepted, and

the Hypotheses: There would be a significant relationship between the levels of expectation and satisfaction of foreign adventure tourists with respect to variables such as Safety and Security and Accommodation in India is rejected.

Discussion and implications

The results of the study show that there is a significant difference between the levels of expectation and satisfaction of Indian and foreign adventure tourists. The expectation level of both Indian and foreign adventure tourists are much higher than the corresponding satisfaction level of adventure tourists. The expectation level might be high because of the high perception of the adventure tourist of Indian adventure tourism destinations with regard to natural resources or topographical features; services which have a direct relation to hospitality; facilities which are a natural outcome of a strong economic base; safety and security as it is regarded as a peaceful country. The Indian economy is growing at a very fast pace and, along with it, it is assumed that infrastructure, superstructure, facilities and services will also grow. The

mean scores of the level of expectation of Indian adventure tourists are greater in variables such as Information and Accommodation than the level of expectation of foreign tourists, indicating that Indian's have higher levels of expectation for Information and Accommodation and levels of expectation of foreign adventure tourists are greater than Indian adventure tourists in variables such as Aesthetic Appeal, Facilities, Safety And Security and Food.

On observing the satisfaction level of Indian and foreign adventure tourists, it is clear that the satisfaction level of Indian adventure tourists is higher than the satisfaction level of foreign adventure tourists for all the variables. The possible reasons for this may be that the foreign tourists have more international exposure and the facilities and services available in India might not meet international standards. The Indian adventure tourist has less international exposure and the adventure sports in India are also relatively new; hence the level of satisfaction is comparatively high.

The second observation of the study is that there is a significant and a positive correlation between the levels of expectation and satisfaction of both Indian and foreign tourists, i.e. with changes in expectation levels, there are going to be   changes in satisfaction levels of adventure tourists. For the Indian adventure tourist, the relationship between expectation level and satisfaction level is significant and positive for Aesthetic Appeal, Facilities, Safety and Security and Accommodation. For the foreign tourist, the relationship between expectation level and satisfaction level is significant and positive for Information, Aesthetic Appeal, Facilities and Food.

As there is a significant difference and significant relationship between the expectation levels and satisfaction levels of both Indian and foreign adventure tourists, it is suggested that this difference be reduced and the relationship further strengthened. The difference can be reduced by forming expectations of tourists with appropriate information closely reflecting the realities on location, so that they formulate expectations which are closer to the realities and would thereby lead to greater satisfaction.

The formulation of appropriate expectations for the adventure sports in India is a very sensitive issue, as lower expectations might not turn a potential tourist into an actual tourist and higher expectations might not necessarily result in a higher satisfaction level. Moderate expectations are best, as the possibility of moderately satisfied or highly satisfied tourists increases, thereby ensuring positive word of mouth, boosting the tourist traffic movement to the destination and, in the process, ensuring returning clientele, which is the major motive of all destinations.

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NEW SOURCES OF EMPLOYMENT TO PROMOTE THE WEALTH–GENERATING CAPACITY OF RURAL COMMUNITIES

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Abstract: New Sources of Employment to Promote the Wealth-Generating Capacity of Rural Communities (acronym: RuralJobs) is a collaborative research project partly funded under the European Commission Research and Development 7th Framework Program. The RuralJobs consortium consists of partners drawn from eight European Union (EU) countries (Bulgaria, France, Hungary, Italy, Lithuania, Romania, Spain and UK). The project began on February 2008 and finished in October 2010. RuralJobs quantified labour market, demographic and economic trends, and the impact of employment creation measures and policies in seven, representative "reference areas" across the EU, and used the information to demonstrate how rural development measures can be better targeted and how rural development policies should evolve. We identified labour market, demographic and economic trends in rural areas across EU-27 and the potential for new sources of employment outside traditional primary and secondary sector activities, and examined the interaction between different types of rural area (peri-urban, remote, high environmental/amenity value etc.). We identified employment growth areas where rural development programmes can be targeted to increase their contribution to employment creation. Our strategic objectives were the following: review of employment policies and programmes, scenarios for new sources of employment according to rural typologies, recommendations for better targeting of strategies, dissemination and mainstreaming. The main outcome expected is that the results will allow a better targeting of rural development measures and future evolution of rural development policies in line with the Lisbon Strategy.

Key words: RuralJobs, rural employment, labour market, strategies

Introduction

Fifty-six per cent of the population of the 27 Member States of the European Union (EU) live in rural areas representing 91% of its territory. This is why rural development is so vitally important. Article 158 of the consolidated version of the current Treaty, on economic and social cohesion, establishes that "the Community shall aim at reducing disparities between the levels of development of the various regions and the backwardness of the less favoured regions or islands, including rural areas".

RuralJobs quantified the employment needs and potentials in different typologies of pilot areas within contrasting reference areas in seven countries, evaluating the effectiveness of past and current policies in addressing these needs and potentials, and by systematic analysis of the results, providing guidelines on the better targeting of future rural development measures.

The RuralJobs consortium consisted of partners drawn from eight European Union (EU) countries. The partners were selected on the basis of the following criteria: a track record of previous cooperation, geographical distribution and complementary skills (Fieldsend, 2008). The partners of RuralJobs:

- University of Debrecen, Hungary, the Coordinator,
- University of Plymouth Higher Education Corporation, UK,
- Universitatea Babes Bolyai, Romania,
- Lithuanian University of Agriculture, Lithuania,
- Consejeria de Agricultura y Pesca – Junta de Andalucia, Spain,
- Conseil Regional de Limousin, France,
- Institute of Agricultural Economics, Bulgaria, and
- Istituto Nazionale Istruzione Professionale Agricola, Italy.

RuralJobs has four strategic objectives:
- review of employment policies and programmes,
- scenarios for new sources of employment according to rural typologies,
- recommendations for better targeting of strategies, and
- dissemination and mainstreaming.

Methodology

2.1. The division of tasks

RuralJobs is divided into 'work packages' (WPs), of which WP1 is project management and WP7 covers all dissemination activities (Fieldsend, 2008).

There are five research-based WPs: WP2 'Assessment of labour market policies and programmes', WP3 'Assessment methodologies and indicators', WP4 'Typology for regions', WP5 'New strategies for employment in pilot areas' and WP6 'Synthesis of recommendations'.

WP2. Assessment of labour market policies and programmes

WP2 was designed to review the current state of knowledge relating to rural employment in the EU.

WP3. Assessment methodologies and indicators

The objective of WP3 was to select methodologies that can be used to collect, from the study areas, the necessary data to assess, on the basis of a recognised set of indicators, labour market, demographic and economic trends, the impact of employment creation measures and policies in the reference areas and top-down and bottom-up constraints on their effectiveness. The work package was divided into two tasks.

WP4. Typology for regions

In order to challenge the 'one size fits all' position, a framework is needed in which we can demonstrate that different types of region require a different policy approach to rural employment. Thus, WP4 interprets the field research results of RuralJobs WP5 in terms of a regional typology.

WP5. New strategies for employment in pilot areas

The objectives of this WP were to identify labour market, demographic and economic trends in a selection of representative pilot areas an to identify employment growth areas in the context of available human capital, skills and adaptability as well as demand for labour and existence of top-down and bottom-up constraints.

WP6. Synthesis of recommendations

This WP collects all results from all WPs, producing a set of recommendations with the aim of helping decision makers at the EU, national and regional levels to better target rural employment development strategies and programmes.

WP7. Dissemination and technical assistance for mainstreaming

WP7 manages all activities associated with dissemination, exploitation, marketing and long term maintenance of the results of the project and provides technical assistance and a framework for the mainstreaming of good practices identified and developed through the project.

The main products are the following:
- *Collaborative platform*. Agora-Project (http://www.agora-project.net/), a flexible and evolutionary web application composed of several modules, has been chosen as a tool for sharing information and collaborative work.
- *Website*. This is structured by the following main pages: background, objectives, methodology, work-packages, publications, partners, links, and contacts. The deliverables are being posted on the site in PDF format. The website went online in January 2009.
- *Newsletter*. The first newsletter was sent out in August 2009 to all contacts identified in a deliverable and via partners' own mailing lists.

2.2. The RuralJobs typology and rationale behind it

The main purpose of rural typologies is to ensure that policies for rural areas are based on a fundamental recognition that the issues that they are seeking to address are multi dimensions. It is important to explore the range of issues of concern, the way in which the typology will be used and the scale at which data are available to avoid the practical problems of typology development and its implementation.

The typology chosen for RuralJobs (Raupelien , 2009) was applied at NUTS3 level and was based on an EU DG Regio study (Dijkstra and Poelman, 2008) which combines a new classification of remoteness, based on accessibility measured by driving time to the closest city (of 50,000 inhabitants or more), with the OECD classification of rurality based on population density (OECD, 1994). RuralJobs combined this with the criterion of competitiveness of region, which is measured by GDP per capita. The result is twelve 'types' of NUTS3 region of which four are urban, two are very few intermediate, remote regions regardless of level of GDP, and six 'types' of rural area which occur widely.

The choice of 50% as the GDP threshold, rather than 75% which is currently used by the EU at NUTS2 level to define 'convergence' and 'competitiveness and employment' regions, reasonably clearly divided the regions of the EU-15 and the New Member States (NMS) from Eastern Europe into separate groups. RuralJobs deliverable D2.1. (Pakurár and Kovács, 2008) has demonstrated major differences in the characteristics of the rural labour market of the two types of region.

The research undertaken in the RuralJobs project was founded on three hypotheses:
1. That a territorial approach to improving the wealth generating ability of rural areas through the creation of new sources of employment is required, whilst recognising the uniquely important role of agriculture and other land-based industries in the rural economy.
2. Initiatives to create new sources of employment in

rural areas must take full account of the existence of markets for the products of labour, whether these are in the primary, secondary or tertiary sectors. Frequently, the largest markets are in urban areas

3. Rural areas in different parts of the EU are fundamentally different from each other in many respects and that a single, EU-wide "solution" or "strategy" for creation of rural employment is not appropriate. Through the study of a representative selection of "reference areas" it may be possible to identify a set of general principles which can be applied in varying combinations to different typologies of rural area.

The RuralJobs typology therefore addresses all three RuralJobs hypotheses and is an adequate framework within which results must be interpreted. We recognised that the Dijkstra and Poelman (2008) study was work in progress, but we felt that the merits of using a 'recognised' EU methodology outweighed its possible weaknesses.

According to the typology, of the 'high GDP' EU NUTS3 regions, 15% of all EU regions are 'predominantly rural - accessible', 8% are 'predominantly rural - remote' and 29% are 'intermediate - accessible'. Of the 'low GDP' regions, 6% are 'predominantly rural - accessible' 3% are 'predominantly rural - remote' and 6% are 'intermediate - accessible'. The remaining 32% of EU NUTS3 regions are 'predominantly urban' (Raupelien , 2009).

Seven of the eight RuralJobs partners undertook field research in pilot areas. Thus all six most common rural 'types' of region were included in the research:

• 'high GDP – urban – accessible' and 'high GDP – intermediate – accessible' (UK),
• 'high GDP – predominantly rural – accessible' and 'high GDP - predominantly rural - remote' (France),
• 'high GDP – intermediate – accessible' and 'high GDP – predominantly rural – remote' (Spain),
• 'low GDP – intermediate – accessible' (Bulgaria),
• 'low GDP – predominantly rural – accessible' and 'low GDP – predominantly rural – remote' (Hungary),
• 'low GDP– intermediate – accessible' and 'low GDP
• predominantly rural – accessible' (Lithuania), and 'low GDP – predominantly rural – remote' (Romania).

The RuralJobs review of previous relevant researches (Sabau and Paquiet, 2009) noted many different approaches to defining the boundaries of study areas for field research. Frequently, administrative boundaries (NUTS2, NUTS3 or NUTS4) were used. As our research was expected to "examine the interaction between different types of rural areas (peri-urban, remote, high environmental/ amenity value etc.) and the evolution of labour markets, travel to work areas and changing work patterns", we opted to use 'labour market' or 'employment' areas. Remarkably, in most countries

represented in the RuralJobs research, evidence was available which allowed these areas to be defined, as follows: 'Travel to Work Areas' (TTWA) in the UK (Bond and Coombes, 2007); 'Local Labour Systems' (LLS) in Hungary (Radvánszki and Sütő, 2007); and 'agglomeration areas' in Bulgaria (Anon., 2007). In France, a 'Pays' is the result of a collective bottom-up approach with regional approval of its boundary. Only in Romania was it necessary to use an administrative territory (a NUTS 3 region) as a pilot area. Inevitably, the methodology used to define labour market areas is different in the different countries.

It was sometimes less easy to define which parts of the pilot area were rural. It is widely accepted (e.g. Kerekes, 2010) that a single definition of 'rural' does not exist. Thus, as with labour markets, different RuralJobs partners adopted different definitions of 'rural' but again this is not a serious problem. In all pilot areas, rural areas share two sets of properties giving a degree of homogeneity:

• They have relatively low population densities.
• Their landscapes are dominated by landforms linked to the natural environment.

2.3. The DPSIR Model: Driving forces – Pressure – State – Impact – Response

This increasing interest in rural employment beyond agriculture must be accompanied by a better understanding of the relevant factors and processes in rural economic development, and the relationships between them. One approach to this, which has been successfully applied in other contexts, is to use the driving force, pressure, state, impact and response (DPSIR) model as a framework. RuralJobs has adopted the DPSIR model as a tool to show the link between 'driving forces' which affect employment and economic prosperity, and policy responses. (Fieldsend, 2009)

In the model *(Figure 1),* rural employment (jobs per person) represents the state. Employment has an impact on economic prosperity and other issues such as social cohesion, and these in turn influence policy responses (and other, such as socio-economic). These responses may be
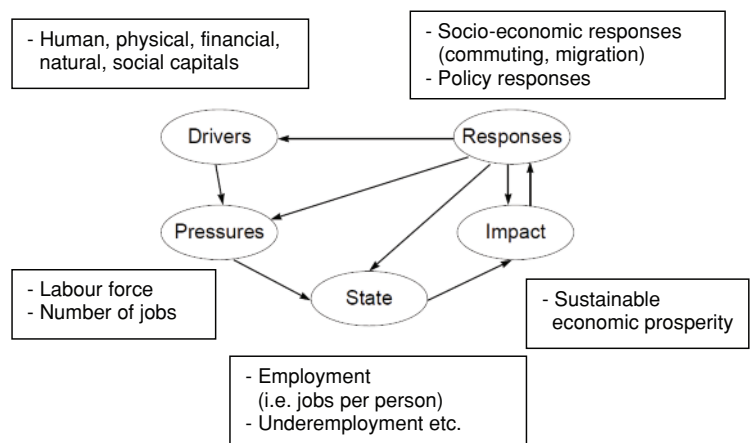

Figure 1. The DPSIR framework as applied to rural employment in the RuralJobs project

targeted either at the driving forces which in turn influence the pressures on employment, i.e. supply of labour (working age population) and supply of jobs (economic activity); directly at the creation of more and better jobs, or even at the state, by connecting the offer with the demand (e.g. through jobcentres). In all ways, policy responses can lead to an increase in employment in rural areas which in turn would have a positive impact in terms of their sustainable economic prosperity. This approach is extremely policy-relevant as economic prosperity is a key objective of the EU Sustainable Development Strategy.

Driving forces can be categorised in several different ways, but are frequently characterised as five 'capitals', namely natural, human, social, physical and financial (e.g. Alkan Olsson et al., 2004). Although the term 'capital' is used, most of the assets are not capital stocks in the strict economic sense of the term. The term 'capital' is used because this is the common designation in the literature (DFID, 1999). Simple and employment-focused definitions of these 'capitals' are as follows:

- Human capital is defined as the skills and knowledge possessed by workers.
- Social capital is defined as the networks of relationships between people, firms, and institutions in a society, together with associated rules of conduct, trust, cooperation, etc., that enable a society to function effectively.
- Financial capital is defined as money used by entrepreneurs and businesses to buy what they need to make their products or provide their services.
- Natural capital is defined as a stock of natural resources used for production.
- In general, physical capital refers to any non-human asset made by humans and then used in production.

A set of 40 indicators was compiled, as a framework for the Task 5.1. research. Partners were asked to present data (at LAU2 level where possible) in Deliverable 5.1. for four indicators describing pressures, six describing state and four describing impacts in a form which demonstrates any differences between the performance of rural areas and urban centres (indicators 15–28 in Fieldsend, 2010). Fourteen indicators (numbers 1–14) of driving forces constituted an indicative list of topics which may arise during the interviews in the pilot areas and, if so, which should be discussed in D5.1. Employment issues which can be difficult to quantify (e.g. underemployment, employment in the informal economy) through lack of data (numbers 29–36) were also to be addressed in a qualitative way. Finally, the research also touched on major non-policy responses (such as commuting and migration) specified by indicators 37–40.

2.4. Field research methodology

The field research was expected to interpret the rural employment situation in the pilot area in order to conclude whether any employment problem of a specific rural nature existed (and, if so, in what form), and to identify employment

growth areas in the context of available human capital, skills and adaptability as well as demand for labour and existence of top-down and bottom-up constraints.

The method proposed for the pilot area field research was a case study, a complex method, which includes a variety of quantitative and qualitative methods. The following methods were used during the field research: secondary analysis of statistical data and relevant literature (reports, strategies, studies, monographs etc.) about the pilot area, semi-structured interviews with key informants and structured interviews for recording information about successful initiatives for employment creation ('good practices') identified in the pilot area, as well as SWOT analysis and SOR analysis (involving also focus group meetings) to evaluate the employment development potential of the pilot areas. The methodological framework used is fully described by Vincze *et al*. (2009).

For collecting quantitative data no specific tools were developed; influenced by the availability of statistical data at LAU2, LAU1 and NUTS3 levels, partners built up their own databases.

Primary data was collected through interviews. To maximise consistency between the partners, in all pilot areas the same interview guide was used. Around 20 interviewees with expert knowledge of rural employment issues were selected in each pilot area (although not all interviewees were based in the pilot area), including decision makers (elected representatives of administrative units relevant for the pilot area), local government experts, other experts (e.g. academics, consultants), representatives of community organisations/NGOs and of the business sector (e.g. Chamber of Commerce, Farmers' Union, private companies).

The subject of the SWOT analysis was the rural labour market in the pilot area. Thus the 'internal audit' i.e. the Strengths and Weaknesses, was based on the assets of the pilot area, and the 'external audit' i.e. the Opportunities and Threats was based on drivers which do, or which are likely to, affect rural employment in the pilot area.

In each pilot area a draft list of components of the SWOT was prepared from the results of the quantitative data analysis, interviews and review of existing reports; this was circulated for validation to the interviewees, who were asked to select the five most important factors from each group. On the basis of the feedbacks received, the draft SOR matrix was compiled, which was again circulated to the interviewees. The importance to rural employment in the pilot area of the relationship between each Strength/Weakness and Opportunity/Threat was scored on a 0–3 scale where 0 means not important and 3 means extremely important. For each of the relationships obtaining high scores from most of the interviewees, an 'operational objective' (a concrete way to face / give an answer to the issue) was drafted.

The provisional SOR matrix results and the draft wording of the operational objectives were validated at focus group meetings (one or two per pilot area), attended by interviewees and other key local stakeholders. The validated operational objectives were then clustered into a series of

'strategic orientations' which could be the focus for future strategy development in the pilot area.

3. Results and discussion

3.1. Strategic orientations for rural job creation

The strategic orientations formulated by the RuralJobs research can be grouped into five 'top level' strategic orientations for rural job. While the first two strategic orientations underpin the improvement of human capital and the development of infrastructure, the three subsequent ones focus on the mobilisation of the natural capital of rural areas through the development of key growth sectors, the reinforcement of local economy and the improvement of governance.

3.1.1. Improving skills and labour market participation in rural areas

Here, the synergies between natural capital and human capital are developed. The need to improve skills in rural areas through higher quality and more accessible education and training programmes is widely recognised. It is mainly suggested to improve rural delivery of education and training, including entrepreneurship and business skills, to reduce the dependence on low-skilled jobs and/or urban centres, based on the recognition that the access to and suitability of training courses are bigger problems than the quantity of training that is available. The provision of forecasting tools and the support to other learning processes such as local actors networking are further strategic orientations.

3.1.2. Developing infrastructure and services

The focus here is on developing the synergies between natural capital and physical capital. In both the EU-15 and the NMS, the need to develop infrastructure in rural areas is noted. Transport links need to be improved in order to facilitate the access to education/training, basic services, jobs and markets. There is also a need to develop rural services across the EU, particularly services which are traditionally provided by the public sector such as healthcare, education and social assistance. In the line with the contribution of the above to the quality of life in rural areas, the provision of substantially more affordable homes is suggested so that residents of all ages have the option of living and working in their community.

3.1.3. Encouraging the development of key growth sectors

Regarding production based on renewable resources, it is felt that there is still potential for rural job creation in the agri-food chain, especially in the NMS pilot areas. The RuralJobs strategic orientations include the consolidation of farms, increase in competitiveness, diversification, development of food processing, high value added, and development of markets and market institutions.

In the EU-15 pilot areas, much less emphasis is placed on job creation in the agri-food chain, except as part of the green economy. Also as part of the green economy, these latter are the only pilot areas which identify, by implication, the forestry and renewable energy supply chains as activities for creation of new rural jobs. Production based on non-renewable resources is not included in the strategic orientations of any pilot area.

In terms of consumption by non-residents of the territory including visitors, all pilot areas identify scope for rural job creation in the tourism and leisure sectors. The link between rural tourism and cultural and natural capital is clearly stated here, with an emphasis on the creation of synergies for the development of the tourism and leisure sector as far as the offer and the access to markets are concerned. Such synergy and a full institutional and business awareness of the sustainable use and better valorisation of local resources are also major strategic orientations. Some of the strategic orientations listed above for the agri-food chain also allude to the consumption dimension via topics such as local characteristics, healthy foodstuffs and local products.

The consumption by residents component is only advocated in the EU-15 pilot area reports, in particular the promotion of the establishment in rural areas of businesses (including home based businesses/ consultancies with the possibility to work from home) with low environmental impacts, particularly in the knowledge based services. It is suggested to take advantage of the opportunities offered by the silver economy, which covers the demand for products and services, as well as the mobilisation of savings and of human capital of retired people.

3.1.4. Reinforcing local rural economy

This strategic orientation, to some extent, develops the synergy between natural capital and financial capital so as to support the establishment, growth and sustainability of rural businesses, as well as their competitiveness, thereby promoting job creation, either in employment or self-employment.

Firstly, there are several ways in which business practices can be improved, for instance by setting up a rural-urban private sector-led entrepreneurial learning network in which key private sector businesses should, either by themselves or in partnership with universities and public agencies, establish learning networks to stimulate entrepreneurship through a range of business-focused activities. Marketing innovation is also capital to the growth of businesses and markets.

Another suggestion is to recognise the elderly profile of rural business owners in some sectors, which may be linked to lack of innovation and increased risk of closure of the company, by emphasising takeovers of existing businesses.

Secondly, to support the above, rural business support services should be improved, including at municipal level,

particularly for small businesses. Rural businesses outside agriculture have almost the same needs as urban ones, but isolation is an issue and rural businesses have less of an understanding and ability to access available support. Support for innovation includes efforts towards the expansion of markets for local endogenous products and goods and the support for the creation of products with declared origin.

Thirdly, there is a need to improve the trading environment for rural businesses in several different ways. Linking two urban areas so as to create an enlarged market (including activity areas, clustering) through collective and coherent governance is suggested in order to reduce territorial competition by giving them slight specialisations according to their assets. Also, the suggestion to increase flexibility of spatial planning is intended to promote more economic activities with low environmental impacts in rural areas, for example via more small serviced office units and live/work units, more tourist activities/accommodation. Coupled with this, it is suggested to promote rural localities as places to accommodate new businesses, emphasising that such areas can offer access to urban-related benefits without the associated diseconomies such as congestion and higher local taxes, and to conduct an audit of rural premises in the sub-region in order to identify structures and areas that could accommodate future business growth, particularly amongst business service activities.

A similar suggestion is to promote reserved land for the development of agricultural structures and local production (short supply chains, organic production), for the development of the green economy (biofuels, green chemistry) and for the development of the silver economy.

Regulation and bureaucracy need to be reduced, especially in the NMS, for instance it is suggested to dissuade permissive regimes, as well as to develop one stop services and e-services via the Internet. Similarly, labour costs need to be reduced so as to boost the labour market.

3.1.4. Ensuring the proper implementation of the strategy through support actions

Here the link between natural capital and social capital-related issues is explored. There is a need to mobilise the population around the participative approach, which is particularly evident in the NMS. Improving governance in rural areas through bottom-up approach in the definition of strategies and the implementation of local development projects is strongly suggested. In this regard, strengthening Leader and integrating all local public and private stakeholders around local strategic objectives is seen as a way towards such improved governance.

There is also a need to valorise rural areas as places to live, work and play, which is at present mainly recognised in the EU-15 pilot areas only, although an even bigger perception problem seems to exist in the NMS.

RuralJobs recommendations are meant to support the formulation of political priorities for growth and the creation of new jobs in rural areas. At regional and national levels, the recommendations will contribute to underpin core priorities such as the need to bolster education and training, improve the accessibility and attractiveness of rural areas and enhance good governance. The level of knowledge has to be raised so as to optimise the sustainable use of resources, unleash innovation and diversify the economy so as to ensure the competitiveness of businesses. Rural areas ought to be attractive to people for residence, work and leisure, as well as to businesses; accessibility of all to services, goods and information has to be improved. Efforts towards better legislation need to continue so as to improve the business environment and governance as a whole. Raising the level of knowledge of key public and private stakeholders through mutual learning must be scored within an accrued determination to raise the quality of institutions and governance.

Finally, RuralJobs has sought to give a major "visibility" to the diversity of the state of employment in rural areas across the EU. Such attempt has made necessary the definition of types of rural areas within which are brought to light and analysed the complexity of their social and economic situations. RuralJobs recommendations also mean to capitalise on the outcome of such a task by taking them to EU political agenda for jobs and growth. Rural areas need to be more "visible" in the EU 2020 Strategy. Rural development policy should be set within territorial cohesion strategy and must be given major financial and administrative support. Differentiated development priorities must be defined for each rural area on the basis of well defined types.

3.2. Conclusions of RuralJobs field studies

The broad conclusions which arise from the RuralJobs pilot areas field studies are that rural areas are typically made up of small settlements that have truncated economies and are highly dependent upon "export-import oriented" businesses. The majority of rural markets are located in urban centres which, by contrast, are much larger settlements with complex internal economic structures that allow for a broader range of goods and services and greater self-sufficiency. Understanding and expanding urban-rural linkages is crucial for effective rural policy, and this reality is reflected in the fact that the potential for new sources of rural employment is interpreted in a regional context. Secondly, 'natural capital' is a potentially important component of this wealth generating capacity (Pakurár et.al, 2010).

Besides, in developed rural areas, information and communication technologies (ICT) and biotechnology have created new employment opportunities. Other areas may be looking for more self-sufficient ways of living ('radical rural'). Alongside this, there are the politics of a new environmentalism and changing opinions about EU subsidies. Agri-industry and the desire for cheap food now sits alongside demands for traceability in food and the reconnection of urban and rural areas through the supply of

locally produced quality food. Hence, new patterns of consumption are emerging, driven by a range of different forces and demands for different ruralities. These are helping to produce new representations of life, work and play in rural areas. Elsewhere, however, people are finding themselves living in increasingly peripheral areas, lacking employment opportunities and services.

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THE SOCIAL VALUE OF SCIENCE SHOPS: A COST-BENEFIT ANALYSIS

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Abstract: We describe and apply a method to determine the net social benefits of science shops. University departments operating as science shops coordinate research projects for individuals or civil society organizations (CSO) lacking the financial means to turn to professional consultancy bureaus. Three cases are analyzed; the science shops at Wageningen, Brussels and Eindhoven. After investigation, it appears that under the normal assumptions for the application of CBA, the science shops concerned show positive net social benefits.

1. Introduction

Over the past decades, science shops have been set up, closed, rebuilt and developed, not only in Europe, but also in Canada, the USA, Africa and Asia (CW, 2009). The main aim of these science shops is to provide access to (academic) knowledge to private persons, civil society organizations (CSO) and/or small and medium enterprises (SME). These individuals or organizations lack the financial means to turn to professional consultancy bureaus (Straver, 2008). One of the preconditions of the science shops in selecting projects is that public organizations should be able to use the research conducted by the science shops (Straver, 2010). The wider goal of science shops is in the impact that influencing research may have on citizen participation (Wachelder, 2003).

It is said that the increasing involvement of civil society organizations leads to an increasing amount of research questions posed by clients and a need to extend the number and capacity of science shops (PERARES, 2010). We will evaluate this argument by analyzing science shops with the help of a cost-benefit analysis (CBA) (Prest and Turvey; 1965). The central question of this research is therefore *whether or not science shops are economically efficient*. This analysis aims to be a substantive addition to the evaluation methods and models available for the evaluation of science shops and is intended to generate further discussion within the wider area of community based research.

Initially established in the Netherlands in the early 1970s, the concept of science shops is currently spread around the world (Wachelder, 2003). As a consequence, science shops developed in a large variety of ways; depending on the region, area of expertise, focus from policy makers and institute to which the science shop is connected (CW, 2009). Because of the different origins and transitions of science shops, there is a large variety in structure and way of functioning. So far, the literature on science shops often focused on the internal organization, local context and differences in ways of coping (Fischer *et al.* 2004; Leydesdorff and Ward, 2005; Wachelder, 2003). In this article, by contrast, we propose a uniform approach to treating science shops with the help of a cost-benefit analysis. In order to answer our research question, we will give an economic evaluation of science shops that differ in size, region, target groups and area of expertise; however, we will limit our research to science shops that are linked to a university or research institute. This led us to evaluate three different science shops; that of Wageningen (NL), Brussels (B) and Eindhoven (NL).

The remainder of the article is organized as follows. Section 2 describes the methodology used and section 3 provides an analysis of the three science shops. In Section 4, we will present the results. Finally, Section 5 contains the conclusion and the discussion.

2. Methodology

The economic evaluation of science shops can be best assessed with the help of a Cost-Benefit Analysis (CBA). This is a method to determine whether a project, program or policy is efficient given the objectives that have been stated and the assumptions that have been made (Prest and Turvey; 1965). Cost-benefit analysis has been applied in many different fields of research; however, science shops or more in general, research bureaus, have never been included. In general, a CBA aims at answering whether a project or program should be carried out and if funds are limited, which elements should be selected. In doing this, the specific project is compared to its next-best alternative (Mishan and

Quah; 2007). Boardman et al. (2006, p. 2) formulate it as follows: *"CBA is a policy assessment method that quantifies in monetary terms the value of all consequences of a policy to all members of society…More generally, CBA applies to policies, programs, projects, regulations, demonstrations, and other government interventions"*.

This study is based on the theoretical principles of welfare economics (Brent, 2009), where we assume perfect competition, which implies a large number of companies, identical products sold by all, the freedom to enter in and out of the industry and perfect knowledge on prices and technologies (Krugman and Obstfeld, 1994). These assumptions imply that there are competitive alternatives to science shops; i.e. professional research bureaus. With this economic evaluation we try to assess the social desirability of science shops relative to its next best alternative; i.e. where clients of science shops would turn to if science shops would not exist.
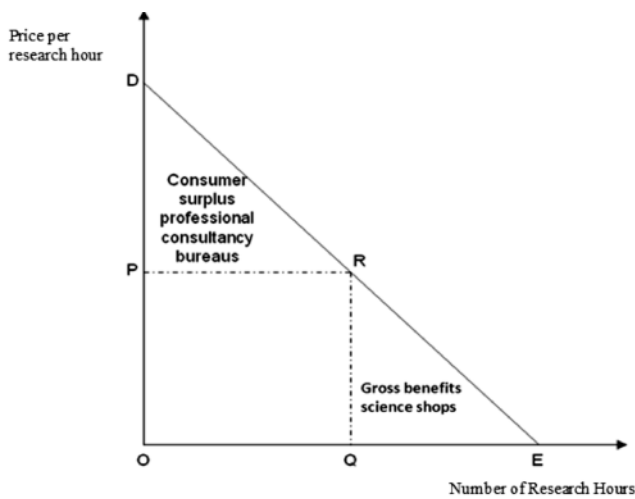

Figure 1: social benefits of science shop research

The entrance of science shops to the market may at first give the idea of price discrimination[1]; however, in essence we deal with market segmentation. Market segmentation is the distinction of a market in different groups of buyers and sellers and occurs when a sub-set of the market is made up of organizations that share one or more characteristics with the related market that cause them to demand similar products and/or services (Krugman and Obstfeld, 1994). Because of the financial restrictions of science shop clients, these clients would not engage in the market segment of professional consultancy bureaus if there would not be a science shop. Therefore, clients of consultancy companies effectively

engage in another segment of the market than clients from science shops. The different segments of the market are graphically represented in Figure 1, where area ODRQ represents the segment of professional consultancy bureaus and area QRE the segment of research conducted by students, under which science shop research falls, as will be explained in the following section.

Hence, the difference in price and provider results in two market segments; that of the professional consultancy bureaus and that of student research. In this study, we assume divisibility, which means that the benefits of research conducted by science shops can be measured by the amount of research hours conducted. The unit of measurement used in our analysis will therefore be one research hour, where its valuation will be based on the market price for a research hour conducted by a professional consultancy bureau. In the rest of our analysis, we will indicate a professional research hour by the abbreviation 'PRH' and a student research hour by 'SRH'.

The framework for quantifying the benefits and costs can be understood as encompassing the main actors in an economy: producers, consumers and the government. This determination follows the basic principles of welfare economics, where consumer surplus is measured by the difference between the willingness to pay for a particular good or service and the actual expenditure (Mishan and Quah; 2007). Clients of the science shops only have to put their own working hours in the projects conducted by the science shop. Therefore, we assume that they get the research for free. If point O to point Q represents the number of PRH against price P, then clients of a science shop will demand research hours from point Q to point E. Alterra, a research institute linked to Wageningen UR that conducts research for organizations from outside and thus acts as a professional consultancy bureau, charges an average market-rate of €147.- per hour (Holsteijn, personal communication, 29-9-2010). This means that in Figure 1, based on Mishan and Quah (2007), point P represents 147. This may be considered a low price, but the idea is not to overestimate the value of a research hour carried out by the science shops.

We do not know exactly how many hours are demanded in the market segment of professional consultancies, but according to the methodology as presented in Figure 1 above, the area ODRQ under the demand curve from point D to point R represents society's willingness to pay for these hours. The area OPRQ represents the total amount society has to pay for the hours of research conducted by professional consultancy bureaus and the area DPR represents what the clients would additionally have been willing to pay for. As mentioned before, we assume perfect

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[1]Price discrimination means that "*the sales of identical goods or services are transacted at different prices from the same provider*" (Krugman and Obstfeld; 1994). This leads to actions that give certain buyers advantages over others; namely clients from science shops, who do not have to pay for research conducted. However, because the providers of the service are different; professional consultancy bureaus versus science shops, it is not likely that the price discrimination will lead to its typical effects; lower prices for some consumers and higher prices for others together lead to an output expansion or decline. Because the price differentiation effectively occurs in a segment of the market, there would be no effect on either the efficiency or output within professional consultancy bureaus with the engagement of science shop research in the market. In essence, there are different firms that sell the same product, but against different prices.

competition, which means that consultancy bureaus will produce up to the point where marginal costs equal marginal revenues. Hence, the square OPRQ also includes the costs that professional consultancy bureaus have to make. The triangle DPR is also referred to as the consumer surplus of professional consultancy bureaus. This is the amount of benefit that consumers gain by being able to purchase a product for a price that is less than they would have been willing to pay. Subtracting what clients actually have to pay (area OPRQ) from the willingness to pay of buyers (area ODRQ) gives us the consumer surplus (Mishan and Quah; 2007).

The second segment of the market is represented by triangle QRE, which represents the research hours that are conducted by student research, where the science shop is a part of. The costs of the science shop projects are represented by the total costs, i.e. the variable and fixed costs, for the science shop. The surface of the triangle QRE corresponds to the maximum consumer valuation of the work conducted by student research. The maximum valuation for science shop research is, as represented in Figure 1 above, part of the triangle QRE and part of this maximum valuation is composed of the total costs paid by science shops. Therefore, this part of the triangle can be best referred to as 'gross benefits of science shop research'. For each of the total units of research hours purchased, there is a different maximum valuation; the straight line from point R to each of the axes represents the different prices that people are willing to pay given a certain quantity (Mishan and Quah; 2007). We will however value the price of the research produced by the science shop as the average of the triangle QRE, which is halfway on the straight line RE. We assumed the average of this price to be half of price P, which makes the average willingness to pay for an hour of student research €73.50.

Figure 1 above shows that the economic value of science shop projects is determined by the economic behavior in the context of demand and supply. The estimate of the gross benefits will be entered as benefits in the cost-benefit calculations. Hence, they represent the welfare gain from consumption gained by the clients of the science shop. Costs, on the other hand, represent the aggregate inputs measured in monetary units and compose the salary costs and other overhead costs. Another important cost factor is the added time involved in organizing collaborative, democratic processes among members of an usually diverse project team between CSO's and science shop researchers.

There are two lines of thinking in deciding upon the next best alternative for science shop clients. On the one hand, there are the critics of science shops who say that without science shops, clients and student researchers would have found each other just by demand and supply of the market. If this is true, the next best alternative would be student research without science shops acting as an intermediary. On the other hand, there are the proponents of science shops, who argue that without the interference of science shops to regulate demand and supply, the clients would not get their questions answered. In this latter case, the next best

alternative would be where civil society organizations would turn to if they would have the financial means to do so; hence, professional consultancy bureaus. Here, we would like to perform a cost-benefit analysis based on both views of the science shops. Therefore, we will first perform a cost-benefit analysis according to the methodology presented in the previous section, where the benefits are represented by a multiplication of the amount of science shop research hours by the average willingness to pay for these hours and the costs are represented by the total costs made by the science shop.

Hereafter, we will perform sensitivity analyses from two viewpoints; the first based on the assumption that if science shops would not exist, the only option left for its clients would be professional consultancy bureaus. With this sensitivity analysis, we will estimate the amount of SRH that can compose one PRH up to the point where the science shop breaks even. It can namely be assumed that one SRH does not have the same efficiency and productivity as one PRH has. This assumption is made partly because students do not have the experience and facilities that professional researchers have and partly because of the specific field in which science shops work. Science shops operate on the cutting point between science and society. This situation sometimes leads to conflicts in the means of presentation and analysis between students or researchers and civil society organizations. These conflicts take time and may lead science shops to become less efficient than professional consultancy bureaus. Therefore, we will analyze the benefits or losses that the science shop makes with the help of a benchmark for the rate of efficiency between a PRH and a SRH. Based on discussions with supervisors of science shop projects we can set this benchmark at one PRH representing three SRH (Heijman, Oude Lansink, Straver; personal communication, November 2010).

The second viewpoint will be based on the assumption that if science shops would not exist, student and clients would meet each other via the market. In this case, the costs that the science shop as a mediator would have made do not occur. This would obviously make research where science shops interfere less cost-efficient than when the client and the student meet each other without the science shop, namely by the amount of the costs for central coordination of the science shop. A side note here is that those involved in science shop work often argue that science shops do not only connect client and student, but also lead to a higher quality product, because they also supervise and support the whole research process. Here again, we will use a benchmark for the amount of SRH that would also have been conducted if the science shops would not exist. Based on discussions with science shop leaders, we decided to use a benchmark that without science shops, only 50% of science shop clients would get their research question answered (Sijtsma, personal communication).

These two viewpoints will lead to four different scenarios performed on the science shops, as they are represented in Table 1 below. In scenarios 1 and 3, we will use a positive

view on science shops, where 1 PRH represents 1 SRH. In scenarios 2 and 4, we will use the benchmark of 1 PRH represents 3 SRH. In scenarios 1 and 2 we will use the proponent's viewpoint that without the science shop, its clients would not get their questions answered. Scenarios 3 and 4 use the benchmark of 50% of SRH, that would also have been conducted if science shops would not exist.

Table 1. Different scenarios for sensitivity analyses on science shops

Scenario	1	2	3	4
SRH-PRH ratio	1 PRH:1 SRH	1 PRH:3 SRH	1 PRH:1 SRH	1 PRH:3 SRH
Without science shop	0	0	50%	50%

In this study, we will treat the student input and academic supervision without cost because they are considered to be part of the education process. It could however be argued that by having students conduct science shop research, the research is, at least in some countries, partially government financed (Sclove *et al.,* 1990). For example, part of the basic education of Dutch university students is government financed. This would mean that science shops would receive an effective government subsidy when they enroll student researchers. However, this argument can easily be rejected by the fact that the education of all Dutch university students is government financed, whether or not they are in that minority of students that choose to do a science shop project.

In the same way that universities are often specialized in certain research areas, science shops also focus on answering research questions from specific academic fields. It is possible that projects from different fields may bring different costs or benefits. Because each science shop focuses on its own field, they do not compete with each other. Therefore, we will treat each science shop as a separate segment of the market and compare this segment with that of professional consultancy bureaus. In the next section, we provide an overview of the results of the above mentioned methodology, applied to the three science shops.

3. Data

The difference in origin and structure of science shops is likely to cause variation in the costs and length of projects and research hours conducted at science shops. In order to overcome variation in costs or revenues between years, we tried to use a five year period for our analysis to measure the costs and benefits of research hours conducted for each science shop. For reasons of the date of establishment or large changes in structure, we did however sometimes have to use shorter periods of analysis. In this section, we will shortly introduce the three different science shops analyzed and give an overview of their costs over the past years.

Since its establishment in 1985, Science Shop Wageningen is the place for CSO's with research questions

in the field of Wageningen University and Research Centre (Wageningen UR). In the 25 years since its establishment,, Science Shop Wageningen has conducted more than 260 research projects. It is the ambition of the science shop to start and finalize 10 projects per year. With an average of 13 projects per year over the past 5 years, it easily meets this aim. The science shop guides research projects for civil society organizations that do not have the financial means to turn to professional consultancy bureaus. The prerequisite is that these organizations are prepared to use the research results and that requests need to fall within the research fields of Wageningen UR: sustainable agriculture, food and health, a livable green environment and processes of social change (Aalbers, Padt; 2010). Table 2 below shows an overview of the costs of science shop Wageningen, where the overhead costs are the costs that are independent from the projects and the variable costs are connected to the projects.

Table 2: Costs and hours spent by science shop Wageningen over the past 5 years in euros

	2009	2008	2007	2006	2005	Total
Overhead Costs	14232	120595	121700	84015	78868	419410
Variable Costs	340442	420826	304060	280238	325000	1670566
Total Costs	354674	541421	425760	364253	403868	2089976
Total amount of SRH [a]						64200
Total amount of PRH [b]						16342

[a] Based on the number of credits that students receive. One credit = 28 hours.
[b] 90% of total variable costs are composed of salary costs. An internal tariff of €147/hour in 2010 is used.

In Belgium, science shops have been established since the academic year 2002/2003, initially with a pilot of 3 years initiated by the universities of Brussels and Antwerp and subsidized by the Belgian government. As of 2006, the government obliged every university to establish a science shop, which led to the network of Flemish science shops that coordinates all Dutch-speaking Belgian science shops. This network consists of two active science shops who together answered 40 research questions in 2009; those of Brussels and Antwerp, and three rather inactive science shops; those of Leuven, Hasselt and Gent, who together only answered one research question in the same year. The strength of the network of science shops is in the fact that five science shops possess the means to answer a question from society; however, with only two of the five science shops actively functioning, this may also become a weakness.

The coordination of the network, under the name "wetenschapswinkel.be", is in hands of a central unit connected to the *Vrije Universiteit Brussel* (VUB). The wetenschapswinkel.be is the central contact point for non-profit organizations which search for scientific support via

research or advisory services. It's most important tasks are in promotion and information, assembling and distributing requests of new organizations and supporting regional science shops and taking care of the national and international networks. As of 2008, the science shops are officially part of the range of responsibilities of "science and communication" in Belgium. Science and communication is financed by the Flemish government, but the exact method of financing depends, among others, on the size of the science shop. At least until 2011, the science shops will be financed by the government, but the budget is decreasing because of the economic crisis. Here, we will focus on the science shop Brussels, of which the costs can be found in Table 3 below.

Table 3. Costs and hours of research conducted in the science shop Brussels

	2009	2008	2007	2006	2005	Total
Overhead costs central unit [a)]	6360	6360	6360	6360	6360	31800
Overhead costs science shop	66880	66880	66880	66880	66880	334400
Total Costs	73240	73240	73240	73240	73240	366200
Total amount of SRH[b)]						71680
Total amount of PRH [c)]						0

[a)] Yearly labor costs of €25,000 between 2005–2007 (0.3 FTE) and €20,000 between 2008–2009 and other costs of €6800 divided by the number of science shops (5)
[b)] Student research hours, all from master theses (20 ECTS)
[c)] Professional research hours

At the science shops in Eindhoven in the Netherlands, research is completely conducted by students who, guided by scientists from the university, try to answer questions that mainly come from individual persons and small and medium enterprises (SME). The students are supported by the facilities of the university and their work can lead to for example a tangible product such as a technical tool for patients or a research report that analyses harmful substances in materials. There are four science shops in Eindhoven that conduct research for civil society organizations. These science shops are the architecture shop, the chemistry shop, the electro shop and the physics shop. Each of these science shops is linked to a faculty of the university. The different science shops meet once every two weeks to discuss the progress under the different science shops.

In this article, we focus on the Chemistry Shop Eindhoven. This science shop was established in 1973 under the name "*Milieu Aksie Groep T*" and changed names to Chemistry Shop Eindhoven in 1975. The aim of the chemistry shop is to function as an information center, specialized in chemistry and the environment, for society. Initially, the chemistry shop Eindhoven was based on the

idea to conduct research for individual persons against low costs. During the academic year 2006-2007, the chemistry shop started to also include cases from SMEs. The idea behind including this sector is that, because of the low costs of student work, it becomes affordable for small or new companies to have their research conducted by the chemistry shop. Apart from the attractiveness for its clients, the chemistry shop provides possibilities for students to apply their knowledge to other areas of chemistry and development. Table 4 below shows the costs for the science shop Eindhoven.

Table 4. Costs and hours of research conducted in the chemistry shop Eindhoven

	2009–2010	2008–2009	2007–2008	2006–2007	Total
Salary Costs	26281	31086	27653	28556	113576
Other Costs	2840	4523	5767	4008	17138
Total Costs	29121	35609	33420	32564	130714
Total amount of SRH[a)]					16459
Total amount of PRH					0

[a)]0.9 FTE for 5 board members €16.- / hour for executive work

4. Results

For the three science shops mentioned, we performed a cost-benefit analysis and a sensitivity analysis based on both views on the next-best alternative for science shops. In the comparison between science shop research and that of professional consultancy bureaus, we estimated the number of SRH that can compose one PRH up to the point where the science shop breaks even. This based on the idea that students at science shops are often less efficient than researchers working for professional consultancy bureaus; partly because students do not have the experience and facilities that professional researchers have and partly because of the specific field in which science shops work.

Figure 2 below presents the net-benefits of the science shops with different rates of efficiency of a PRH relative to SRH when other things remain equal. In the most extreme case, where a student hour is not of any use, all science shops would make a loss. It is however very unlikely that a student hour would not be of any use. Therefore, in analyzing the cut-off point of the efficiency of a student hour, we can see that the break even ratio of 1 PRH represents between 5 and 6, 19 and 20 and 9 and 10 SRH for respectively science shop Wageningen, Brussels and Eindhoven. Here, the science shops break even in their costs and benefits; costs and benefits respectively equal €417,995, €183,100 and €32,679.
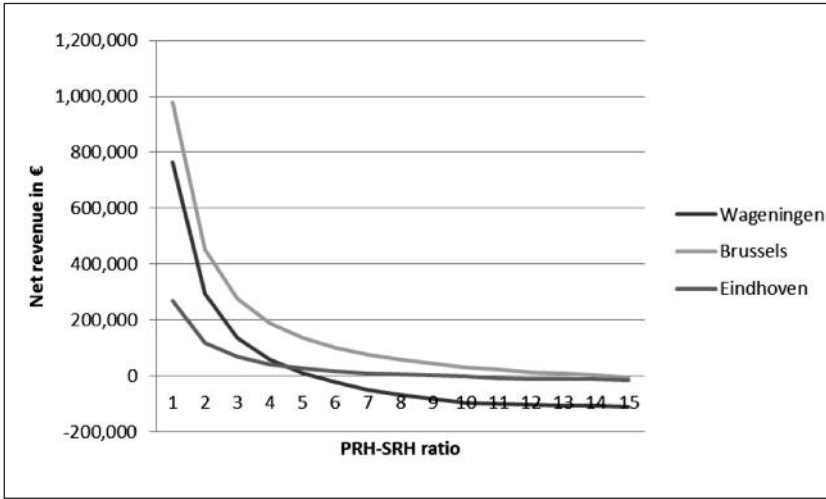
Figure 2. Comparison of science shop revenues with changing SRH/PRH ratio

Because of the large difference in size and structure of the science shops, it is difficult to compare their costs and benefits. Table 5 below does however show that the CBA on the science shops Wageningen and Brussels result in much larger benefits. This result can be easily explained by the size of the science shops. With an average of 13 projects per year over the past 5 years and a maximum working budget of €35,000.- per project, science shop Wageningen is one of the larger science shops. This situation also counts for Brussels, characterized by a central coordination point that oversees all Belgian science shops and a budget of nearly €70,000 per year. There is however quite a large difference in annual budget between these two science shops, which is reflected by the difference in PRH-SRH ratio. This difference in fixed costs for coordination can mainly be explained by the fact that also researchers of Wageningen University conduct research for the science shop, where research of science shop Brussels is only conducted by students.

All science shops end up with negative results under the scenario that one PRH equals 3 SRH and 50% of the SRH would also occur without the help of the science shop. Most striking in these losses is the small loss for Wageningen. This result is due to the fact that the science shop acts for a relatively large part as a professional research bureau and therefore the loss of 50% of the SRH does not have a large effect on the science shop Wageningen compared to the others. However, again the ratio of 1PRH: 3 SRH combined with the 50% of SRH that would also have occurred without the science shop is probably quite a strict calculation in the cost-benefit analysis. We can therefore conclude that the best guess of the economic efficiency of the analyzed science shops would be halfway between the most positive scenario (Scenario 1) and the most negative scenario (Scenario 4). This conclusion would lead to the net benefits as presented in Table 5. From this table, we can conclude that both large and small science shops can be economically efficient.

Table 6. Best guess of economic efficiency of science shops

Science shop	Annual Net benefits (€)
Wageningen	215 457
Brussels	365 800
Eindhoven	93 335

From Table 6 above, we can also conclude the financial risk of a small science shop like Eindhoven, being measured as the absolute value of the net benefits of the least beneficial scenario (Scenario 4) is smaller than the risk of larger science shops like Brussels and Wageningen. The net benefits of the most positive scenario (Scenario 1) are bigger for the larger science shops.

5. Conclusion and discussion

A previous study conducted by Sclove *et al.* (1990) has shown that, compared to professional consultancy bureaus, community-based research is relatively efficient. One main reason for this is that science shops often rely on student or community volunteers. Obviously, the studies would be

Table 5. Comparison of CBA results and sensitivity analyses between science shops

Scenario	1	2	3	4
SRH-PRH ratio	1 PRH:1 SRH	1 PRH:3 SRH	1 PRH:1 SRH	1 PRH:3 SRH
Without science shop	0	0	50%	50%
WAGENINGEN				
With science shop (€)	765,972	136,812	765,972	136,812
Without science shop (€)	0	0	471,87	471,87
With – Without (€)	765,972	136,812	294,102	-335,058
BRUSSELS				
With science shop (€)	980,456	277,992	982,016	277,992
Without science shop (€)	0	0	526,848	526,848
With – Without (€)	980,456	277,992	455,168	-248,856
EINDHOVEN				
With science shop (€)	269,755	68,132	269756	68,132
Without science shop (€)	0	0	151217	151,217
With – Without (€)	269,755	68,132	118539	-83,085

much more expensive if citizen groups would have to pay professional researchers.

In this paper, we analyzed whether science shops are efficient from an economic perspective according to two views on the next-best alternative; the first one professional consultancy bureaus, the other one the assumption that if science shops would not exist, students and clients would find each other via demand and supply of the market. Here, we provide a conclusion on the results obtained and highlight some important items for further discussion and improvement in order to rightfully assess the social desirability of science shops.

We analyzed the social desirability relative to its next best alternative; where clients of science shops would turn to if science shops would not exist. The analysis has been based on the assumption that science shops provide scientifically valid services for groups of people that would otherwise not be served. For proponents of the science shops, this means that the next-best alternative for clients of science shops would be the market of professional consultancy companies. Science shops offer their services against much lower prices than professional consultancy bureaus do and thereby fulfill another segment for the market of answering research questions of society. Without this segment, CSOs or SMEs would not enter the market because of their financial restrictions. However, this difference in pricing does imply price discrimination in the market.

Critics of science shops argue that without science shops, clients and students would have found each other just by demand and supply of the market. In this case, the next best alternative would be student research without science shops acting as an intermediary. It is however quite unlikely that without the existence of the science shops, all clients would be able to find a student to conduct their research. However, if this would be true in theory, it is still likely that science shops do not only connect client and student, but also lead to a higher quality product, because the science shop supervises the whole research process of the student.

The analysis provided in this study gave some useful insights in the costs, benefits and efficiency of science shops. There are however a number of other important aspects to keep in mind when evaluating the social desirability of science shops. Here, we will touch upon the most important of these.

In our CBA, the benefits have been represented by a multiplication of the amount of science shop research hours by the average willingness to pay and the costs have been represented by the total costs made by the science shop. We used €147.- as the threshold value of price P for an hour of research conducted at a professional consultancy bureau and assumed from this that the demand curve was a straight line to each of the axes. We are however aware that another threshold value as the price for a professional research hour or another slope of the demand curve would lead to very different results.

The CBA analysis only took the direct costs and benefits into account. Costs and benefits can however be disaggregated into three categories: direct, indirect and intangible. Direct are those costs which are directly related; such as overhead and labor costs, which are taken into account in related markets. Indirect costs refer to the inputs and outputs that occur outside the science shops. These indirect effects could be measured by the earnings foregone or enhanced due to the work of the science shops. These are reflected by the value of production lost or gained by society. Intangible costs or benefits refer to the internal valuation of people to costs incurred or benefit obtained by science shop work (Brent, 2009).

It can easily be assumed that the projects conducted by science shops have not only led to direct costs and benefits, but also to indirect ones. These indirect costs and benefits are however very difficult to measure in monetary terms. Including all costs and benefits of the projects conducted by science shops will be very hard. Not only is it difficult to indicate a monetary value to all costs and benefits, but also to measure externalities. In economic theory, different techniques to measure non-market valuation have been developed. Among these are the stated and revealed preference techniques. The stated preference techniques rely on answers from surveys where revealed preference techniques draw statistical inferences on values from people's market behaviour. (Brent, 2009). However, science shops often do not possess these kinds of data and acquiring them is outside the scope of this research.

Moreover, science shops themselves do not only focus on answering research questions for clients, but do also bring a valuable contribution to the education of students by offering practical topics for, amongst others, master theses. In this way, they not only aim at answering research questions of private persons, CSOs or SMEs in realizing their future plans, but also bring a valuable contribution to the training, and possibly motivation, of students for their further jobs. Moreover, the fact that science shops are generally linked to universities makes them the ideal bridge between science and society and allows them to often bring new, innovative approaches to answer research questions.

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EFFECTIVENESS, EFFICIENCY AND SUSTAINABILITY IN LOCAL RURAL DEVELOPMENT PARTNERSHIPS

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Abstract: Due to the ever-increasing role the LEADER approach is playing in realizing rural development policy, Local Action Groups (LAGs) have become key actors in the institutional system of rural development. Through their activity in supporting and improving local development, they represent a spatial organizing force in rural regions. Their operation can effectively contribute to the competitive and sustainable development of their local area, within the framework of European rural development policy. Compliance with this role requires the active and conscientious work of the LAGs, both in the process of programming and implementation. In this paper, we aim to present the impact mechanism of the operation of LAGs and its determinant factors. Based on expert evaluations, we investigate the experiences of the implementation of the LEADER approach for rural development from the viewpoints of effectiveness, efficiency and sustainability

Introduction

During the 1980s, throughout Western Europe, the need for the new approach to rural development was raised, in order to counterbalance the unfavourable effects of the significant socio-economic changes, to meet the new challenges and to answer the specific development needs of rural areas. As a result, in the EU's rural development policy, the emphasis was put on the application of endogenous development, which was introduced into the practice of rural development in the framework of the LEADER programme.

Due to the ever-increasing role the LEADER approach has played in realizing rural development policy, Local Action Groups (LAGs) have become crucial to the institutional system of rural development. Through their activity in supporting and improving the local development, they represent a spatial organizing force in rural regions. Their operation can effectively contribute to the competitive and sustainable development of their local area, within the framework of European rural development policy. The timeliness and importance of this topic is supported by the fact that the significance of applying the LEADER method in rural development is on the increase within the EU. On 18 November 2010, Dacian Ciolo , EU Commissioner for Agriculture and Rural Development, presented the Commission Communication on the future of the CAP post 2013, and stressed that the new CAP will integrate the LEADER approach to an even greater extent (EC, 2010).

Endogenous development and the LEADER approach

Earlier, decision makers considered rural regions as homogenous areas, where the same factors and possibilities determined development. As the European Spatial Development Perspective (EC, 1999) indicated, this attitude does not correspond to the realities of the EU, as the characteristic of the European countryside is varied and diverse, as reflected in the diversity of its peoples and communities, as well as nature, landscapes and activities. Consequently, development possibilities and trends of rural areas represent significant differences. All this diversity makes it necessary for development programmes and measures to take local features and specificities into consideration. Thus, different means and different policies must be applied for their development. According to Szörényiné Kukorelli (2005), high levels of differentiation in rural areas contributed to the evolution of the characteristically European model of rural development, promoting local developments by introducing bottom-up policies during the 1990s, as mentioned above. Consequently, sustainable rural development based on local consensus can only be realized by strengthening local society and by increasing its ability to assert interests; therefore, solutions and strategies to boost these must be implemented. An innovative solution for this is provided by the LEADER programme called into life by the European Commission, the

principal feature of which is an approach of so-called endogenous development, based on internal resources and local communities in a bottom-up arrangement. According to Barke and Newton (1997), endogenous development implies a process of local social mobilisation and requires an organizational structure which brings together different interests to achieve common goals, a locally agreed strategic planning process and an agreed allocation of resources with the specific purpose of developing local capacity in terms of skills and competencies.

Accordingly, the main objective of the LEADER programme is to build on the internal resources of rural regions and to support the population living there in considering their long-term development opportunities and implementing plans designed through collaboration. In conformity with the principle of subsidiarity, a development programme is to be designed and managed by development groups (LAGs) established at the sub-regional (micro-regional) level, coordinating the representatives of entrepreneurs, NGOs and the public sector by involving the local population. Thus, LEADER breaks away from centralized, centrally managed, top-down support systems, one of the specificities of which is that local problems, opportunities and solutions are not known at a central level; therefore, in many cases, centralized systems do not offer real roads for development, as they do not enable the implementation of development programmes based on local needs.
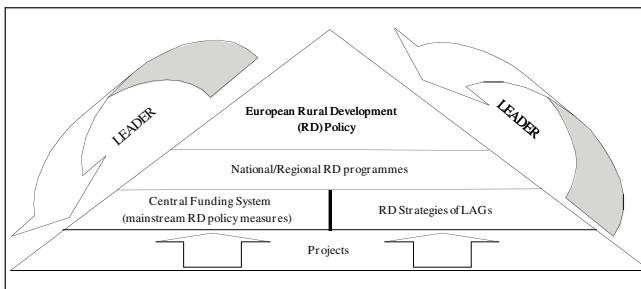
Source: Own presentation
Figure 1. The 3P triangle of Rural Development (Levels of Realization of the Rural Development Policy)

Note: The share of the "Rural Development Startegies of Local Action Groups" is not proportional with the financial contribution of the Rural Development Fund, which represents 5.5% in Hungary and around 6% at EU level.

As a result, application of the endogenous development or the LEADER approach has become an organic part of European rural development policy (Figure 1). The multi-level interpretation, as shown by the figure above, makes integration possible at each level (the 3P refers to the first letter of policy, programme and project), since realization of the rural development policy can be interpreted as a purpose-means type realization of the levels built on each other; the important part of which is the application of the LEADER approach. This latter element is proved by the fact that, since the 1991 introduction of the LEADER programme as a

Community Initiative, the programme has become the most important element of mainstream rural development policy due to the success of the programme started as an experimental form of local rural development. However, LEADER is not only a successful form or way of rural development, but also a concept; a model that pervades and embraces the entire process of programming and execution of rural development from the policy level to the implementation of projects.

The role of local partnerships in rural development

In the framework of the LEADER programme, important elements of the institutional system enforcing rural development policies include LAGs (organizations for development established in rural areas throughout Europe), which are intended to elaborate and implement strategies for sustainable development. Consequently, LAGs play an important role in the implementation of rural policy objectives in local level. However, in conjunction with strategy implementation, the role of LAGs in the efficient use of funds does not end with planning local development strategies. As funds are used, specific activities are realized at a project level, local players' capacity building and ability to act must be boosted in order to provide a basis for the successful and efficient use of development funds. Thus, efficient strategy implementation and the further development of a given rural area requires on-going efforts, in the course of which LAGs must become real organizing forces in the development of their area.

The role of action groups in the implementation of Local Rural Development Strategies cannot be restricted only to the distribution of the development funds they coordinate: their operation spans over a much wider range of activities, in which the mobilization of local communities, partnership building, generation of cooperations, skills development, promotion of sustainable development and endeavours to interlink developments for complexity should appear as important aspects. Actually, efficient strategy implemen-tation requires an increase in the ability and cooperation of local players, necessitating the completion of a variety of tasks.

Within rural development, local development is a process of identifying a set of objectives that can be realized. Hereby, the process itself is at least as important in the course of the implementation of the LEADER programme as measurable and quantifiable results.

The previously mentioned support, in case of the LEADER programme, is characterized by participation, cooperation, partnership and community initiatives, community development and capacity building (formation and development of abilities). This support should by necessity precede or complement the actual implementation of local development strategies. Since it is necessary to

assure broad participation, people and organizations should be involved in the process of development; communities, cooperations and partnerships should be formed and strengthened and then make the community able to form their own future, to manage their life. Only after this is it expected that the local development will work effectively and efficiently serve the fulfillment of needs and the improvement of quality of life of local people. At the heart of the LEADER philosophy is the belief in local communities that they are able to solve their problems at the community level. For this, it is necessary to build communities apt to act in the establishment of which community development and capacity building can assist.

In the following, by means of Figure 2, we illustrate the impact mechanism of the operation of LAGs and the factors which determine their activities.
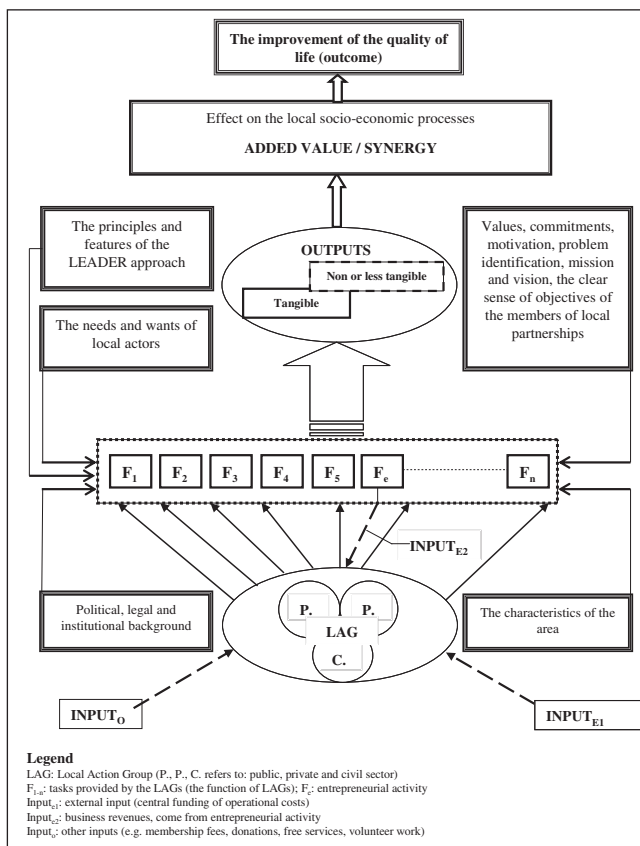
Source: Kis, 2011
Figure 2. The impact mechanism and determinations of the operation of LAGs

In the case of rural areas, it is typical that they have to face many challenges and they have to find the path for development that suits their particular conditions. In this process the local governments, civil organizations, enterprises and their partnerships based on efficient relationships between them have a decisive role. The one of the significant insitutionalized forms of this type of cooperations are the LAGs formed within the LEADER programme. The LAGs can use various inputs for their activities, and several factor determine the scope of their

tasks to be performed, which can be divided in five main groups according to their nature: 1) principles and features of the LEADER approach; 2) needs and wants of the local actors; 3) characteristics of the area; 4) features/quality of the LAGs' members (values, commitment, motivations, problem recognittion, mission, objective orientation of the members of the local partnership); 5) political, legal and institutional background.

Naturally, the specific tasks are realized locally, since endowments of the area, development needs and the make-up of the LAGs' members vary by settlement and region. Thus, it is difficult to describe them specifically. The operation of LAGs and thus the success of the application of the LEADER approach are considerably influenced by the role of legislation, cooperation and coordination of the managing authority responsible for the implementation of the rural development programme and the organizations involved in this process. Yet, we can say that the success of the LEADER programme depends considerably on the capacity of the local community to act and assert its interests; therefore, it is necessary to improve them, a process in which the LAGs have a prominent role. The proactive operations of LAGs, their activities to organize local society make it possible and greatly contribute to achieve that social changes assist the realization of economic objectives, enabling more effective and efficient development work.

Through their activities, tasks and functions the LAGs induce a synergy effect which is actually the positive contribution of the LAGs to shaping territorial processes. In this way, synergy is the added value of their operation; a joint effect coming from the improvement of the relations between the stakeholders. The added value is certainly not equal to the resource distribution role of the LAGs; it is more than that. This surplus or synergistic effect can be created only with community development and capacity building. Synergy results in new structures, puts new mechanisms in place which, due to their favourable effects on socio-economic processes, lead to an improvement of the quality of life. Consequently, through their role in local development, LAGs represent a significant community organizing force, as they are important institutions of local development and the implementation of rural development.

Focusing on the effectiveness, efficiency and sustainability of local rural development

Below, we examine the experiences of the application of the LEADER approach in practice, from the viewpoints of effectiveness, efficiency and sustainabilty, using the relevant analyses published on this subject. First of all, we consider it necessary to clarify several concepts and connections.

In general, effectiveness can be described as the achievement of the objective set. We can say that something is effective when it has realized the objective set, i.e. achieved the set result. Thus, effectiveness is the measure of

the achievement of the planned result or the expression of how much it was successful in transforming objectives into results. In this present case, effectiveness can be defined so if it was successful, or how much it was successful, in realizing the objectives set in the Local Rural Development Strategy. Of course, in case of the LEADER approach, effectiveness cannot be separated from the added value coming from the successful adaption of the method put into practice. Since LEADER does not strive only to implement a project, to simple realize the objectives or to achieve tangible results. It is clear from the previously mentioned that the further aim of implementing the LEADER approach is to gain more or less tangible results, to create a kind of surplus or a joint effect, which is not possible with other types of development interventions.

Efficiency always means a relationship between a certain output and a certain input category, which in case of evaluation of spatial development programmes the indicators of output, result and effect are related to resource (input) indicators (NÁBRÁDI ET AL., 2008, 2009). These definitions can be found in the EU's financial regulation, as well, which specifies that the Union's budget shall be used with regard in particular to the principles of efficiency and effectiveness. According to the regulation, efficiency is concerned with the best relationship between resources employed and results achieved, while effectiveness is concerned with attaining the specific objectives set and achieving the intended results (EC, 2002).

The concept of sustainability and sustainable development – stressing the coordination of economic, social and environmental considerations – is an indispensable basic principle of all developments in the 21st century, including rural development. According to the definition published in the famous Brundtland Report the sustainable development is a form of development "…which meets the needs of the present generation without endangering the chance of the future generations to be able to meet their own needs" (CSETE AND LÁNG, 2005). If the objective is sustainability, the sustainable development means the way there to the realization of which the local development provides the best solution (MOSELEY, 2003).

The basic conception behind the LEADER approach is that local strategies carried out according to the basic principles and features of the programme make a more effective and efficient development possible and contribute to a greater extent to the sustainable local development than the traditional, top-down type of development (EC, 2006). Thus, the success of the programme depends on how and to what extent the basic principles and features are put into practice.

Below, we examine the application of the LEADER method in local rural development from the viewpoints of effectiveness, efficiency and sustainability, based on the evaluation of the last two LEADER programmes – LEADER II (ÖIR, 2003) and LEADER+ (ECA, 2010). Experts' evaluations examining the adaptation of the LEADER approach called the attention to the fact that there are many

factors which affect the successful adoption of the method and indicates that it cannot be adopted by putting its principles and features into practice at every time and every place. According to the examined viewpoints, Table 1 shows the factors which helped or hindered the positive effect of the LEADER method in local development. It can be seen from the table that there is a significant difference between the findings of two expert analyses, which is food for thought.

Summing up the results, it can be stated that according to the analysis carried out by the Österreichisches Institut für Raumplanung (ÖIR, 2003), it has been sufficiently proven that the implementation of the LEADER method considerably contributed to the effectiveness, efficiency and sustainability of rural development processes and measures and to the creation of added value. However, the report of the European Court of Auditors (ECA, 2010) found that there is little evidence on the effectiveness of LEADER programme in achieving rural development objectives or the added value of the LEADER approach.
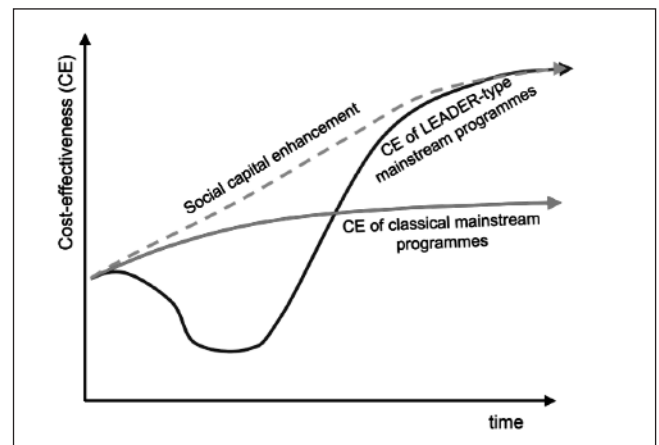
Source: ÖIR, 2004
Figure 3. Social capital and cost-effectiveness in LEADER-type programmes

In another study of ÖIR, on the basis of the impact assesment of the implementation of the LEADER approach, it was concluded that in certain areas, as a result of participation, partnership and cooperation, the social capital has obviously strengthened, which had a positive effect on the efficiency and sustainability of developments. The results obtained from the analysis are shown in Figure 3, which illustrates that the early phase of classical (mainstream) programmes can be implemented with better cost efficiency, but as a result of participation, partnership and capacity building, social capital is increased. This enrichment of social capital leads to an increase in efficiency in programme implementation, thus in a longer term the cost efficiency of the LEADER-type programme exceeds the similar index of the mainstream programmes (ÖIR, 2004).

The ECA report states that LAGs did not achieve the full advantages of the LEADER approach and did not make efforts of their own accord to increase the efficiency and effectiveness of programme implementation. The report has

<div style="text-align:center">***Table 1.*** The impact of the implementation of the Leader features on effectiveness, efficiency and sustainability</div>

Success factors	Hindering factors
Effectiveness	
*Adaptability to every rural socio-economic and governance context	*A too short implementation time
*Capacity to bring local actors, administrations, and support structures closer together	*A disempowering administrative environment
*Ability to mobilise additional efforts of committed local actors	*The prior existence of similar initiatives at the local level
*Responsiveness to small-scale activities and projects	**Overly bureaucratic implementation, lengthy procedures (long and detailed grant application forms required, delays of payments)
	**The lack of measurable objectives, specific to the area in the strategies, that can be achieved by the Leader approach; more intention and less about the situation it aims to achieve
	**Conflict of interest – LAGs providing grants to its own members
	**Monitoring focusing on detailed information about projects rather than on achieving objectives and adding value
	**Local strategy objectives were not a determining factor in project selection
	**Award grants to independent projects and supporting promoters in their normal activities
	**Deadweight effect (e.g. funding already completed projects)
	**Insufficient capacity building, animation and stimulation
	**The lack of focus on achieving local strategy objectives
	**The selection of weak strategies with non-specific objectives and a lack of clear intervention logic
	**Poor or non-existent provision for monitoring and evaluation of the strategies
	**Most of the strategies contained few concrete details about how the Leader approach would be implemented
Efficiency	
*The closing of the gap between a top-down programme and local needs / aspirations	*A too short implementation time
*A mentality change from passive to active attitude	*A disregard of the bottom-up approach
*The responsibility conveyed to local partnerships	*A weak and unrepresentative local partnership
*Direct and indirect effects on strategic issues (e.g. job creation and new investments in key sectors, diversification)	**Less effort to maximise the efficiency of the grant expenditure (e.g. the objective is to spend the maximum amount possible, rather than to achieve the maximum results possible)
	**Deadweight effect (e.g. funding already completed projects)
	**Monitoring focusing on detailed information about projects rather than on achieving objectives and adding value
	**Conflict of interest – LAGs providing grants to its own members
	**Insufficient capacity building, animation and stimulation
	**Overly bureaucratic implementation, Inflexible, lengthy procedures (long and detailed grant application forms required, delays of payments)
Sustainability	
*New avenues for creating added value or synergies between existing value added chains	*The disruption of the local partnership and of technical assistance by cutting funds abruptly at the end of the period
*Capacity building at the local level around partnership	*High fluctuation rate of key actors
*Increased public-private co-operation	*The continued dominance of a single sector or of public actors in the local partnership
*Integration of environmental concerns	*The relatively small size and impact of the intervention compared to other influence factors
*The programme provided the European, yet global perspective how to implement local development	**Insufficient capacity building, animation and stimulation

Source: Own presentation based on *ÖIR (2003) and **ECA (2010)

shown that in case of LEADER, the added value and the efficient and effective implementation of local strategies cannot be taken for granted. It is the Court's opinion that it is absolutely necessary to respect and observe the basic principles of the LEADER approach in order to realize the expected results and added value, when implementing LEADER-type local rural development. The report, on the whole, is critical and damning; although it mentions that there are examples where the programme is working well and has lived up to expectations (ECA, 2010).

On the basis of the ÖIR study, it is clear that the successful adaption of the LEADER approach benefits rural areas, the key element of which is the creation and strengthening of social capital. However, the ECA report points out that the expected benefits of the LEADER approach does not follow automatically its application to the local rural development. What should be done? How can the result of the LEADER be improved?

To improve the effectiveness and efficiency of the programme and its impact on sustainability, first of all, it is necessary to strengthen and maintain the factors of success, secondly, to transform and to avoid the factors which hinder or reduce the successful adaption of the LEADER method. The following should be mentioned in this context.

The basis of the success of the LEADER approach is the attitude which is appropriate to the conception and ideas of the method. Acceptance of the principles and values of the LEADER and identification with them are of great importance in it. It is important to stress that rural development, local development is a process as a result of which the objectives set can be realized. Capacity building and community development are its important elements that help to form and strengthen skills and abilities by which communities become able to manage local development, to realize their common goals effectively and in a sustainable way. A basic component of the LEADER philosophy is trust in local communities that they can solve their own problems in a community arrangement. However, this necessitates capacity building in the population and organizations of the area to enable them to do so, thereby being able to work towards helping themselves to improve the quality of their lives. Capacity building can include a variety of activities, such as training for participants and stakeholders, assisting the flow of information between them, improving communication, encouraging connections, encouraging thinking differently, establishing norms and values, presenting on the advantages and opportunities of cooperation, etc. As a result of capacity building, local communities become more active, effective and efficient in the processes of programming, strategy development, and implementation as well. The capacity building, the essence of which lies in the creation and development of social capital that could benefit the whole community, is a process which should necessarily precede and complement the design and implementation of local development strategies. It is a means to achieve that social changes assist the realization of the objectives set out in the strategy, enabling more effective and efficient development work and contributing to sustainable

local rural development. It is important to emphasize that it can take several years to enhance the capacity of local communities to take action according to the local circumstances.

Although, the LAGs are primarily responsible for implementing LEADER approach and they are who can create the expected added value through their activities, we think it is important to stress that the success of local development work is highly influenced by the horizontal and vertical relationships between the stakeholders. In this regard, the decentralization along the management chain in accordance with the principles of subsidiarity, the cooperation and coordination between the different actors can be highlighted. Effective and efficient planning and implementation of local strategies for sustainable development requires that the central power, guided by clear principles and values, should form a well-defined, transparent regulation, financial and institutional structure. Establish a system of monitoring and evaluation is an essential part of it, which provides guidance for the LAGs and allows measuring and monitoring their performance. The LAGs should therefore recognize their mission, and from the financial and regulatory side, they must be enabled to fulfill the tasks and functions expected from them.

Conclusion

In the 1980s, the EU's rural development policy shifted towards endogenous development, as introduced into the practice of rural development in the framework of the LEADER programme. The LEADER as the new model of rural development policy, the new paradigm of development focuses on participation, cooperation and utilization of the local resources.

The basic institutions of implementation of the LEADER programme are the LAGs, which play a key role in local development with their proactive operation. In our opinion, the most important task of the LAGs is to improve the social capital available in their areas of operation, the utilization of which as a real resource is based on the cooperation of local actors. Cooperation enables the inclusion of social capital – as a resource to support action – in spatial processes, thus creating a new combination of resources which may greatly contribute to the success of the LEADER programme and to the development of settlements and areas affected by LAGs on the basis of local resources.

Community development and capacity building provide assistance in creating and developing social capital, as a result of which relationships as usable resources, i.e. functional communities are created. In order to become real organizing forces in their areas, LAGs should play a catalyst role, which can create synergy, resultsing in the improvement of the quality of life through its positive impact on socio-economic processes.

The impact assessment of the implementation of the LEADER approach showed that in spite of several positive examples, there are many factors which hinder the wide

adoption of the features of the programme into practice, thus realization of results and impacts expected from it in the process of local development. Therefore, it is necessary to maintain and strengthen the factors of success and to avoid factors which weaken or hinder the effective adaptation of the method. In this regard, the key challenge is that LAGs should recognize their mission; the central power should be supported from the financial and regulatory sides allowing them to fulfill their expected tasks. Thereby, it can be hoped that the possibilites provided by the LEADER approach can be utilized in local rural development.

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EDUCATION AS A FACTOR OF AWARENESS DEVELOPMENT OF ORGANIC PRODUCT CONSUMERS

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Abstract: Organic agriculture provides good quality products, the development of sustainable agriculture, environmental protection and economic efficiency. To develop a habit of consuming organic food, as is case with all habits, it is necessary to educate the younger population, so that they can become accustomed to the fact that organic food is a source of both human health and a healthy environment. Therefore, educational institutions should initiate actions in order to develop awareness of the importance of healthy and safe food (especially fresh fruits and vegetables) among youth. This action has already been carried out in some countries.

Keywords: organic agriculture, consumer education, promotion of organic products, educational institutions.

Situation and basic characteristics of organic agriculture in the world

Standards that characterize organic agriculture, which are prescribed by IFOAM (International Federation of Organic Agriculture Movements), were established in 1974. Following this, some countries (Austria, France, Denmark and Spain) developed their own regulations on organic agriculture. Under its regulation (EEC) 2092/91, the European Union presented its standards of organic agriculture (1991). Afterwards, many other states developed their own regulations. The first guidelines for organic food devised by the Codex Alimentarius (Instructions for the manufacturing, processing, labeling and marketing of organic food), a joint program of the UN, WHO (World Health Organization) and FAO, were published in 1999.

IFOAM defines organic agriculture in the following way: "Organic agriculture is a production system that maintains the health of soil, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions but not on the use of ingredients with undesirable effects. Organic agriculture combines tradition, innovation and science for the benefit of the shared environment and promotes fair treatment and good quality of life for all people in the certain area."

Organic production is characterized by the conversion period (transition period), which can last from 1 to 3 years, depending on the certifying body, which means that the total output is adjusted to the standards of organic production.

The goals of organic agriculture are represented in the new regulation of the Council Regulation (EC) 834/2007 which has been in force since 2009, which replaced the regulation (EEC) 2092/91. Goals are the following [*Schmid et al.,* 2008]:

1. Establishment of a sustainable management system for agriculture where:

a) natural systems and cycles are taken care of that maintain the health of soil, water, plants and animals and establishes the balance between them;
b) contributes to a high degree of biological diversity;
c) energy and natural resources (water, soil, organic substances and air) are used in a rational way;
d) the high standards of animal welfare, which require that their needs are met, are complied with.

2. Production of high quality products and

3. Consumer satisfaction, i.e. meaning that the process of producing food and other agricultural products do not endanger the environment, human health, plants and animals, as well as their welfare.

Organic agriculture in the world is booming, both for environmental reasons (in order to prevent further collapse) but also due to the health of the population and profitability. Countries that have most of the organic agricultural land are Australia, with 12.00 million ha, followed by Argentina with 4.40 million hectares and the USA with 1.95 million ha. (*Chart 1*.).
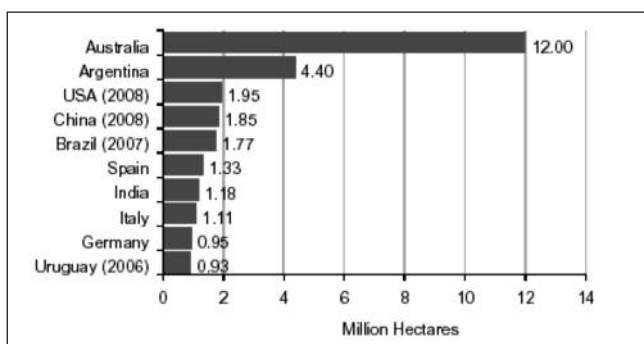
Chart 1. World: The ten countries with the most organic land in 2009
Source: Willer [2011]

The country with the largest share of organic land is the Falklands, with 35.7%, followed by Liechtenstein, with 26.9% and Austria, with 18.5% (*Chart 2*).
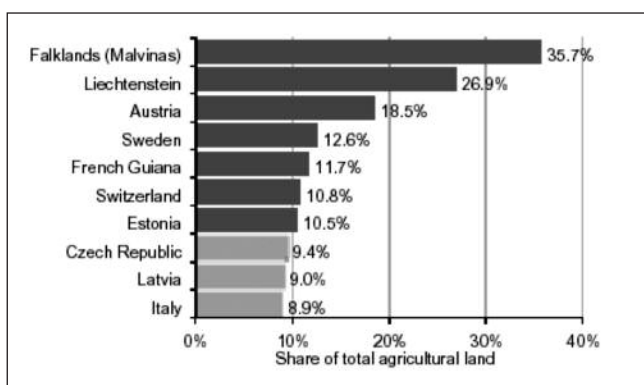
Chart 2. World: The ten countries with the largest share of organic agricultural land in 2009
Source: Willer [2011]

The biggest producers of organic food in the world (2009) are India, where there are 677,257 producers, then Uganda, with its 187,893 producers and Mexico, with up to 128,862 (*Chart 3*).
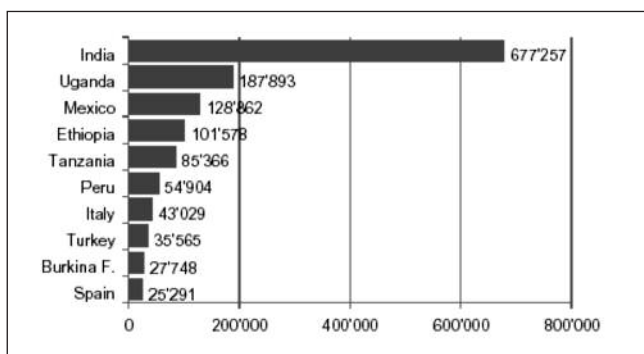
Chart 3. World: The ten countries with the largest number of organic producers in 2009
Source: Willer [2011]

Demand worldwide for organic products is very high, because consumers want healthy and safe food, and most of them are aware that organic farming preserves the environment. The international sales of organic products in 2009 amounted to 54, 9 billion of U.S. dollars. The greatest demand for organic products is in the U.S., where sales totaled 17,835 million Euros, followed by Germany with 5,800 million Euros and in the France with 3,041 million (*Chart 4*).
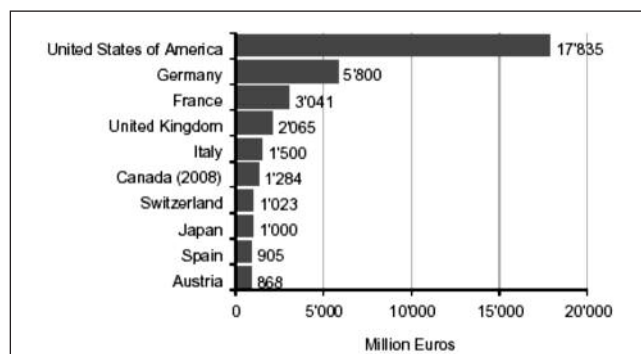
Chart 4. World: The ten countries with the largest markets for organic food in 2009
Source: Willer [2011]

Thus, the greatest demand for organic products is in North America and Europe. Significant producers and exporters of organic food are Asia, Latin America and Australia.

Education of consumers of organic products

While conducting consumer research target groups should be determined. Then one should take and examine the results of the research carried out by Hartman Group. A well-designed study was conducted by the Hartman Group, which established the relationship and attitude of consumers towards food that is "good for the environment" in the centre. The results were published in two volumes in 1996 and in 1997, and some of these results are as follows [*Karuki, Matheson*, 2009]:

– 48% of respondents will not buy this food because they are not interested (18%) and because the market is saturated (30%).
– Half the population makes the target group for this food. Those who are really willing to buy these foodstuffs are known as "real naturalists" according to the Hartman report, and they represent 7%, and others who are just willing to buy make up the other 45%. These 45% were classified into three categories. The first group is called the "new green trend" and represents 23%. They are determined about shopping provided that the product meets their expectations on price and availability. "Rich healers" belong to the second category, and they make up 12%. Their decision to make purchases increases if they feel that the offered good is a real product and think that it has a higher nutritional value. The next 10% represent the third category which consists of "young recyclers"

who, like the second category, are less committed to this food but their opinion is that environmental protection is an important field.

– For consumers, the price, taste, quality, accessibility and usability are the main criteria in the purchasing process. That based on the tags, consumer and believes in the product and that product label is understandable.

– The greatest concern among respondents is the pollution of surface and ground water with pesticides, then the effect of pesticides on birds and wildlife, but they are also concerned that the food contains pesticide residues.

– Many show their concern for the environment, but on the basis of their behavior, they are not in line with their concerns. Based on responses from respondents in terms of purchasing behavior, the Hartman Group realized that only half of the respondents transformed their words into action.

All activities that involve obtaining a true picture about organic products should be directed to consumers. They are a major factor because their demand depends on the offer of organic products in the market. Primarily through the media (as the prime media), customers should be presented with a logo that presents certified organic product, so in that way they can be sure what they are buying. Consumers should be aware that this logo means that the product contains at least 95% of the ingredients of organic origin, that inspection requirements are met, that the packaging of products meets the mandatory criteria and that the organic product comes directly from the manufacturer. It is necessary to educate consumers about organic farming through educational series where experts as well as known producers in this field would inform them about the benefits of consuming organic foods. Then, in various retail outlets, samples should be made available, in order that the population be able to try organic products and thereby encourage demand. Also, celebrities have a large impact on consumers because most of the young population identifies with them. Through the campaign, they are supposed to provide consumers with a message that eating organic food protects the health and the environment, (campaign can be supported by the Ministry of Agriculture, as well as by the companies involved in the production of organic food which want to position themselves in the market). Most recently the younger population is turning to social networks so it is advisable to work on creating sites about organic products.

The consumption of organic food reflects the attitude of consumers towards health and culture of the body and the relation to the environment protection. To develop a habit of consuming organic foods, as it is case with all habits, one should start educating the younger population so that they can get accustomed to the fact that organic food is a source of both the human health and the healthy environment. Therefore, an action should be initiated in order to develop awareness of the importance of healthy and safe food (especially fresh fruits and vegetables) at schools and

universities. Many educational institutions have canteens or cafeterias with food, i.e. fast food. Therefore, the Ministry of Education should initiate an action to introduce organic food in coordination with the Department of Organic Agriculture within the Ministry of Agriculture. All key actors suggest that being in charge of the education of young people would have a positive impact on the health of pupils and students, since obesity in young people is a noticeable trend. The importance of organic food should be promoted to the students at the school level, but it is very important that a person who is an expert in this field makes this topic interesting and acceptable to students by means of understandable and simple language because it is possible that too many facts or incomprehensible and unknown technical terminology will create resistance in children. A person who speaks to children should be primarily a pedagogue who can, on the basis of short and interesting presentation, understand and monitor the reactions of students and maintain their attention.

As far as the faculties are concerned, it is necessary to educate students about the values of organic agriculture, as well as provide them an opportunity to consume organic food in cafeterias/canteens. Faculties, such as schools, should direct the cafeteria to sign deals with certified organic farmers. These contracts would provide data on the quantity they need, about the prices of these products (lower prices should be offered in relation to the market since these are educational institution and they can stimulate demand among young people), payment terms and delivery time so the products would be available at any time, as well as requirements for packaging. This would in some way help to develop organic agriculture because organic producers would have a safe market of educational institutions and this would also help the local economy. Many developed countries have introduced organic food in restaurants on their faculties because they are aware of the benefits of eating organic foods.

In America, there is the program from farm to school, and in order to be successful this program requires good buying, selling and distribution systems. Successful distribution approaches in the program from farm to school, according to Kelly Sanger from the Department of Small Farm Agriculture and Direct Marketing in Washington, are namely [*Bellows et al,* 2009]:

Private farmers belong to certain unions within which they organize themselves so that their products are collected, processed and then distributed to schools and/or institutions. An example of this practice is a community of small farmers the New North Florida and the program for the student cafeteria at the University of Wisconsin.

The connection between growers and buyers in the institutions was created with the help of nonprofit organizations. Institutions order food through an organization which comes into contact with farmers in order to execute orders. An example is the Iowa project for meals at the State University of Iowa.

Schools purchase products in local markets, and to obtain adequate quantities of products and the products they want,

ordering is done in advance with the seller. In order that products are ordered, picked up and transported the co-ordinator is required. An example is a school district in Santa Monica in Malibu and Western Student Center for Food and Justice.

The program of fresh products includes procurement of fresh products which are used for school lunches through the Ministry of Defense. The Ministry buys food from farmers and then it sells food to schools, but delivery is not included. Examples include North Carolina, Florida, Tennessee, Kentucky and Washington State, which work with the U.S. Department of Defense in coordination with USDA's initiative for small farm/school meals. California and Illinois also have pilot programs.

Intermediaries between farms and campuses are also private companies that have contracts with colleges and universities, and are required to provide services of orders, procurement and delivery of food. Examples are the Aramark at Slippery Rock University in Pennsylvania, Burlington Food Service at Midlberi College in Vermont, Bon Appetite at Evergreen State College in Washington.

Within the U.S. Department of Agriculture, there is a program that includes an association of American schools for food service. This program as suggested by program Farm Bill in 2002, supports the introduction of the program from farm to school and other programs for feeding the community). The USDA coordinates the implementation of the supplies to create pilot programs, to provide nutrition services in schools, to increase the amount of fruits and vegetables, and to enable children to get these services for free. Pilot projects are being implemented in Indiana in Michigan, Iowa and Ohio, where each out of 25 schools in the state can receive up to $ 50,000 so that children can receive free fresh and dried fruits and vegetables.

Most countries should go in this direction, which means that colleges and schools could work directly with farmers, where there would be a coordinator within the Council on Nutrition at the educational institutions who would monitor all the necessary actions. In order to earn the trust between both sides, it is necessary to start with one educational institution at a time. It is assumed that initially there would be various problems, but all that needs to be overcome in order to provide opportunities for young people to consume organic food. Also, main actors may be NGOs, private companies, as well as the Ministry of Agriculture which may be the link between educational institutions and farmers. In order that all of this could come to life requires a strong promotion with regard to the issue of organic food. The media and social networks have a major impact on young people, and states should give maximum support in promotion because a healthy nation and healthy environment are vital for every country.

Conclusion

There are more and more appeals for consumers to eat organic food as this protects their health and helps to protect the environment. Consumers should be educated about the benefits they receive when eating this kind of food and that the higher prices the pay for organic products are not so high in the long run, when you take into account that the consumption of unsafe food threatens the health and therefore a huge amount of money should be allocated for health care.

It is important to promote organic products, and increase their "presentation" in educational programs, because the goal is for young people to understand the importance of consuming healthy and safe food, which in perspective leads to a healthier workforce, and therefore higher productivity in the production process.

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ECONOMIC QUESTIONS OF LAND USAGE – SCARCITY, SUSTAINABILITY

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Abstract: The aim of this paper is to show the economic importance of land usage. This topic is important because land is the basis of industrial and agricultural production, as well as energy and environmental security. The focus of the analysis is the relationship between land usage and scarcity and sustainability.

Keywords: land usage, scarcity, sustainability

Introduction

The current global economic crisis may well become the longest in three generations. If confidence in finance and the economy does not return rapidly, economic reform, socio-economic growth and political stability will suffer. While some confidence in the financial system will return in due course, a new financial architecture is required to strengthen the global economy and increase economic and financial fairness. In this context, it is critical that the needs for global food and environmental security are taken into account. World population growth is the biggest trend-making factor: 70 to 80 million more people a year, close to 7 billion by 2012. Population growth creates a rapidly growing demand for food products including feed arising from increasing meat consumption. Other major global trends are globalization and urbanization. Moving production to the most competitive regions causes the food trade to become more liberalized and also more concentrated. Growing energy demand and climate change will also influence food production; agriculture contribute to emissions of GHG into the environment and also suffer or benefit from changing climates, depending on climatic zones. Additional challenges are the increasing market volatility resulting from yield and stock fluctuations and consumer sensitivity to food quality, safety and price. Finally, there is the question of who will pay for agricultural public services provided by land managers that the market does not finance, such as rural landscape maintenance, environmental protection biodiversity, and animal welfare. These challenges are aggravated by global irresponsibility related to food security, water and environmental sustainability – and energy security.

Energy prices have seen a decline (in constant dollars) over the past 200 years. The latest fossil energy price hikes have not even brought us back to the price levels of some 30 years ago. The tragic reality is that political zeal led governments to keep fossil energy prices as low as possible, thus frustrating most attempts to increase energy productivity. Energy price elasticity is very much a long-term affair, and return on infrastructure investments crucial to the creation of an energy-efficient society requires time. Much debate surrounds the potential contribution of agriculture to renewable energies. Unfortunately, existing technologies produce energies that may be renewable, but most are not green. Whether second generation biofuels may eliminate most of the pitfalls of the first generation is open to doubt, although they include saving food components of plants. Biofuel policy is a major aggravating factor, even if it is now in the background because of the decline in oil prices that reduced demand and the drops in food prices. The current economic crisis is now the focus of attention, but renewable energy will return as a problem when the crisis ends.

In terms of climate change and the worldwide ecological situation, the picture is not better: it is a good deal grimmer. By adopting the correct policy mix, we can decouple wealth creation from energy and material consumption just as we decoupled wealth creation from the total number of hours of human labor. This was the great achievement of theIndustrial Revolution. Labor productivity has risen at least 20-fold in the past 150 years of industrialization. Resource productivity should become the core of our next industrial revolution.

Today, we know that the [over] exploitation of our entire ecosystem and the depletion of natural resources (the reserve-to-production ratio of oil reserves is rapidly declining) carry a price that must be paid today to compensate future generations for the losses (or costs of substitution) they will face tomorrow. Moreover, world population growth by 50% during the next 50 years, causing new scarcities (water) and pollution (CO_2 emission rights) is accelerating these issues.

Joseph Stiglitz and Nicholas Stern made a joint appeal to use the financial crisis as an opportunity to lay the foundations for a new wave of growth based on technologies for a low carbon economy (Financial Times, 2009). The investments would drive growth over the next two or three decades and ensure its sustainability. They noted that "providing a strong, stable carbon price is the single policy action that is likely to have the biggest effect in improving economic efficiency and tackling the climate crisis." Lord Stern calculated that governments should spend at least 20% of their stimulus on green measures to achieve emission targets (Stern, 2006).

The environmental resource scarcity issues are entirely real. As a result of climate changes, most agricultural patterns may become disrupted and the poorest countries are the most vulnerable to such disruptions. Over the long term, environmental security is the mirror image of food security, because we have no food without substantial clean water resources, productive soils, and appropriate climate. Climate change subjects all businesses and society in general to cumulative, long-term risk. The failure of agriculture alone would lead to widespread hunger in developing countries and mass migration of people (half a billion, according to the United Nations), mostly to developed countries.

Presently, when the world economy has decreased rapidly, it is necessary to analyse the different possibilities which help us change this negative tendency and to find the right way. We therefore need to valuate our resources from those of human capital to natural resources. This is the reason why I focus on one of the most important resources, which is arable land. Land, as an economic resource, is mostly utilised by agriculture. Land usage occurs in a competitive environment (market competition) and economic factors are primary for all farmers. However, it should not be forgotten that land is a natural resource at the same time, regardless of who the owner of a given piece of land is. Land is part of the national wealth of any country and it must be used in an optimal way. The regulation of land use activities is a governmental task (e.g. environmental protection).

In my opinion, land usage can be defined as a fine balance between sophisticated and inter-related activities, a precise order and harmony of biological, physical and chemical processes. This system of relations can only be described by using the rules of system theory and its adaptation to the specific conditions of land usage. It is important that land usage is defined on the basis of system theories by the fact that the whole system and the relationship between certain elements must be clearly specified and quantification must also be done.

On the one hand, I have to emphasize that land utilization is a complex category, and agricultural utilization is only one part of it – however, it may be the most important one. On the other hand, the present type of agricultural land usage give us such examples that show us that this question area cannot be defined on its own, only in a complex system compared with other land utilization possibilities. This is true for both micro and macro levels, as well. The aim is to find the best solution

for utilizing land in the most effective way. In a narrow sense, land utilization is part of global utilization, because it uses only some parts of it. Yet, on the other hand, in some cases it is a wider category, because it includes those lands which are needed for the processing industry and the services. Global utilization can give answer only to those questions that are in connection with the comprehensive relations of economical development. However, in order to make thorough analyses of the most important production factor of the agriculture – arable land – I will have to separate the different forms of land usage and point out its extern and intern relationships.

After finding the best utilisation, our task is to produce in a sustainable manner. Currently, this is very important - when we use so much limited resources, such as oil, gas, arable land. Everybody knows that we are borrowing land from our grandchildren, so we will have to give it back after we have used it.

Results and discussion

Land utilisation and scarcity

The problem of how to define, determine and assign the price, or the value of the land, is an important issue in the economic literature. Land could be seen as an asset, but also as a production factor that serves production and consumption purposes. Land assets have three important characteristics: *scarcity* (land exists only in fixed amounts and cannot be created easily), *immobility*, and *durability* (it cannot be destroyed easily: but fertility can be destroyed easily: biodiversity loss: crop production is impossible without biodiversity because that creates food production (crops and grass). These characteristics make land an attractive asset as a productive factor, as a collateral for credit and as a store of wealth.

Scarcity

The total land area of the world is 148 940 000 km^2. Europe has 10 180 000 km2 land area. The surface area of Hungary is only 0,91% of Europe, 93 030 km^2. About half of the total area of Hungary is agricultural area, which is outstanding in the world.

The total amount of land available at a given location is fixed, and the total supply of usable land in a nation is fixed – territory of Hungary is 9.303 thousands hectares. There is also usually more than one competing use for a parcel of land. The rent that can be charged for the use of land depends on its marginal revenue product in the highest.

Let me see the supply which is perfectly inelastic. If land rents at a location increase, the quantity of land supplied at that location could not increase. Because the supply at a given location is fixed, the price of land depends entirely on the level of demand at that location and governmental subsidies. Governments provide supports to agriculture in the form of transfers through a wide variety of policy

measures. Fortunately, the OECD has created a methodolgy to calculate the support. The most important are: CSE, PSE. The Consumer Support Estimate (CSE) is an indicator of the annual monetary value of gross transfers to (from) consumers of agricultural commodities, measured at the farm gate (first consumer) level, arising from policy measures which support agriculture, regardless of their nature, objectives or impact on consumption of farm products. The Producer Support Estimate (PSE) is an indicator of the annual monetary value of gross transfers from consumers and taxpayers to support agricultural producers, measured at farm gate level, arising from policy measures, regardless of their nature, objectives or impacts on farm production or income. http://stats.oecd.org/glossary/detail.asp?ID=1901

Immobility

Land is an immobile resource, because we cannot move it from one part of the world to another. The root of this characteristic results in both advantages and disadvantages. If the land is located near industry and the market, it is an advantage and of course the opposite is a disadvantage. We can abate the problems of the disadvantages with well planned industry location and well planned production structure of the plants.

Durability

This characteristic is true, but not in every case. If we only use the land, without implementing any environmental prevention on it, the quality and the productivity of the land will be lower. On the other hand, agriculture uses those parts of the land – the topsoil – which are the most dangerous,

because it can be easily destroyed by both wind and water erosion (and biodiversity loss). Therefore, my opinion is the following: durability is true in general, but it is not true in the case of the agricultural land.

Land utilisation and sustainability

It is very difficult to determine a concrete definition for the concept of sustainability. In my mind, a reasonable definition of sustainable development might be as follows: it involves maximising the net benefits of economic development, subject to maintaining the services and the quality of natural resources over time. Mankind is directly influenced by the loss of biodiversity. Through the extinction of species, we lose crucial opportunities to solve many problems of our society. Biodiversity provides us directly with essentials like clean water and air and fertile soil; it protects us from floods and avalanches. These benefits can all be valued economically. It is a difficult and complex task, but such a valuation would clearly show how important biodiversity is for human wellbeing and economic development.

Many people are unaware of the speed with which we are consuming our natural resources. We are producing waste far faster than it can be recycled. It is important to compare the needs for public goods and services with arguments whether or not market failures are linked to the provision of services. Market failure is a crucially important justification for taking measures to protect our landscapes. Corrections in market failures may also be achieved through investments and the provision of payments to reward land managers who provide public goods and services (European Commission, 2008). *(Table 1)*

Table 1. Future Environmental Scenario to 2050

Use	2000	2010	2050	Difference	Difference	Difference
	Million km^2	Million km^2	Million km^2	2000 to 2010	2010 to 2050	2000 to 2050
Natural areas	65.5	62.8	58.0	%	−8%	−11%
Bare natural areas	3.3	3.1	3.0	-6%	ᵐⁱ1%	−9%
Managed forests	4.2	4.4	7.0	5%	62%	70%
Extensive agriculture	5.0	4.5	3.0	−9%	−33%	−39%
Intensive agriculture	11.0	12.9	15.8	17%	23%	44%
Woody biofuels	0.1	0.1	0.5	35%	437%	626%
Cultivated grazing	19.1	20.3	20.8	6%	2%	9%
Artificial surfaces	0.2	0.2	0.2	0%	0%	0%
World Total	108.4	108.4	108.4	0%	0%	0%

Source: Braat, L., and Brink, ten P., Eds. 2008. Contribution of Different Pressures to the Global Biodiversity Loss between 2000 and 2050 in the OECD Baseline: Interim Report. Brussels: The Economics of Ecosystems and Biodiversity (TEES).

When I focus on sustainability in relation to land, we need to think in the long run. It is the basic condition of long-term sustainable agriculture to fit in with the environment, i.e. to use land for production at an intensity which would mean the most optimal utilisation, without destroying it.

In the beginning of the 1970s, at the time of the world oil crisis, economists suddenly realised that some of our resources are limited. That was the reason why so many dissertations were written about different alternatives of sustainability. One of these documents was "Limits of growth," by D. H. Meadows, the purpose of which was to remind national governments of the dangers to society, by sketching a concrete global problem. In her research, we can find a lot of problems, but we would like to focus on only five of these, which are in close connection with land utilisation.

The first of these problems is population growth. Analysing the table below, we can see a huge increase in world population, which will be more than 3.5 times bigger in 2050 than it was in 1950. This growth will be a great problem, because currently about 1 billion people are starving and this figure will increase in the future. From the table, we can see that the biggest problem occurs in the case of the less and least developed countries, where this increase is much higher than the average. *(Table 2)*

Table 2. World population (1950–2050)

	1950	2000	2003	2050
Total (million)	2519	6071	6301	8919
Developed countries	813	1194	1203	1220
Less developed countries	1706	4877	5098	7639
Least developed countries	200	668	718	1675

Source: UN (2003) World Population Prospects: The 2002 Revision. Highlights. New York: United Nations.
Less developed countries: all African and Asian countries, excepting Japan, Latin America and the Caribbean region
Developed countries: all European countries, North America, Australia, New Zealand and Japan

The second problem is the increase in natural resource production. It started in the 18th century after the Industrial Revolution, and has increased step by step, but at a higher rate. On the 3rd table, we can see the production of primary energy in the last decade. In this period, in EU countries – including Hungary – it has decreasing by a small proportion, but the increase in China in the same years was about 70%, which was shocking. The production in the USA and Japan was consistent.

The third problem is the expansion of the industrial production – production of electricity is presented in the 4th table – which is in a close relationship with the increasing of the natural resources production. The electricity is very important because that is the basis of all the other industries.

Table 3. Primary energy production (billion tons, oil equivalence)

	2000	2001	2003	2005	2007	2008
EU-27	933,0	932,2	926,4	890,2	859,5	…
USA	1678,8	1699,9	1634,5	1629,9	1665,2	1716,1
Japan	105,8	104,7	84,0	99,8	90,5	87,1
China	1073,0	1104,5	1331,3	1640,9	1814,0	…
Hungary	11,32	10,8	10,7	10,4	10,2	10,4

Source: Hungarian Statistical Office, 2009

Table 4. Gross electricity production (billion kWh)

	2000	2001	2003	2005	2007	2008
EU-27	3020,9	3108,1	3216,0	3308,9	3361,7	…
USA	3990,5	3924,1	4075,8	4257,4	4348,9	4354,5
Japan	1057,9	1039,7	1082,6	1133,6	1133,7	1085,2
China	1368,5	1434,6	1905,2	2474,7	3277,7	3103,1
Hungary	35,2	36,4	34,1	35,8	40,0	40,0

Source: Hungarian Statistical Office, 2009

The fourth problem is environmental pollution, which has increased to a great extent. All three factors – population growth, grow in the natural resources- and industrial production – generate environmental pollution alone, but these are cumulated that is why that we could find a higher increase in this area than in the others.

Last, but not least, we could see a great decrease in the territory of the agricultural area all worldwide, except for in China. This trend is very dangerous because the population has increased at a high rate and requires more territory for producing basic materials for the food industry. (Table 5)

Table 5. Agriculture area (1000 ha)

	2000	2001	2003	2005	2007
World	4960102,0	4967137,1	4937312,0	4945770,4	4931862,0
Europe	486189,0	483612,6	479373,0	476634,4	474273,5
USA	414399,0	414944,0	416902,0	412878,0	411158,0
Japan	5258,0	4793,0	4736,0	4692,0	4650,0
China	544358,0	543356,0	541851,0	547340,0	552832,0
Hungary	5854,0	5865,0	5865,0	5863,0	5807,0

Source: Faostat 2008

These five factors are interconnected. When the population increases, it needs to use more resources that are used by industry. All of these three factors generate environmental pollution and they usually use agricultural areas. It is true all over the world, which is why the quantity and ratio of agricultural land has decreased in the past.

Daniella Meadows suggested zero economic growth in her survey, so in her mind it will be necessary to decrease the first four components increasing rates by 30–70% and to increase the fifth one in the same ratio.

Conclusion

Population growth creates a rapidly growing demand for crop products. Growing energy demand and climate change will also influence food production; agriculture will contribute to emissions into the environment and also suffer or benefit from changing climates, depending on climatic zones. Additional challenges are increasing market volatility resulting from yield and end stock fluctuations and consumer sensitivity to food quality, safety, and price. The challenges are aggravated by global irresponsibility related to food security, water and environmental sustainability- and energy security. The exploitation of our entire ecosystem and the depletion of natural resources carry a price that must be paid today to compensate future generations for the losses they will face in the future. The food crisis affected more people more severely than the macroeconomic issue because the populations most affected by sharply rising food prices spend larger shares of their income on food. The global food crisis produced an extraordinary human impact, larger and more adverse than the global financial crisis. Resource productivity should become the core of our next industrial revolution. There are five factors in close relationship with the land utilisation. These are the next: rapid population growth, increasing utilization of natural resources, expansion of industrial production, increasing environmental pollution and decrease in territory of agricultural area.

Land, as an economic resource, is mostly utilised by agriculture. It could be seen as an asset, but also as a production factor that serves production and consumption purposes and have three important characteristics: scarcity, immobile and durability. Land constitutes part of the national wealth and it must be used in an optimal way. Land utilization is a complex category, and agricultural utilization is only one part of it – however, it may be the most important

one. The land utilisation is needed being in accord with sustainability. The root of the problem is the population growth, which will be more than 3.5 times larger in 2050 than it was in 1950. This growth will be a great problem because currently about 1 billion people are suffering from hunger and this situation will only increase in the future. About forty years ago, when the price of oil went up, economists suddenly realised that some resources are limited. In addition other crucial problems emerged, such as the increase of natural resource production, the expansion of industrial production and intensification of environmental pollution, which has been increasing exponentially. This development is dangerous, because the population has increased at a high ratio and requires more territory for producing basic materials for the food industry.

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METHODOLOGICAL AND INTEGRATION ASPECTS OF ABC-METHOD APPLICATION IN TRADE ORGANIZATIONS

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Abstract: In conditions of declining consumer demand and deficit of credit resources more and more managers of Russian companies think of necessity of introducing effective methods and systems of cost management. One of the most relevant is method of "Activity Based Costing" (ABC-method). Since, in western experts' opinion sectors of service and trade are adjusted to use of ABC-method even more than production, we should refer once more to the main methodological and integration aspects of ABC-method application and consider it from position of trade organization.

Key words: ABC-method, ABB-method, allocation of costs, managerial accounting

ABC-method in trade – is the variant of forming reliable information about prime-cost of selling goods, customers in service and taking place in organization business processes (Vakhrushina M.A. 2004), exercised by means of previous distribution of consumed resources between organizations and following transference of operation cost to terminal object of calculation (goods, sales channels, etc.) (Atamanov D.Y., 2003) Schematically ABC-method can be represented in the following way (Fig. 1).

According to fig.1 all direct, relative to subjects of calculation expenses immediately referred to prime cost of respective goods, orders, clients etc., and indirect costs – go through the system of drivers, in the framework of which their distribution goes on.

After distribution of indirect costs between operations, there appears an ability to count the cost of accomplishment of each of them. As intended all operations, made in trade organization can be divided to main, service, and management. Main operations depend directly on the level of sales turnover and itself can affect on it, which conditional

upon existence of between them and terminal subject of calculation (delivery operations, packing, setting out on shop window, cash services, etc.). The absence of this operations leads to work stoppage in organization (Sokolov Y. V. 2004).

Service operations are meant for creation conditions, providing normal accomplishment of main operations of the organization (equipment repair, security, stuff recruitment etc.). Presence of management operations conditioned by their interconnection with all service and main operations, since that on any area of work there is a hierarchic subordination of some employees to the others. With the application of the given classification there is a necessity in appropriation of the cost of service and management operations either on main operations or directly on subjects of calculation, for this purpose three methods can be applied (Ivashkevich V.B. 2003, Horngren C., Foster G., Datar Sh. 2007):

1. Method of direct distribution: expenses of service and management operations are attributed with the help of drivers to terminal subject of calculation by-passing the main operations and each other.
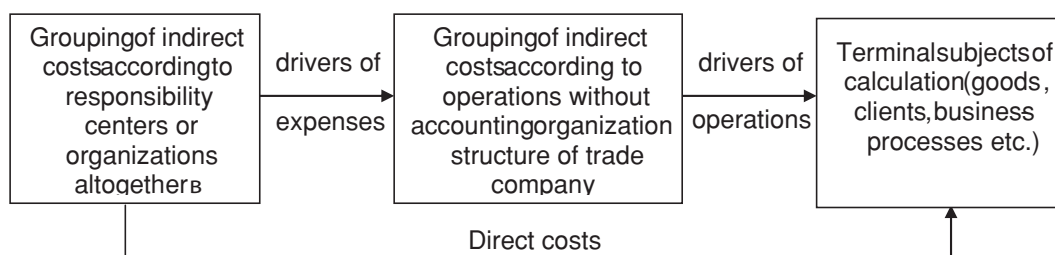

Fig. 1. General scheme of ABC-method

2. Method of step-type distribution: First, we distribute cost of service operations, accomplished in unilateral manner for the purpose of uninterrupted accomplishment of main and management operations. Then the cost of main and management operations are distributed between terminal subjects of calculation. The variety of step-type distribution is method, implying previous distribution of cost not only service, but management operations, the result of which is full attribution of costs of non main operations on main ones, the cost of which, then transferred on terminal subjects of calculation.

Method of mutual distribution is based on definition of the system of multitude linear equations, describing difficult circular interconnections between non main operations. with that we consider situations when:

a) service operations provide services to each other,

b) service operation provides services to management operation, which, in its turn affects on service operation.

Sometimes for the purpose of simplifying of ABC-method the cost of service and/or management operations is not attributed neither on terminal subjects of calculating nor on main and service operations, but by analogy with the method of developed direct-cost is placed on decrease of the financial result in the end of accounting period. It is motivated by that the given expenses are "non-relative" i.e. they cannot be reasonably attributed or distributed between intermediate or terminal subjects of calculation.

Calculation of prime cost of terminal subjects of calculation in retail trading presupposes dividing into two groups: product-oriented (item, lot of goods, type of item, group of similar goods) and client-oriented (order, client, group of clients, (market segment), trade channel). In wholesale organizations enumeration of prime cost of subjects of calculation only by goods and clients is unreasonable because front office of trade organization needs to full assessment of expenses. For example, to assess profitability of selling certain lot of goods it is necessary to add prime cost of sold lot to the cost of servicing the client which has purchased that lot. Thus wholesale organization using ABC-method, compound subjects of calculation, such as "goods –clients" and "clients – goods".

Introduction of ABC-method can be implemented on the basis of its integration with other methods and systems, for example, with elements CVP-analysis, traditionally used in trade organizations. Focal point in the process of integration of ABC-method with the elements of CVP-analysis is allocation of variable in the cost of each operation i.e. variable depending on goods turnover, and constant, i.e. part independent from goods turnover. Then goes distribution of variable cost, using driver "Turnover volume", with it it's necessary to take into account interconnection of main and non main operations with terminal subjects of calculation. For example operation of pre-packing relates to only certain list of goods. Distribution of constant cost of accomplishment of each operation goes with the help of standard for ABC-method drivers. With that it should be appreciated that chosen as drivers of operations indexes must, firstly, set interconnection with terminal subjects of calculation, secondly they mustn't imitate the driver "Turnover volume". Thus, the conclusion can be made that as a result of integration with elements of CVP-analysis the methodology of ABC-method keeps being the same to a large extend, because in fact there goes additional detailing of indirect expenses, as a result of which the process of their further redistribution between terminal subjects of calculation goes on in turn – at first for the variable, then for the constant cost of each operation. (see fig.2).

After distribution cost of operations, there comes the stage of calculation of prime cost of terminal subjects of calculation. Since in the process of integration of ABC-method with elements of CVP-analysis there takes place detailing of costs into constant and variable, forms of consolidated and pay-roll records must be added by columns, registering such detailing. Upon completion calculating accounts the analysis is carried on, the results of which are processed as a report to principal officers of trade organization. With that the analysis can be carried out both on the basis of ABC-method data, and on the basis of dividing of expenses into constant and variable (CVP-analysis), the basis of which is finding marginal profit, rate of coverage and breakeven point.

Besides more detailed analysis of the achieved results, integrated variant of ABC-method has other advantages. For instance it provides more precise calculation of prime cost of terminal subjects of calculation, in comparison with the simple ABC-method. It can be explained by that, the simple ABC-method does not take into account the variable part of cost of service and management operations, which could be
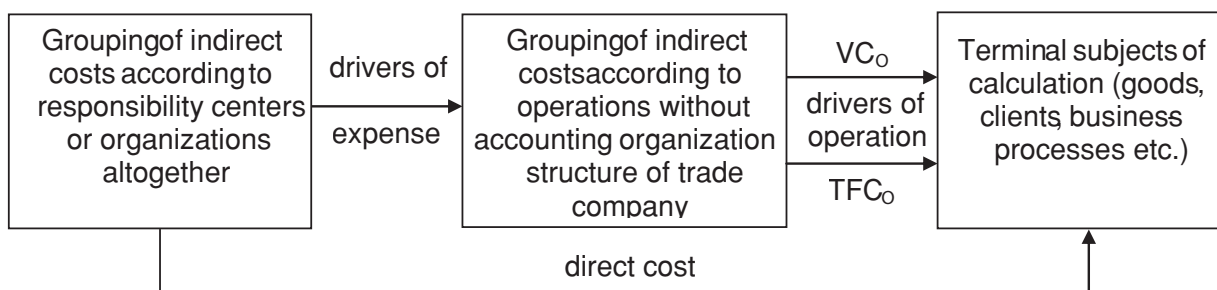

Fig. 2. Scheme of ABC-method integrated with elements of CVP-analysis, where VC – variable part in operation cost, TFC – constant part in operation cost

distributed between terminal subjects of calculation proportionally to company's turnover. Thus the level of "irrelevance" of the given operations would be lowered. Along with that, the integrated variant of ABC-method has an ability of previous forecasting cost of operations and terminal subjects of calculation, depending on probable increase/decrease turnover both altogether and in layout in groups of similar goods. Suppose that in the following period, expected increase in organization's total turnover on 7%, which is conditioned: increase in sales volume the first group of goods on 2%; increase in sales volume of the second group of goods on 6%; decrease in sales volume n-group of goods on 1%.

Percent terms of increase/decrease are calculated relatively to the current volume of total turnover of organization. In such case we can apply the following technique of expenses forecasting:

1. Factual variable part in the cost of each operation multiplies by coefficient 1, 07. Thus we find forecasted cost of variable part in the cost of each operation for the next month (VC_{pl});
2. Factual constant part in the cost of each operation remains unchanged ($TFC_f = TFC_{pl}$);
3. We find total forecasted cost of each operation for the next month ($VC_{pl} + TFC_{pl} = \Sigma_{pl}$);
4. We find difference between forecasted and factual cost of each operation ($\Sigma_{pl} - \Sigma_f$);
5. We calculate consumption factor of operations driver by terminal subjects of calculation (d_{pl}/D_{pl}). With that for the common value (D_{pl}) we take 7% forecasted increase of total turnover, and for indexes of consumption of driver by the subjects of calculation (d_{pl}) – percentage value of forecasted increase/decrease of goods turnover, calculated relatively to index of the total turnover of organization of the current period;
6. We find increase/decrease of variable expenditures by the terminal subjects of calculation: ($\Sigma_{pl} - \Sigma_f$) * d_{pl}/D_{pl};
7. To the increase/decrease of variable indirect expenses, which was found by the terminal subjects of calculation, we add the sum of factual indirect expenses which was found by the terminal subjects of calculation in the accounting month. Integration of ABC-method with elements of CVP-analysis is able to give organization other advantages. For example, it is an ability to calculate breakeven point for service operations i.e. assess efficiency of their accomplishment. Thus we can determine the level of breakeven condition, for instance for legal department, accountants office, security department, repair service, etc. If the results of carried out analysis show that efficiency of accomplishment of service operation is lower than breakeven level, then principal office of trade organization needs to refuse to accomplish that operation or pass its accomplishment over to subcontractors.

In conditions of integration of ABC technique with the system of budgeting (ABB-method) budgets of commercial and administrative expenses of trade organization are replaced by multitude of budget operations, which allows forming indexes for the upcoming period more reasonably. To our opinion we can distinguish four main stages, connected to forming of budget operation indexes:

1. preparatory: finding of preliminary budget cost of operations with the help of rate of operations' drivers, calculated on the data of the past budget period, and also values of the drivers of operations of the next period.. For example, if, according to the results of trade budgeting process there was determined that sales turnover (D) of pre-packed goods will amount in January – 128473 rubles, in February – 119394 rubles, in March – 207491 rubles and so on and annual rate of the driver of operation (r_0), calculated according to the data of the past period, is 0,12 rubles/rubles, then preliminary budget cost by months will comprise:

    in January: 128473 * 0,12 = 15417 rubles.;
    in February: 119394 * 0,12 = 14327 rubles.;
    in March: 207491 * 0,12 = 24899 rubles and so on.

2. analytical: forming and specification of cost items by each operation for the budget period. Technology of forming items of operation budgets in general view can be the following:

   a) determination (specification) of the list of items of expenses, included in the cost of each operation;
   b) determination of drivers for each item of expenses (drivers of expenses;
   c) items of expenses are divided into dependant and independent from driver of operation, determined during the preliminary stage;
   d) determination of norms of spending of drivers of dependant expenses in reliance operation driver unit;
   e) the norm of spending of dependant expenses driver is multiplied by budget value of the driver of operation, as a result of which we find natural term (sometimes – at a time monetary) expression of budget item. Then natural expression of budget item is multiplied by presupposed rate of driver of expenses (hourly wages of an employee, cost of one liter of gasoline, cost of one item of packing material etc.) as a result of which we find its ruble equivalent.
   f) determination of overrun or undershoot of driver of dependant expenses and its matching with the other operations, with the purpose of lowering of its overrun or undershoot. With that, for the reasoning of overrun or undershoot it's necessary as in paragraph "e" to use rates of drivers of dependent expenses;
   g) values of independent from the drivers of operations, items of expenses are determined in organization altogether, or by divisions, and then are distributed between operations proportionally to drivers of expenses (sq. meter, unit of similar equipment, etc.);

3. Calculated: finding of the final budget cost of operation accomplishment, and also finding rates of drivers of operations for the next budget period with the help of matrix form table, where horizontally is the information about items and groups of expenses, vertically – about

accomplished operations in organization. If trade organization has several divisions it makes corporate-wide matrix of budget cost of operations;

4. Conclusive: calculation of the budget prime cost of the terminal subjects of calculation. The budget of prime cost consists of two parts, the first of which is made for showing the process of distribution of the budget cost of service and management operations on main operations. If distribution goes on with the help of step-type method, then the first part of budget may consist of two and more forms, since their quantity directly depends on quantity of "steps", provided by the technique of distribution (Dobrovolskiy E., Kabanov B., Borovikov P. 2006). The second part of the budget is designed to show the process of calculation of terminal subjects of calculation prime cost. With that budget cost of main operations, distributed with account of secondary expenses is added to budget value of direct cost on corresponding positions of subjects of calculation. By analogy with developed direct-cost the form of the second part of budget may have step structure which can be explained by the presence in ABB system different levels of expenses(item, installment, sort, group of goods.)

Thus ABB – method has specification, distinguishing it from traditional approach to budgeting. With that given specification affects the budget structure, ways of forming the budget indexes, and also on method of analysis and form

of budgets. However, changes, necessary for the transformation of traditional system of budgeting to ABB-method do not have global character, because they accomplished only in a part of indirect (administrative and commercial) expenses, for which planning, account, control and analysis must be accomplished in another way.

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IMPACTS AND EXTERNALITIES
OF AGRICULTURAL MODERNIZATION
IN BRAZILIAN STATES

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Abstract: This study aimed to analyze the relationship between the levels of agricultural modernization and socioeconomic indicators of the Brazilian federation units. A multivariate approach to data analysis led to the creation of the Index of Agricultural Modernization (IAM). The Spearman correlation test was used to verify the relationship between levels of agricultural modernization and a set of economic and social indicators. As a result of the survey, we obtained the Index of Agricultural Modernization (IAM) which allowed the ranking of Brazilian states in terms of level of modernization. The correlation analysis demonstrated the existence of significant and positive correlation between the agricultural modernization and the following indicators: per capita GDP, trade balance per capita and IFDM. This means that agricultural modernization contributes to increased production, exports and the levels of socioeconomic development of the states. For the variable urbanization rate, test results showed a negative correlation with the IAM, which suggests a contribution of agricultural modernization for fixing people in the countryside. Indicators of inequality in income distribution showed no significant correlation. In conclusion, it can be inferred that the positive relationship of the IAM with indicators of production, exports and socioeconomic development shows the presence of positive externalities and impacts of the agricultural modernization process for the Brazilian states.

Key words: multivariate analysis, agricultural modernization, socioeconomic indicators, externalities.

1. Introduction

The agribusiness is one of the main sectors of Brazilian economy and has a leading position in foreign trade, accounting for 37.9% in the country's total exports in 2010. According to the Ministry of Agriculture (2011), in 2010, exports in the sector totaled $ 76.4 billion, a record for the sector. Taking into account the values of 2009, exports grew by $ 11.7 billion, representing an increase of 18.1% and exceeding in $ 4.6 billion the previous record of $ 71.8 billion, achieved in 2008 - the record for foreign sales of Brazilian agribusiness until then.

According to Correa and Figueiredo (2006), several instruments were used to allow the Brazilian agribusiness

reach this high level of productivity and competitiveness in the international market. For Martine and Beskow (1987), the process of modernization and implementation of technological innovations in Brazilian agriculture began in the 1930s, with the first policies of the government based on import substitution of consumer goods.

Innovations in agriculture, according to its effect on the production process are classified into: mechanical innovations, which modify the intensity and pace of work; physical-chemical innovations, which alter the natural conditions of soil; biological innovations that reduce the production period and enhance the innovations mentioned above; agronomic innovations that permit new forms of organization, allowing the increase of labor productivity in

general (Graziano da Silva, 2003). According to Brum (1988), among the main reasons for agricultural modernization are the increase in labor productivity in order to increase profit; the reduction of the unitary cost of production to beat the competition; and to enable the implementation of the agroindustrial complex in the country.

The modernization of agriculture in Brazil occurred basically in three moments. In the first moment, modernization happened with the constitution of the agroindustrial complex of the 1970s, in the second, the process is intensified with the consolidation of the industry related to the manufacture of agricultural machinery and equipment and, finally, in the third moment, with the integration of financial capital in the agricultural sector (Silva, 1996).

According to Hoffman and Ney (2004), with the objective of facilitating the access to new technologies in the field, the government has relied mainly on rural credit, in this sense, the distribution of rural credit is placed as being directly linked to the different existing levels of agricultural modernization in Brazil. The policy of modernization of Brazilian agriculture is characterized by the predominance of the policy of abundant and subsidized rural credit, yet available in a very concentrated manner.

Defant et al. (1999) argues that from the 1970s, the government encouraged the national agriculture to modernize, through resources for investments, and from the 1980s, for costing. The resources for costing were certainly destined, for the most part, to large producers, aiming their production to reach, together with the investments made earlier, productivity gains and increase of products to export, contributing by one side to the external competitiveness, but on the other hand it also contributed to increase the levels of inequality.

Given this context we must emphasize the negative impacts the agricultural modernization process developed in the country, which contributed to land concentration and therefore income concentration.

According to Hoffman and Kageyama (1985), there are evidences that the process of modernization occurred in the agriculture of the country has contributed to the income concentration especially in the countryside. For Ehlers (1999), the use of new technologies in Brazilian rural sector, and the quick way in which the process of agricultural modernization in the country occurred, contributed to the intense process of rural exodus in the country and consequently for the population concentration in the main urban centers of Brazil. In this same direction, Balsan (2006) affirms that the strong rural exodus begins more intensely in the more developed regions, where the process of capitalization and mechanization of agricultural activities occurred first and in a stronger way. Corroborating the arguments presented above, Graziano da Silva (2000) points out that agricultural modernization in Brazil contributed to the evolution of the exclusionary and concentrating land structure, thus hindering access to land by the rural workers.

In relation to socioeconomic indicators, as shown by

Graziano Neto (1985), it can be noticed that if on one hand, modernization has brought economic gains and income generation, on the other there were several negative impacts resulting from this process. Among papers discussing the effects of agricultural modernization stand out Nicholson (1984), Herdt (1987), Hayami and Ruttan (1985), Otsuka, Cordova and David (1992), Lomar et al., (2009)

Having said that, this work aims to analyze the relationship between levels of agricultural modernization and economic indicators of the Brazilian federation units, that is, it is intended to evaluate the impacts and externalities of the agricultural modernization process in 27 states.

As a contribution, it is hoped that this paper stimulates discussions about agricultural modernization and about strategies that may be useful for reducing the negative effects of modernization on the levels of income concentration, indicators of socioeconomic development and the rural exodus, without letting the country reduce its level of international competitiveness.

2. Methodology

The process of agricultural modernization has a multidimensional character, that is, the magnitude of this process requires the consideration of a set of variables capable of capturing the use of modern technologies associated with it as shown in Hoffmann (1992), Cunha (1995), Meyer (1997), Souza and Lima (2003) and Gasques et. al (2004).

This situation is not exclusive to the Brazilian economy. In international economic literature, there are many works that addressed the conditioning factors of the process of agricultural modernization, as well as disparities in the process. Among the studies that have shown the existence of conditioning factors of agricultural modernization the ones by Schultz (1965), Mellor (1966), Falcon (1970) and Gibbons and Koninck and Hasan (1980) stand out.

Given this multidimensional nature of modernization the present study was based on a multivariate data approach, involving a set of 24 variables related to the use of new technologies in agriculture. The application of multivariate analysis allowed the description of the modernization process in the Brazilian states, allowing also the construction of the Index of Agricultural Modernization (IAM), which allowed to classify the relative performance of the federation units.

2.1. Variables and Data Source

Given the multidimensional nature of the concept of agricultural modernization, it becomes necessary to survey a wide range of variables and indicators capable of capturing the level of agricultural modernization in a region. In order to determine the factors affecting the modernization, 12 variables were selected for each state, representing different dimensions of agricultural modernization, aiming to verify

the adoption of new technologies and the productivity growth of production factors.

The selection of variables used in this article was based on several studies that have focused on the analysis of the process of agricultural modernization. To capture aspects related to the use of machinery and equipment, the variables selected were number of tractors and value of investments in agricultural machinery and tools; to analyze the issues associated with improvements in infrastructure and logistics the variables used were value of investments in facilities and other improvements, value of investments in vehicles and other means of transportation and fuel expenses; the aspects related to the use of inputs were evaluated using the variables costs of fertilizer and correctives, expenses with seeds and seedlings and costs of pesticides, and finally to consider the issues associated with the use of capital the variables used were total investments, total expenditure and production value.

All variables were worked with relative values in the global context of each state, allowing a better comparative analysis between them, expressing, more appropriately, their relative contribution. For the relativization of the variables, all data collected is expressed in relation to the explored area (EA) and man-equivalent (ME). This is because, according to Souza and Lima (2003), the aspect of interest is not the volume but the intensity of the use of modern technology. That said, it is justified the variables being expressed in relation to the labor occupied, in man-equivalent (ME), and in relation to the explored area (EA). The concept of man-equivalent (ME) used in this study refers to the homogenization of the work of men, women and children. The concept of the explored area (EA) refers to the sum of areas with permanent and temporary crops, planted pastures, planted forests, areas with natural pastures and natural woods.

With the relativization of data by EA and EM, the number of variables used in factor analysis doubled. In this sense we used 24 variables to determine the rate of agricultural modernization. All information is available on the Agricultural Census of the Brazilian Institute of Geography and Statistics (IBGE) 2006.

2.2. Factor Analysis

In Brazilian literature there are a vast number of studies that used multivariate approach, specifically the factor analysis to identify and explain the agricultural modernization, among which are: Hoffmann (1992), Meyer (1997), Espirito Santo (1998) Souza and Lima (2003), Cespedes (2004) and Cruz Ribeiro (2006).

According to Hair et al. (2009), factor analysis is used to synthesize information from a large set of variables in a reduced number of variables or factors. For Mingoti (2005), the goal of factor analysis is to describe the behavior of a given set of variables, from the dependence structure between them, through a smaller number of variables called factors. The variables most correlated are combined on the same factor, being independent of those that make up the other factor, that is, the factors are not correlated.

The factor model obtained after factor analysis explains, theoretically, the structure of latent factors responsible for the observed correlations between the original variables. Naturally, the model assumes that there are a number of factors below the original number of variables that are able to explain a high percentage of the total variance of the original variables. The rules of the eigenvalue (characteristic root) superior to a Scree-plot are usually used to decide the minimum number of factors needed to explain a considerable proportion of the total variance of the original data. However, these rules only help to select the factors needed to explain the observed variance-covariance, and say nothing about the quality of the factorial model deduced (Maroco, 2007).

To evaluate the validity of factor analysis, we used the criteria Kaiser-Meyer-Olkin (KMO), the Bartlett's test and the percentage of total variance explained by factors. The KMO and the Bartlett's test are two statistical procedures for measuring the quality of the correlations between variables in order to proceed with factor analysis. The KMO near 1 indicates small partial correlation coefficients, while values near zero indicate that factor analysis is an unacceptable option, because there is a weak correlation between the variables.

After obtaining and identifying the factors, and determining the respective factor scores, it is possible to study the stage of agricultural modernization of Brazilian states. Thus, the factor analysis contributes to a view on the process of agricultural modernization, using the values of the factors to obtain the measures of modernization and subsequently the ranking of states. In the next section it is presented the procedures used to create the Index of Agricultural Modernization for the Brazilian states.

2.3. Agricultural Modernization Index (AMI)

From the factors obtained in the factor analysis, it is possible to create an index of intensity of agricultural modernization. The methodology to calculate the indicator follows the procedures used by Cunha et al (2008) to calculate the General Index of Degradation (GID) and Shikida (2010), who estimated the Crude Index of Socioeconomic Development (CISD) for municipalities with sugar cane cultivation in the State of Parana.

To enable the construction of the Crude Index of Agricultural Modernization (CIAM) it is required the aggregation of factors obtained through the equation:

$$CIAM_i = \sum_{j=1}^{p} \frac{\lambda_j}{\sum \lambda_j} F_{ij}, \qquad (1)$$

The $CIAM_i$, represents the Crude Index of Agricultural Modernization for the i-th analyzed state, j is the j-th characteristic root, p is the number of factors obtained through factor analysis, F_{ij} is the j-th factor score of the i-th municipality, and $\sum \lambda_j$ is the sum of characteristic roots referring to the p factors extracted.

Following the procedures adopted by Cunha et al. al (2008), to make all values of the factor scores (F_{ji}), greater than or equal to zero, all the factors were placed in the first quadrant, before construction of the CIAM, using the algebraic expression:

$$F_{ji} = \frac{F_j - F_j^{min}}{F_j^{max} - F_j^{min}} \qquad (2)$$

where F_j^{min} is the lowest score observed for the factor j-th, and, F_j^{max} is the highest score observed for the factor j-th.

Having the CIAM, and by means of weighting, in which the greatest value considered is 100, it was obtained the Relative Index of Agricultural Modernization (IAM) for each Brazilian state, allowing their ranking. All calculations were performed using the SPSS 15.0 (Statistical Package of Social Science), using the licensed version.

2.4. Correlation Analysis

After constructing the IAM, it was analyzed the relationship between the modernization process of agriculture and economic and social indicators of the Brazilian states. For such, we performed the Spearman Correlation Test, which according to Martin (2001) is a technique widely used in empirical studies that seek to evaluate the association between variables. The possible existence of a relationship between variables oriented the analysis, the conclusions and the disclosure of the findings on this investigation.

According to Triola (2008), the Spearman's rank correlation test is a nonparametric test that uses positions of sample data consisting of matched pairs. The test is used to test the association between two variables so that the null hypothesis and alternative are as follows (where ρ_S designates the coefficient of rank correlation for the entire population):

H0: ρs = 0 (there is no correlation between two variables)
H1: ρs ≠ 0 (there is correlation between two variables)

Also according to Triola (2008), there are several advantages of using the Spearman's rank correlation test. Among them are: (i) the Spearman test can be used in a wider variety of circumstances than the parametric method of linear correlation. Using this test it is possible to analyze paired data that are posted or that can be converted into posts, and (ii) the rank correlation can be used to detect some relations that are not linear.

The Spearman test is also used when data from some of the variables studied shows a very asymmetric distribution or outliers. In this case, the analysis of the coefficient r (commonly used) may be compromised, which justifies the implementation of the non-parametric approach of Spearman, which uses only the ordering of values (Barbetta, 2008).

2.5. Variables Used in Correlation Analysis

The process of agricultural modernization in Brazil started in the 1960s, as part of the policy of import substitution and as a reflection of the green revolution. It was also during this period that the industry of capital goods for agriculture (tractors, implements, fertilizers and pesticides) was consolidated, and the expansion of processing agroindustries led to profound changes in the technical basis of agriculture.

In this light, we see the contribution that these changes represent to the strong international competitiveness of Brazilian agribusiness. To identify the economic impacts of agricultural modernization in the Brazilian states the variables selected were: trade balance of agribusiness and GDP, both per capita. It is hoped that the levels of agricultural modernization present high positive correlation with the trade balance of Brazilian agribusiness states and GDP per capita, in other words, states with higher rates of modernization have had the highest trade balance and higher values for gross domestic product per capita.

Nevertheless, for some authors as Scott (1985), Graziano Neto (1985), Ramachandran (1991) Ehlers (1999), Graziano da Silva (2000), Hoffman and Ney (2004) and Balsan (2006) the process of agricultural modernization favored an increase in efficiency, leaving in the second plan, social issues such as inequality of income distribution, regional inequalities, socio-economic development and rural exodus.

In order to analyze the externalities of agricultural modernization on the indicators of inequality in income distribution were used the ratio of the income earned by the richest 10% and poorest 40%, the Gini coefficient. Considering that the process of agricultural modernization has contributed to increased inequality in income distribution, it is expected that the selected indicators present high positive correlation with the IAMs.

From the assumption that the modernization process contributes to the process of income concentration it is feasible to say that their externalities on the level of socioeconomic development of the states present negative and high correlation with the IAM, as it is impossible to think of socioeconomic development in a context of inequality in income distribution. The variable used to analyze the relationship between agricultural modernization and the level of socioeconomic development was the FIRJAN Index of Municipal Development (FIMD) of the Brazilian states. Finally, the impacts on the rural exodus were evaluated from the variable urbanization rate. It is expected that the rate of agricultural modernization presents high and positive relationship with the high migration process from rural to urban areas, given the fact that the use of new technologies in production processes demand a smaller number of workforce in steps previously demanding, such as planting and harvesting.

The variables GDP per capita and the trade balance of agribusiness per capita were collected in the website of the Institute of Applied Economic Research (IAER) and from

the website of the Ministry of Agriculture, Livestock and Supply were obtained the values for export and import of the agribusiness sector. The variables of inequality in income distribution, social and economic development and rural exodus were collected in the website of the Institute for Work and Society (IWS). All data were collected for the year 2006, as well as the data used in factor analysis.

3. Results and Discussion

This section was divided in three subsections. In the first one it is presented the factors for agricultural modernization in the Brazilian states, in the second it is presented the rank of the Index of agricultural modernization (IAM) of the 27 Brazilian states, obtained from the factor analysis, in the third subsection it is presented the results of Spearman correlation test between the levels of agricultural modernization and socioeconomic indicators.

3.1. Factors Agricultural Modernization

Initially, it was performed the factor analysis in order to synthesize the information contained in the 24 original variables. To identify the quality of fit of the model of factor analysis it was used the KMO index, which presented a value of 0.538, which, although low, can still be considered a reasonable measure of suitability. Another method used to analyze the validity of the factor analysis was the Bartlett's test, which showed a value of 1.489, significant at 1% of probability. Thus, both tests have concluded that the sample used is appropriate to the analysis procedure, that is, the use of factor analysis.

According to the results presented in Table 1, the factor analysis generated three factors with characteristic roots (λ) greater than 1. The contribution of the factors 1, 2 and 3 for the explanation of total variance of the indicators used was 39.8, 39.3 and 8.6%, respectively, so that their cumulative contribution is equal to 87.8% of total variance, a very significant percentage. The results of the percentage explained by each factor corroborate the results found by Kageyama and Leone (1992), which draw attention to the association of the modernization process of Brazilian agriculture to a production supported by the combined and intensive use of modern inputs, resulting in high productivity of labor and land.

According to Souza and Lima (2003), to facilitate the interpretation of the factors, it should be made their rotation by the Varimax method. With this procedure, the contribution of each factor to the total variance is altered, without, however, modifying their joint contribution. As an advantage, the factors obtained after the rotation are more closely related to certain groups of variables, allowing a more logical interpretation of them.

After applying the Varimax rotation method, the indicators that are associated with factors had factor loadings with a value greater than 0.60, that is, the highest factor

loadings are indicative of higher correlation coefficients between each factor and each of 24 variables and indicators of modernization (Table 1).

Table 1: Matrix of components after orthogonal rotation

Variables	Factors		
	1	2	3
Number of tractors (EA)	0.899		
Total value of investments (EA)	0.930		
Value of investments in facilities and other improvements (EA)	0.890		
Value of investments in agricultural machinery and instruments (EA)	0.868		
Total amount of funding (EA)	0.856		
Total value of production (EA)	0.925		
Total expenditures (EA)	0.888		
Costs of fertilizers and correctives (EA)	0.782		
Costs of seeds and seedlings (EA)	0.806		
Costs of agricultural defensives (EA)	0.698		
Fuel expenses (EA)	0.951		
Number of tractors (ME)		0.815	
Total value of investments (ME)		0.896	
Value of investments in facilities and other improvements (ME)		0.781	
Value of investments in agricultural machinery and instruments (ME)		0.892	
Total amount of funding (ME)		0.958	
Total value of production (ME)		0.814	
Total expenditures (ME)		0.972	
Costs of fertilizers and correctives (ME)		0.939	
Costs of seeds and seedlings (ME)		0.903	
Costs of agricultural defensives (ME)		0.937	
Fuel expenses (ME)		0.960	
Value of investments in vehicles and other means transport (EA)			0.697
Value of investments in vehicles and other means transport (ME)			0.779
% of Variance explained by the factor	39.83	39.35	8.68

Source: research results.

From the results presented in Table 1, we proceeded to analyze each of the factors obtained.

Factor 1 – Use of new technologies in relation to explored land use

The variables of this factor are more closely related to land use, since all the variables associated with factor 1 were relativized by the explored area. In this sense, it is clear which factor contributes to explain the use of technology applied to a better performance of a given explored area, more specifically, the use of new technologies in order to optimize the use of the land input.

The factor 1 was composed by 11 variables that represent the various dimensions related to agricultural modernization. Thus, it is noticed that the higher the factor scores in this factor, the greater were the incorporations of the guidelines that have oriented the process of agricultural modernization, that is, in states with good performance in this factor, there was probably a greater concern for increasing the productivity of used lands instead of the expansion of farmland. It is emphasized the importance of this factor to explain the phenomenon of agricultural modernization as a whole, this factor was responsible for 39.83% of the explained variance of selected variables to analyze agricultural modernization in the Brazilian states, thus putting the land use as the main responsible for the modernization of agriculture in the area studied.

Factor 2 – The usage of new technologies in relation to labor

The variables that compose the factor use of new technologies in relation to labor are the same which formed the first factor, the difference between the variables from the first and the second factor is the variable used to relativization. All variables of the second factor are relativized by the equivalent-man, that is, the variables were standardized in relation to labors.

From the set of variables that compose the second factor, it is important to notice that if the factor score of factor 2 for a given state is high and positive, it means that it has a high intensity of use of technological resources and less intensive use labor, that is, higher level of modernization in agriculture.

Factor 3 – New Technologies for Logistics and Transportation

It was observed that the third and last factor heavily incorporates the indicators related to technological tools designed to transport and logistics processes (vehicles and other means of transport). Thus, by strongly capturing the use of means of transport, a high value of investments in these processes is related to the needs of a more efficient production flow. Thus, the higher this indicator, the better will be the conditions of logistics and transport of the Brazilian states.

3.2. Index of Agricultural Modernization (IAM)

After the identification of factors associated with agricultural modernization from the factor analysis, it was performed the construction of the index of agricultural modernization (IAM) from factor scores. The motivation for building the index refers to the difficulties faced in the classification of Brazilian states in relation to the level of agricultural modernization using only the values of the factor scores (F1, F2 and F3). By aggregating the three factors, the IAM allowed a more appropriate classification of the states. Table 2 presents the IAM and its ranking for the 27 Brazilian states.

Table 2: Index of Agricultural Modernization and its ranking for the 27 Brazilian states

Classification	Estate	IAM
1°	Distrito Federal	1.000
2°	São Paulo	0.905
3°	Mato Grosso	0.776
4°	Santa Catarina	0.743
5°	Paraná	0.680
6°	Mato Grosso do Sul	0.677
7°	Rio Grande do Sul	0.609
8°	Goiás	0.509
9°	Espírito Santo	0.424
10°	Minas Gerais	0.382
11°	Pernambuco	0.341
12°	Rio de Janeiro	0.332
13°	Alagoas	0.330
14°	Sergipe	0.292
15°	Tocantins	0.287
16°	Bahia	0.226
17°	Rio Grande do Norte	0.222
18°	Rondőnia	0.222
19°	Roraima	0.215
20°	Pará	0.195
21°	Paraíba	0.180
22°	Ceará	0.174
23°	Maranhão	0.168
24°	Piauí	0.164
25°	Amapá	0.153
26°	Acre	0.152
27°	Amazonas	0.142

Source: research results.

The average of the Index of Agricultural Modernization (IAM) obtained by the Brazilian states was 0.389. This low value is the result of poor performance shown by some federation units (FUs), including, Acre, Amapá and Amazonas, confirming the thesis presented in the literature that the main excluded states from the process of agricultural modernization in Brazil were the states of north-northeast.

The results presented by the state of Amazonas confirm the view of Mellor (1966), who points some restrictive factors for agricultural modernization, such as the excessive land concentration and the poor use of land. The condition of the state of Amazonas relates mainly to the high land concentration, for in the state there are high levels of concentration. It is the same situation presented by the state of Pará, which is among the ten worst indexes of agricultural modernization (IAM).

It is noticed that the states of North and Northeast regions had low modernization. Among the main factors responsible for this poor performance, there are the high concentration of land in cases such as the state of Amazonas and the historical differences occurred mainly between the states of North-Northeast and the other federation units.

Among the states with intermediate level of modernization, two belong to the Northeast region, Pernambuco and Alagoas. According to IBGE data (2011), the state of Alagoas is the penultimate in area, but stands out as one of the largest producers of sugar cane in the country, an activity that requires investments in technology and due to the small area available requires a great intensity in the use of these technologies in relation to the explored area.

Regarding the state of Pernambuco, it is noticed that its high performance in relation to the first factor is also credited to historical and cultural factors that favor agribusiness in the state. It is emphasized the importance of Pernambuco for the country economy in the colonial period, especially in relation to the sugar economy. Another aspect that contributes to the prominent position of the state is the investments made in the agriculture of the state through public irrigation projects and other government investments, which enabled the state to achieve great prominence in the production of fruits for the foreign market.

In relation to states with the highest level of modernization, it is noticed their concentration in the South, Southeast and Midwest regions. The high levels in the intensity of agricultural modernization in the states of these regions are credited to historical advantages and to the projects that aimed to improve the economic indicators of the Midwest, an extremely important region for the Brazilian agribusiness. The states of Mato Grosso do Sul and Mato Grosso have had such prominence thanks to the performance achieved in relation to the factor 2, due to the low rates of population density, which makes it necessary the intensive use of new technologies in relation to labor.

The Distrito Federal had the highest rate of modernization due to its performance in relation to the factor 1, since it has the smallest area among the Brazilian states, requiring a great productivity in relation to the explored area,

mainly achieved by the use of new technologies. The other states are in that position thanks to the advantages obtained over time, for example, large volume of rural credit received, the need of agro-industries for raw materials, one of the main inducers of agricultural modernization.

The results obtained from the creation of the IAM corroborate the studies of Correa and Figueiredo (2006) who, based in the agricultural census, identified evidence of a pattern of concentration of this phenomenon in some regions and states, particularly in the state of São Paulo, and in states of South and Midwest regions. This study confirms the pattern of concentration indicated by the authors.

3.3. Relationships between Modernization, Inequality, Socioeconomic Development and the Rural Exodus

In this section it will be analyzed the relationships between measures of agricultural modernization, obtained through factor analysis, and some economic and social indicators in the Brazilian states.

As presented in the section of methodological procedures, in order to analyze the relationship between modernization and economic indicators the variables used were: trade balance of agribusiness and gross domestic product, both per capita. To analyze the relationship between the level of agricultural modernization and the inequality in income distribution the variables used were the ratio between the income earned by the richest 10% and the poorest 40%, and the Gini index. To analyze the socio-economic development and the rural exodus the variables used were: the FIMD and the urbanization rate, respectively.

Table 3 presents the results of the Spearman correlation test between the IAM and the selected variables.

Table 3: Spearman correlation test

	Correlation coefficient	Level of significance
Trade balance of agribusiness per capita	0.485	0.010
GDP per capita	0.412	0.033
Gini Index	0.047	0.818
Ratio between the income earned by the richest 10% and the poorest 40%	–0.201	0.315
FIMD	0.436	0.023
Urbanization rate (%)	0.384	0.048

Source: research results

As presented in the literature, the process of agricultural modernization in Brazil aimed to strengthen the competitive position of agribusiness of country in the international market. From the results presented in Table 3, it is identified empirical evidences that agricultural modernization actually

contributes to the trade balance of agribusiness per capita, as the result of the Spearman test indicates the presence of positive and significative correction at 10 %. This result supports the argument that the process of agricultural modernization favored an increase in efficiency as shown by Ehlers (1999), Graziano da Silva (2000), Hoffman and Ney (2004).

Another economic effect of agricultural modernization would be the increase in gross domestic product, since the increase of productivity in the sector has made the agribusiness one of the main sectors of Brazilian economy. The sector is responsible for generating jobs, being prominent in foreign trade, with significant share in the total of Brazilian exports. The correlation test results also corroborate the importance of modernizing agriculture to generate wealth in the Brazilian states, demonstrating the existence of a positive and significant correlation between IAM and state GDP per capita.

It is also highlighted the relationship between the level of modernization and socioeconomic development, in this study represented by the index FIMD. From the results presented in Table 3, it can be verified that an increase in levels of modernization leads to increased levels of socioeconomic development. The findings from this analysis allows us to disagree with the arguments presented in previous studies, which show that the modernization would be an obstacle to socioeconomic development and quality of life, causing, among other things, a detriment of health conditions, employment and income.

The rural exodus presents itself as an issue that has significant relationship with the studied phenomenon. The results contradict the points elicited by Balsan (2006), which suggest a contribution of the modernization process to the rural exodus. The results of the Spearman correlation test suggest that changes occurred in agriculture, in the sense of the use of new technologies, reduce the flow of migration from the countryside to the city. This situation can be credited to the stabilization of migration flows, but also to the increase of productivity that occurred in the countryside, which decreases the necessity for labor in some phases of production such as planting, but started to require more labor in other steps such as transport and distribution.

Concerning the income concentration, reported by Hoffman and Kageyama (1985), Ehlers (1999) and Graziano da Silva (2000) as being directly linked to processes of agricultural modernization, this study showed different results from the others, since the relationship was not significative. This difference is mainly due to the fact that there was, in the analyzed period, several other mechanisms aimed to prevent the income concentration. In this sense, the effects of modernization levels had no significant relation to the issue of income distribution today as in past decades, when the generation of income in the country was more dependent on the agricultural activity.

4. Conclusion

This study aimed to analyze the relationship between the levels of agricultural modernization and economic indicators of the Brazilian states. The main factors responsible for agricultural modernization in the Brazilian states were related to the use of new technologies in relation to the use of explored land, use of new technologies in relation to labor and new technologies of transportation and logistics.

Based on the factors responsible for agricultural modernization it was created the index of agricultural modernization (IAM). The analysis of the IAM showed a great heterogeneity among the Brazilian states, this situation also applies to other indicators covered in this study.

The levels of modernization were significantly related to per capita GDP, trade balance of agribusiness per capita, FIMD and urbanization rate. In this sense, this relationship can be considered positive, since the effects from the process of agricultural modernization can enable, among other things, an increase in income and quality of life, and contribute to keep the population in the rural areas. In relation to the indicators of income concentration mentioned in the literature as being negative and directly related to agricultural modernization, this study could not observe such situation, given that the relationship presented was not significant.

The improvement in socioeconomic indicators and in reducing the rural exodus is related to the issue of modernization, due to, among other things, the economic gains brought by the increased competitiveness of Brazilian agribusiness sector, which generates an increase in the production of the country and in trade balance.

It is hoped that the considerations presented in this study contribute to demonstrate the importance of policies of agricultural modernization, and also that their focus should not only be in the increase in levels of productivity and the potential economic gains coming from the same, but they should also take into account the possible impacts and externalities caused by this process.

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IMPROVING AUDIT FUNCTIONS OF SUPREME AUDIT INSTITUTIONS TO PROMOTE SUSTAINABLE DEVELOPMENT

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Abstract: In this paper, we demonstrate and analyze the substance of the added value effect of a Supreme Audit Institution (SAI), focusing on sustainable development issues. We intend to answer such questions as: how could a SAI respond to global and local challenges and how it could help government to implement commitments towards sustainability. Finally, we trace a possible way to improve external audit functions both on the state level and at the International Organization of Supreme Audit Institutions (INTOSAI), by using some ideas from network theory.

Introduction

The concept of sustainable development (SD) has become well-known and generally accepted among policy makers by the Brundtland Report in 1987, which defines sustainable development as "development which meets the needs of the present without compromising the ability of future generations to meet their own needs" (UNITED NATIONS, 1987). The next, notable stage was the Conference on Environment and Development – often called "The Earth Summit" – in Rio de Janeiro, in 1992, at which the participants committed themselves by signing the Agenda 21, an action plan of the United Nations (UN) related to sustainable development to be implemented globally, nationally and locally by organizations of the UN, governments and major groups in every area in which humans directly affect the environment. The main topics were: social and economic affairs, natural resources management, stakeholders, means of implementation and regional dimensions (UN).

A decade later, the World Summit on Sustainable Development (WSSD) was held in Johannesburg (South Africa), in order to review progress made since 1992 and affirmed UN commitment to "full implementation" of Agenda 21, alongside achievement of the Millennium Development Goals and other international agreements. For this period of time, it became apparent that former patterns of resource utilization, exploitation, the allocation, or the concentration of the inputs increasingly narrow the ability of effective and efficient dicision-making opportunities. From another aspect, there is a growing - basically - implicit debt, liabilities against future generations: such additional costs of the satisfaction of present needs and wants that do not appear directly today, but they would be necessary for maintaining the level and quality of consumption or the alternative options. In order to sustain the niveau of opportunities for coming generations – considering the bottlenecks: demographic trends, constantly rising input prices, limited arable land and water, they will need presumably more financial resources or any kind of capital; they will have to innovate to increase efficiency of assets or they have to face the pressure of being competiteve. Thus, we can say that sustainability is one of the main motivations for innovation, as Nidumolu concluded (NIDUMOLU ET AL., 2009).

The three aforesaid pillars: the social affairs and equality, economic activities and other actions affecting the natural environment and their common intersections as well, now became the most importan strategic factors whose sustainable development incorporated into governmental policy showing its significance. Different countries have different development priorities. While social equity may be very important to some, protection of environment may be the priority for others. The objectives for each country are derived from the WSSD Plan of Implementation (UNITED NATIONS, 2002B). The outcomes of WSSD are applicable to all nations, because the three pillars are interdependent and mutually reinforcing (UNITED NATIONS, 2002B). After defining the main goals, the next problem for countries is the effective and efficient realization of them using public funds, because in the public sector there is not enough motivation

for sound financial management, and there is no appropriate level of competitive pressure (Ász, 2010). The supreme audit institutions (SAIs) have the mandate on national level to conduct external audits to serve the society's claim for rational spending of public money. In the following sections, we discuss the audit functions of SAIs in connection with sustainable development and a possible way to improve the impacts of audit findings.

External audits – the role of Supreme Audit Institutions (SAIs) regarding the Sustainable Development

The WSSD Plan of Implementation states that "good governance within each country… is essential for sustainable development" (UNITED NATIONS, 2002B). The external auditing of the fulfillment of objectives and the expenditures spent on SD related commitment and processes are the key role of national supreme audit institutions. These organizations predominantly characterized by independence, professionalism, probity but often with different mandates. Through audit activities and extension of SAI's functions the "vital" good governance and the implementation of WSSD commitments could be enforced while contributing the effective and efficient sustainable development.

There are many different ways in which the SAI could audit the implementation of (WSSD) commitments, it basically depend on several steps that all countries need to take for the full implementation, but at the same time, the SAI's audit activity should be very specific to the country's priorities. The SAI has the possibility to conduct an audit on some of these or all of them. In this context, the *first step* is: "Translate WSSD commitments into national commitments". It is an early step for SAI to look at what action has been taken for interpretation and a good opportunity to evaluate whether a country has started to integrate the WSSD outcomes into its national policy (INTOSAI, 2007C, 2010A).

The *second step* is: "Develop delivery mechanism". A country should establish means (delivery mechanisms) to achieve national commitments. These could include for instance effective policies, strategies, action plans, regulations, reporting and accountability mechanisms, working groups, specific projects. An audit focusing on delivery mechanisms assess the extent to which a specific country has set up the structures and systems to enable progress to be planned, coordinated, monitored and reported. The links between WSSD and national sustainability strategy – if it is developed at all- can be detected and characterized.

The *third step* is: "Delivery". Here the SAI evaluates the success of individual policies in achieving the policy objectives related to sustainable development (called delivery). The *final step* is: "Monitoring and feedback". The main audit function is to ascertain whether monitoring processes and feedback systems are appropriate to improve

the future outputs of national policies. In the progress of auditing fulfillment of WSSD commitments, the SAI has the following types of audits to apply (INTOSAI, 2007D):

– *financial audits* – usually applied for financial management issues of policies, or auditing externally funded implementation projects or programs.

– *compliance audits* – basically for evaluating the compliance with key commitments in the WSSD Plan of Implementation.

– *performance audits* – assessing the adequacy of delivery mechanisms, the performance of national departments, agencies or the performance in specific WSSD-topic areas.

– *comprehensive audits* – aiming at performance and financial audit objectives in the same time.

In Figure 1, we summarize and synthesize the above discussed processes. With this flow chart, it becomes clear what the essence of the added value of audit activities of a certain SAI is. The question of sustainability and the need for problem solving appear on global and hierarchically lower levels (national, regional, micro). The focus and scope of auditing functions of national supreme auditors are basically related to national actors linked to policy-making, implementation of WSSD commitments or to the use of public funds for achieving the objectives. These acitivities for scrutinizing the four implementaiton steps are derived from the outcomes of WSSD taking into consideration the governmental politics and priorities. It is important for SAI because it has to adapt to the surrounding deterministic milieu by choosing the proper audit method and type in order to create the largest possible positive effect (added value) of its functions in the short and long run. In the short term, it is usually called a "result" and defined as immediate changes arising for direct addressees at the end of their participation in an intervention (e.g. improved quality of wastewater treatment). Impact is the long term effect and it has socio, economic, an environmental consequences, that can be observed after a certain period after the intervention, which may affect either direct addressees of the intervention or indirect addressees falling outside the boundary of the intervention (ECA, 2010). After an extensive and comprehensive review of the literature, we specify the added value effects of national SAIs. After publication of audit findings and the emergence of effects a sound financial management of public money could be realized, which will improve governmental performance by creating a "quasi" competitive pressure on the public sector. It will maintain credibility promoting public trust and finally could intensify competitive and innovative skills both in public and private sector. Due to the above mentioned factors, both sustainability and the quality of life could grow.

To deepen the impact of auditing work, there is a need for cooperation and knowledge sharing among SAIs on a global level, too. In the next section, we discuss the role of the INTOSAI (International Organizationin of Supreme Audit Institutions) in this context.
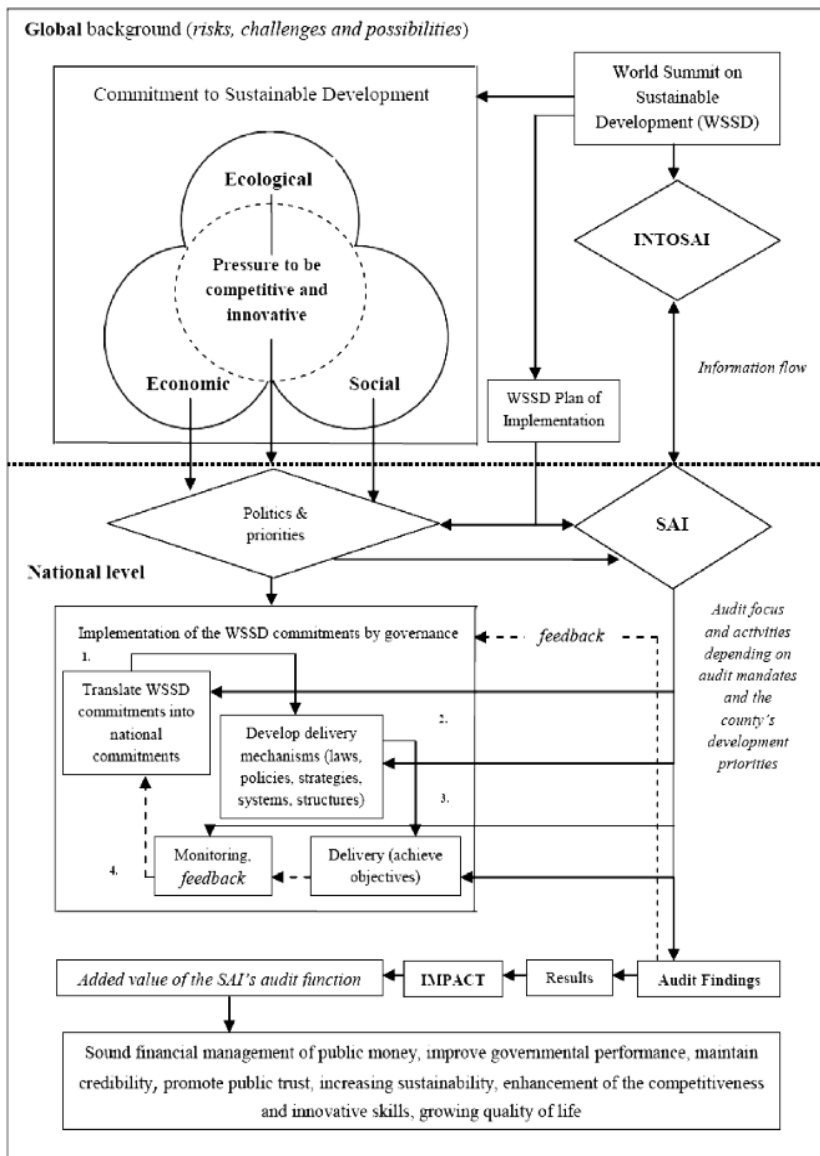
Source: own work based on "An Audit Guide for Supreme Audit Institutions" (INTOSAI, 2007d)

Figure 1. The origin of added value of a supreme audit institution in context of sustainable development

Knowledge sharing among SAIs – network building for deeper audit impact

The International Organisation of Supreme Audit Institutions (INTOSAI) operates as an umbrella organisation providing an institutionalized framework for the external public audit community to promote development and knowledge transfer, improve government auditing worldwide and enhance professional capacities. It was founded in 1953 in Cuba, and presently has 189 full members and 4 associate members. INTOSAI provides a forum for government auditors from around the world to discuss specific issues of mutual concern and keep abreast of the latest developments in auditing and other applicable professional standards and best practices (INTOSAI, 2010b).

INTOSAI recognizes that its strength lies in the cultural, linguistic, and governmental diversity of its global membership and seeks a balanced representation of regions and auditing systems. The INTOSAI's motto reflects this creed: "Mutual Experience Benefits All – *Experientia Mutua Omnibus Prodest* (*lat.*)."

The concept of sustainable development presents new challenges to SAIs and it is likely to pose new methodological and analytical tasks to improve the "scrutinizing" function whether public funds are spent economically and efficiently in compliance with existing rules, regulations and commitments towards sustainability. The INTOSAI has created several committees, working groups and task forces with special missions responding, reacting to global risks, conditions and possibilities to maximize the added value of individual SAIs. The WGEA is an INTOSAI Working Group on Environmental Auditing – formed in 1992 – with specific goals to encourage SAIs to conduct audits on sustainable development issues and projects, help SAIs gain better understanding of specific environmental auditing, facilitate cooperation in order to exchange informations, experiences and best practices among members and publish guidelines and another informative materials (INTOSAI, 2007a, b, c).

The connections and interactions between SAIs and INTOSAI can be interpreted along different dimensions. We evaluate these from the perspective of information flow – focusing on benchmarking best practices, knowledge sharing and knowledge creation on organizational level – on the basis of network theory. If we treat INTOSAI with its relevant stakeholders as a real network with vertices (e.g. a member of working groups, internal, external experts, professionals, colleagues at national level) and links between them (information flow, knowledge transmission), we can boost the added value of audit activity by analyzing the structure of network, increasing the expected quality of interactions and finally by building an effective network regarding knowledge sharing. We define from our point of view effective (real) community/network on the basis of Krebs, as follows (KREBS, 2002): it is sum of vertices and connections based on graph structure and functionally more effective, efficient, more adaptive and productive (e.g. in knowledge creation) than other structures in consequence of advantages derived from synergic effects emerging from adequate interactions and improved, optimized features of connections. Mathematicians, biologists, physicists, management experts and other

scientists have all discovered similarities and identified analogies in effective networks:

- there is a linkage among nodes (vertices) as a consequence of common attributes, goals or governance, there are clusters in the network – similar nodes congregate in groups or flock together
- on the other hand, diversity is very important too: to achieve the desired level of innovation in the network it is needed to maintain connections to diverse nodes and clusters
- robustness of the network: in case of some links or nodes are removed other pathways serve for uninterrupted information flow
- some nodes (vertices) have special functions in the network: they can be hubs, brokers or boundary spanners. Hubs have many direct connections that quickly disperse information, brokers connect the disconnected parts of the network and the boundary spanners connect two or more clusters or communities
- there are very few long paths in the network that lead to delay and distortion of information flow and knowledge transfer (KREBS, 2002).

The *first step* in the progress of creating effective community or network is to observe the present situation from the aspect of a well designed research problem or a special interest. In the case of INTOSAI especially by the Working Group of Environmental Auditing - which is responsible for environmental and somewhat for sustainable development related audits - we must examine the strategic and managerial features, commitments connected to recognition of importance of knowledge sharing and cooperation. Similar to other organizations or companies from a competing sector, the INTOSAI has defined its own individual strategic factors to achieve its desired vision. Below, we list the most relevant declarations: The mission of the organization states that the INTOSAI will foster the exchange of ideas, knowledge and experiences to promote continuous improvement among diverse SAIs. The second strategic goal concerns institutional capacity building. They intend to build the capabilities and professional capacities (human capital) of SAIs through training, technical assistance, information sharing and other capacity building activities. The third strategic goal covers the knowledge sharing, the collaboration and benchmarking.In the frame of conducting best practice studies, WGEA publishes audit guidance materials and performs research on issues of mutual concern. The Communication Policy focuses on the benefits of the free flow of information, ideas, experience, and knowledge between INTOSAI members (social capital). In order to achieve the above mentioned positions, several Communications Objectives were established.

- Establish new and maintain existing working groups
- Facilitate best practice studies consistent with diversity and sovereignty considerations
- Encourage effective INTOSAI communication:

The communication mechanism has to correspond to the needs of SAIs, with consideration for communication instruments, such as the INTOSAI website (www.intosai.org), INTOSAI documents, the individual websites of various INTOSAI bodies, the International Journal of Government Auditing and the Collaboration Tool. The General Secretariat will also facilitate and encourage committees, working groups, and task forces to interact and improve connections with each other on matters mutually relevant to them and innovate and develop other effective methods of communication and share these with colleagues. After a short overview, we can say that the commitment towards effective information flow and knowledge transfer is acceptable (INTOSAI, 2007B, 2010A, B).

The *second step* is network mapping. By drawing the structure of the real connections emerging from the formal hierarchy of the organization, it could help us to detect and measure the parameters defining the key features of the web. These properties appoint the future directions of network building and improvement of effectiveness. Such network metrics are the degree distribution, average path length, community structure, transitivity, vulnerability, resilience, efficiency, robustness and stability. For detailed definitions, see Newman's and Fortunato's comprehensive studies (NEWMAN, 2003; FORTUNATO, 2010). Due to the lack of detailed information about the real time interactions within the organization, we will only propose several developments for network building.

The *third step* is network building, focusing on the desired vision of the INTOSAI and WGEA, in compliance with the initial research topic. At present, we live in a knowledge-based, globalized world, where the possession of applicable knowledge or the ability to learn makes one so adaptive, innovative and productive, that one can sustain a relatively higher standard of living and have wider margins for optimized decisions. In the case of an SAI, organizational adaptability and innovative skills create higher added value of its audit activity. In recent management studies relating to organizational knowledge creation, innovation and productivity, a relevant appreciation of human and social capital and their interactions can be found (GREVE ET AL., 2006). There is a proved relationship between them, both human and social capital have a positive effect on productivity although Grave and Burt demonstrated that the contribution of social capital was predominating in their observations and in academic literature as well (KREBS, 2007). In this aspect, human capital is such skills, capabilities and other features of an individual that make him or her capable of creating realizable value. Social capital, according to Greve and Krebs, can be defined as a property of personal networks – the ability to reach others, inside and outside the organization, for information, advice and problem-solving (KREBS, 2007; GREVE ET AL., 2006). In this context, the harmony between human and social capital is the key element in creating knowledge and increasing output performance. If we accept these findings we can draw a parallel with WGEA and take further steps to enhance the impacts of audit findings.

The management and cultivation of human capital can be interpreted as professional capacity building at INTOSAI and WGEA. Under this kind of capacity building we understand the creation and improvement of applicable personal auditing expertise, broader and more complex knowledge of applied internal and external human capital and other knowledge-creating potency that will contribute to SAI's work. The INTOSAI's Capacity Building Sub-Committee paraphrases it as the skills, knowledge, structures and ways of working that make an organization effective. Building capacity means developing further each of these, building on existing strengths, and addressing gaps and weaknesses (INTOSAI, 2007A). For better understanding and placing the notion we define the "auditing knowledge" of a SAI: the ability to create an auditing routine, practice on professional basis to meet the relevance expectations of its stakeholders and to increase the results and impacts of audit outcomes in order to achieve sound financial management in public finance. To solve complex challenges and to adapt to new conditions in case of possible audits dealing with sustainable development issues a SAI has to face a broad spectrum of increasing analytical and methodological complexity. This is the reason why many SAIs are continuously building its professional capacity which could happen through internal trainings in partnership with the INTOSAI Development Initiative, course materials, detailed instructor manuals, staff development programs and daily formal and informal exchanges between colleagues and partner institutions worldwide. Responding to circumstances with professional responsibility, the SAI is obliged to improve both the human and the social capital, namely capacity building and cooperation or liaison building. These two factors should work together to create auditing knowledge on organizational level and to facilitate its dissemination. The social capital of a supreme auditor community can be interpreted - referring to Greve – as a property of personal/institutional network representing information flow and knowledge sharing between vertices and the structural pattern which emerged from the formal hierarchy. In other words, we refer to the ability to reach others (members, colleagues, concerned stakeholders) inside and outside the organization for information, advice and problem-solving. From "The sixth survey on environmental auditing" (INTOSAI, 2009), it becomes obvious that member organizations appreciate cooperative activities and find it a significant and useful tool in their work. Cooperative audits are merely one kind of the cooperative tools but the more relevant. For the institutions cooperative audits foster mutual sharing of knowledge and learning, capacity building, networking and recognition of best practices. Cooperative audits are audits in which two or more audit institutions are involved and can be defined as having three types (INTOSAI, 2007B):

– Joint audit: an audit conducted by one audit team composed of auditors from two or more SAIs, who prepare a single, joint audit report for publication in all participating countries. In practice, they are rare.

– Concurrent or parallel audit: an audit conducted more or less simultaneously by two or more SAIs, but with separate audit team from each SAI reporting only to its own government and only on the observations and/or conclusions relating to its own country. This implies that the participating SAIs may each adopt a different audit approach suited to national needs and preferences. Information exchange is the most important aspect of this form of cooperation.

– Coordinated audit: any form of cooperation between joint and concurrent audits. In a coordinated audit, participating SAIs at least coordinate or harmonize their audit approaches in some way, but differences between countries are possible. This can be a joint audit with separate reports; more commonly, it is a concurrent audit with a joint audit report in addition to separate national reports.

To exploit the synergic effects of information flow within the institution and thereby create organizational knowledge to intensify adaptability, we suggest the introduction of a network approach – based on scientific fundamentals – and the development of an effective network. At this point, we return to our former train of thought and identify specific patterns that could already allude to presence of effective network at INTOSAI (KREBS, 2002):

1. An effective network contains communities, modules, clusters where the concentrations of vertices and edges could be derived from common attributes, goals or governance that shaping the structure and affecting activities. This feature of a network is often called a community structure, or clustering. Fortunato defines it as the distribution of edges when it is not only globally, but also locally inhomogeneous, with high concentrations of edges within special groups of vertices, and low concentrations between these groups (FORTUNATO, 2010). In the case of our investigatedion, we can treat the working groups (WGEA) or regional formal cooperation efforts (e.g. EUROSAI, ARABOSAI) as communities.

2. The diversity refers to connections between diverse vertices (auditors, experts), fixed formal structures (SAIs) or communities. We found a high degree of diversity manifested in different mandates, different auditing issues.

3. The robustness of a network: the linkages and paths between member SAIs and the well-developed means of communication and cooperation within INTOSAI could contribute to fluent information flow and knowledge transmission.

4. There are several SAIs or special communities playing special roles in knowledge sharing; for instance, they speed up the dissemination of best practices or link diverse groups. Their functions are vital for network health. The Steering Committee of the Capacity Building Committee or the Steering Committee of the Committee on Knowledge Sharing and Knowledge Services could function as a broker or boundary spanner (see above).

5. There is a decreasing trend in the average path length in real networks that could induce real time information availability via internet and make knowledge exchange easier. We must distinguish however between explicit knowledge and complex tacit knowledge. Explicit knowledge can be easily codified and disseminated indirectly even electronically such as auditing standards or simplified methods. The most relevant means of dissemination are e.g. the INTOSAI or WGEA web page, guides, publications and e-learning materials. Tacit and complex knowledge (e.g. performance auditing, professional capacity building, special organizational knowledge to be shared with members) requires direct relationships, trust and sharing of experiences and must be dispersed through human networks (KREBS, 2007). A wide range of means can be found at INTOSAI for transferring tacit knowledge for example trainings, exchange programs, cooperative audits (see above).

Concluding remarks

Due to its complexity, the concept of sustainable development requires new skills, new approaches and special methods for problem solving. A supreme audit institution (SAI) can contribute to this process by its audit functions directly and indirectly. In order to improve short and long term effects of its audit outcomes, an SAI has to adapt to the challenges, trends and expectations arising from sustainable development commitments. One possible way to do this is by creating auditing knowledge both on the state (SAI) and global levels (INTOSAI), by exploiting positive effects of cooperation and professional capacity building. The network theory which deals with analyzing social connections and interactions could be a useful concept to serve this idea. After assaying and mapping the features and conditions, we suggest that INTOSAI create new connections between distant vertices to reduce information distortion and entropy. At the same time, the introduction of network management would be needed to improve both human – to generate local audit knowledge – and social capital within INTOSAI to disseminate and create organizational knowledge, in order to deepen the impacts of audit findings relating to sustainable development.

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THE POLITICAL ECONOMY OF AGRI-ENVIRONMENTAL MEASURES: AN EMPIRICAL ASSESSMENT AT THE EU REGIONAL LEVEL

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Abstract: The paper deals with the political and economic determinants of EU agri-environmental measures (AEMs) applied by 59 regional/country units, during the 2001-2004 period. Five different groups of determinants, spanning from positive and negative externalities, to political institutions, are highlighted and tested using an econometric model. Main results show that AEMs implementation is mostly affected by the strength of the farm lobby, and the demand for positive externalities. At the same time it emerges a prominent role played by political institutions. On the contrary, AEMs do not seem implemented by the willingness to address negative externalities.

1. Introduction

Agri-environmental measures (AEMs) are policy instruments targeted to support more environmental-friendly agriculture methods and protection of the European countryside. Started as 'accompanying measure' to the 1992 McSharry reform of the Common Agricultural Policy (CAP), they became one of the most important and innovative policy tools of the UE rural development policy. AEMs are the most important instrument in terms of both financial expenditure - about 44% of the Pillar II CAP money - and land coverage - 25% of EU utilized agricultural area, data referred to the 2000-2006 Rural Development Policies (RDP) Programming Period.

As an effect of this important and growing role and because of their particular nature, AEMs represent one of the most controversial instruments of the new CAP. On the one end the European Commission often emphasize the positive effects of AEMs, claiming for their future expansion (see Commission, 2010). On the other end, AEM like policies are often complained by many experts, who rise several concerns about their effectiveness, stressing that they are a form of disguising agriculture protection (see Anderson, 2000; Swinbank, 2001; Garzon, 2005).

The large literature on AEMs can broadly classified in three main research areas. A first topic is represented by studies that try to quantify the AEMs effects on production and commodities markets, with the aim to clarify their role from the point of view of World Trade Organization (WTO)

rules (e.g. Glebe, 2007; Edwards and Fraser, 2001; Diakosavvas, 2003; Latacz-Lohmann and Hodge, 2003). A second line of research, is focalized on their optimal policy design (see Hodge, 2000; Latacz-Lohmann, 2004; Hart and Latacz-Lohmann, 2005). Last, but not least, an emerging research area is dedicated to farmers' willingness to participate in agri-environmental schemes, starting from the assumption that such a participation is mainly the outcome of a farm-level utility maximization process, influenced by other factors like social capital and the farmer's environmental attitude (e.g. Vanslembrouck et al., 2002; Dupraz et al., 2002).

Until now, less afford has been devoted to investigate the real motivations behind agri-environmental schemes, notwithstanding the large literature on the political economy of agricultural policy (see Swinnen, 2010, for a recent review). Only few papers have systematically investigated this issue (see Baylis et al., 2006; Salhofer and Glebe, 2004) and, more importantly, they have treated the problem only at the EU national level. However, it is important to stress that the EU rules allows member states to design AEM schemes at the national or regional level, in order to adapt this policy to the different farming systems and environmental conditions. Thus, since AEMs are established at the regional level, Regions not Member States should be the relevant decision-making units of the analysis.

Starting from this consideration, this paper adopt a political economy approach to empirically investigate the determinants of AEMs implementation, at regional level. The

analysis covers all the 59 agri-environmental programs of the EU-15 members from 2001 to 2004. Making reference to the 2000-2006 RDP programming period is useful because of the lack of a minimum funding requirement for each RDP axis, giving full freedom to local political bodies.

Special emphasis is given to the characterization of some important dimensions of the AEMs political bargaining process, focusing on the role played by political institutions, a dimension rarely investigated before in the literature. Specifically, the analysis tests five main hypotheses about the driving forces leading to AEMs diffusion: i) agricultural political weight; ii) limitation of negative externalities;, iii) demand of positive externalities; iv) public budget constraints, and finally v) political institutions.

The main results can be summarized as follow. We find evidence that AEMs implementation is mainly affected by farmer political weight, political institutions and the demand for positive externalities. Differently, AEMs expenditure and diffusion do not appear particularly affected by the level of existing negative externalities, suggesting that regions where agriculture is more intensive, causing worse environmental damage, are only marginally affected by the potential environmental benefit due to the diffusion of agro-environmental measures.

The remainder of the paper is organized as follow. The next Section reviews the theoretical background of agri-environmental policies, while Section 3 reviews the evidences from previous literature. Section 4 puts forward our key testable hypotheses and the model specification. Section 5 presents the results. Finally, the last Section discusses the main implication and draws some concluding comments.

2. Background

In the last decades the link between agriculture and the environment has become a relevant subject for economic and political debate around the role the primary sector should play in the future. In many countries environmental issues have gained the top of agricultural policy agenda. Particularly, in the European Union these issues have been risen to a fundamental goal of the Common Agricultural Policy (CAP), in order to contribute of a sustainable development. As an effect, policy instruments like AEMs, have gained progressive interest in both the political and social communities.

This on going process, often called the 'greening' of the CAP, can be included in the actual and more general debate around agriculture's multifunctionality, with specific reference to its environmental function.[1] The concept of multifunctionality is not univocal, but lend itself to several interpretations, often depending on the perspective taken. For

example, Van Huylenbroeck et al. (2007) distinguish between a supply vision, based on agricultural production characteristics, and a demand vision, focused on the role society assigns to multiple agriculture functions. A more detailed survey of heterogeneous viewpoints around multifunctionality issues is also given by Hagedorn (2004), who separates analytical and descriptive interpretations, the latter often merely finalized to policy instruments justification.

From an economic point of view, multifunctionality definition involves some key concepts as agriculture's joint production of commodity and non-commodity outputs (NCOs), externality and public goods (OECD, 2001; Durand and Van Huylenbroeck, 2003). Following the OECD working definition the basic elements of multifunctionality are: *i) the existence of multiple commodity and non-commodity that are jointly produced by agriculture* and *ii) the fact that some of the commodity outputs exhibits the characteristics of externalities or public goods, with the result that markets for these goods do not exists or function poorly* (OECD, 2001).

Since many jointly-produced NCOs have externalities and public goods characteristics, market failures occurs and hence public intervention is required. Depending on the degree of jointness different policy instruments are established to solve market failures (OECD, 2003). To that purpose, it is fundamental to identify causes of jointness (see Boisvert, 2001): policy intervention is particularly needed in case of non-allocable inputs contemporary devoted to the realization of both commodities or NCOs. In this situation NCOs public good features lead to under-provision of positive externalities and over-provision of negative externalities, with respect to the social optimum.

Economic theory suggests that incentives or disincentives to correct market failures and to maximize social welfare should equate social marginal value of every public good in its optimal provision level. This implies that as many policy instruments are required as many goods are addressed (Tinbergen, 1952).

Following this criteria some authors claim for completely production-decoupled instruments to improve multifunctionality (see Anderson, 2000; Blandford and Boisvert, 2002). This could be justified by the fact that many multifunctional features are strictly site-specific and potentially separable from farming. On the other hand, Vatn (2002) and Rørstad et al. (2007) argue that in-depth instrument targeting involves higher transaction costs, often undoing potential benefits. Furthermore, targeting often conflicts with the difficulty to economically evaluate every public good, especially when they are spatially widespread (Randall, 2002). Thus, due to economies of scope, production-coupled tools become more sustainable under the strong assumption that overall non-trade agriculture effects are positive.[2]

The issue of handling NCOs by agricultural policy tools rise also concerns about the acceptability of the multifunctio-

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[1]Other issues are represented, for example, by cultural heritage, food security, food safety, rural viability and so on.
[2]European widespread intensive agriculture's management does not seem to confirm this assumption (Anderson, 2000)

nality approach, or 'non-trade' concerns, in the WTO system Detractors of multifunctionality, especially from US and Cairns Group and, more recently, also from several developing and emerging countries, highlight the trade-distorsive nature of production-coupled measures and charge their advocates with disguised protectionism. On the other hand 'multifunctionalists', as the EU and other high-costs production countries like Japan, appeal to the role of agriculture in preserving landscape amenities and rural viability.

As an effect of the strictly joint production regarding many NCOs, tools aimed to affect their supply seem to imply inevitable production effects (Diakosavvas, 2003; Latacz-Lohmann and Hodge, 2003)[3]. This issue is also valid with respect to AEMs which, in the Uruguay Round Agreement on Agriculture (URAA), were placed in the Green Box, among the minimal trade-distorting measures. Thus, a question arises whether current Green Box policies eligibility criteria will receive confirmation in the future (Josling and Tangermann, 1999; Glebe, 2007). Edwards and Fraser (2001) defends URAA decisions about AEMs, on the contrary Diakosavvas (2003) as well as Salhofer and Streicher (2005) reports evidence on the AEMs significant influences on production and trade.

Summarizing, agri-environmental schemes feasibility depends, from a normative perspective, to the capacity to solve market failures by minimizing market distortions (Latacz-Lohmann and Hodge, 2003). Thus, agri-environmental policies are argued to be sustainable if they are welfare-enhancing, despite possible negative production side effects (Hodge, 2000; Edwards and Fraser, 2001).

Pointing our attention to EU AEMs, many authors have added their contribution to design optimal schemes and to evaluate existing tools (e.g. Hodge, 2000; Lankoski and Ollikainen, 2003; Latacz-Lohman, 2004). Undoubtedly one of the most important limits of EU AEMs is represented by information asymmetry between farmers and policy makers. Because of limited information and lack of targeting, voluntary contributions are approached by only those farmers who easily accomplish to environmental prescriptions. So adverse selection problem involves farmers over-compensation and limited environmental effects. Other restrictions are represented by moral hazard, lack of incentives to ameliorate farming environmental quality and administrative costs for implementing and monitoring policies (see Falconer, 2000; Fraser, 2002; Latacz-Lohman, 2004; Hart and Latacz-Lohmann, 2005).

It is important to remark that the choice to subsidize less intensive farming practices and landscape amenities by contributes linked to extra costs or loss of income, involved in complying with the government program, does not approach the social optimum and it is not consistent with the "polluter pays principle". However, this question involves the hoary problem of externalities evaluation on the one hand and definition of property rights for land use on the other (Glebe, 2007; Schleyer et al., 2007).

Moreover, defining an efficient set of policy instruments represents only a partial aspect of the problem, in fact there is question whether AEMs are mostly implemented to solve market failures or, differently, are also driven by redistributive logics influenced by the rent-seeking activity and political support motives (Peterson et al., 2002; Baylis et al. 2006). Taking care the last perspective and before presenting our main hypotheses, in what follow we will focus the attention on the few existing evidences that have analyzed the economic and political determinants of the AEMs adoption in the EU.

3. Previous evidence

A small literature has investigated the determinants of AEMs from a political economy perspective. Indeed, to date, this approach has been adopted by Baylis et al. (2005, 2006) and Sahlofer and Glebe (2004, 2007). However, although related to local compensation payment for providing landscape amenities, Hackl et al. (2007) offer a convincing interpretation of the political bargaining process of agri-environmental policies[4].

Starting with the US and EU diverging attitudes towards agri-environmental policies[5], Baylis et al. analyze the economic and political determinants of AEM expenditure of EU countries, from 1993 to 2002. These authors investigated the extent to which AEMs are driven by genuine objectives to reduce negative externalities and by satisfying public demand for landscape amenities or, differently, they are a disguised attempt to support farmers' income. The paper proposes four plausible policy 'lenses' for which AEMs could be interpret. In the *pollution lens* AEMs aim at reducing agriculture environmental impact, while in the *green demand lens* they correspond to social request for positive externalities. Other scenarios are represented by the *budgetary lens* in which it is hypothesized a partial substitution of traditional farm income support with 'green' labeled instruments, and finally by the *cynical lens* in which the only purpose is to merely maintain traditional farm support. Note that these scenarios are not mutually excludable.

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[3] Moreover the linkage between commodities and NCOs depends on production intensity, thus the relationship may be negative or positive, the last overall in case of extensive production practices (Romstad, 2004).

[4] Differently, there is an important and growing empirical literature dealing with the farmers' willingness to participate in the AEMs (e.g. Dupraz et al., 2002; Vanslembrouck et al., 2002; Mann, 2005; Defrancesco et al., 2007; Jongeneel et al., 2008). These papers study the relationship between AEMs implementation and farms and farmers' characteristics.

[5] For a comparison between EU and USA agri-environmental policies see also Baylis et al. (2007).

Analogies with the above mentioned approach can be found in Glebe and Sahlofer (2007), who aim to understand heterogeneities in the uptake of AEMs across EU countries. They empirically test a political preference function model on AEMs implementation between, focusing on factors like environmental benefits, agricultural lobby influence, private costs of adhesion, and both national and EU budget pressure. The latter determinant is strictly related to the so-called 'restaurant table effect', namely how a non-cooperative game across EU countries split co-financed policy costs among other contributors, determining total public-resource overspending (see Pokrivcak et al., 2001; Pokrivcak and Swinnen, 2004).

Hackl et al. (2007) modeled the political bargaining process related to Austrian local agri-environmental programs. Considering factors affecting this process, they stress the role of transaction costs existing within and among categories of involved stakeholders (farmers, beneficiaries and politicians). Environmental benefits, opportunity costs, structural differences and budget constraints have also been taken into account. A key advantage of the Hackl et al. study, over the previously mentioned papers, is its focus on the *local* actors responsible for the decision and implementation of the agri-environmental policies. Indeed, a national focus may mask several key details that could be very important in the analysis of AEMs, given their particular nature of site-specific policies.

4. Hypotheses, data and model specification

Starting from the previous discussion, in what follows we advance some hypotheses on the most plausible factors affecting AEMs implementation intensity across EU regions. To organize the discussion we focus on five broad determinants: *i*) agricultural political weight, *ii*) negative externalities limitation, *iii*) positive externalities demand, *iv*) budget constraints and, last but not least, *v*) political institutions. However, it is important to note that these hypotheses are not mutually excludable.

4.1 Hypotheses and explanatory variables

Hypothesis 1: *AEMs implementation should be positively affected by the agricultural group political weight.*

Generally speaking, the agricultural lobby strength is characterized by its ability to seek public transfers. Thus, we expect a positive relationship between Pillar I and AEMs expenditure. Our key proxy to capture the farmers' political weight is the total regional transfer to the agricultural sector

of Pillar I support (price support plus direct and other payments) as a share of the regional agricultural gross value added at basic prices (EU Commission, 2001). Moreover, to better capture the strength of the farm lobby we also include the agricultural labor share, land inequality, and female and young farmers share.[6] The first two variables make it possible to control for traditional factors like relative group size and sector heterogeneity, both elements that affect the transaction costs of farm groups collective action. Differently, the female and young farmers share are indicators of higher environmental sensitivity and a better education level (Hackl et al., 2007; Dupraz et al., 2002; Vanslembrouck et al., 2002).

Hypothesis 2: *AEMs implementation should be positively affected by the level of agriculture negative externalities.*

Agri-environmental schemes provide economic compensation for those farmers who choose to adopt more extensive agricultural methods, in order to reduce negative externalities.[7] In such a scenario, intensive farming areas represent the most suitable target for these measures (European Commission, 2005). Hence, to confirm the assumption that reducing agricultural pollution is an AEMs key objective, we have to expect a positive correlation between AEMs implementation and intensive farming proxies, like farm productivity. On the other hand, intensive farming incurs higher opportunity costs in complying with program commitments, thus discouraging adhesion. The intensity of agricultural production is measured by three proxies: regional average yield of wheat, regional nitrogen surplus,[8] and the share of pasture and permanent grassland over the whole agricultural area.

AEMs payments are calculated on the basis of the additional costs and the loss of income involved in complying with environmental standards beyond a reference baseline. These baseline requirements, called Good Farming Practice (GFP), represent the minimal environmental quality standard from which a farmer's efforts are compensated. As GFPs are not univocal, but are defined locally, it is conceivable that a high degree of environmental compliance might act as a deterrent to the farmer's involvement in AEMs. To quantify the GFPs level we use the European Environment Agency (EEA) IRENA project indicators and, particularly, IRENA 02 indicator 'Regional levels of good farming practices'.[9]

Hypothesis 3: *AEMs implementation should be positively affected by agriculture positive externalities social demand*

Social demand for agricultural positive externalities and, more generally, for environmental amenities is linked to

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[6] Land inequality is measured by the Gini index of operational agricultural land holdings, while the share of female and young holders are respectively represented by female and 35 years old or less farm holders percentage. All these variable are based on Eurostat data.

[7] Reduction of intensive agriculture environmental impact is the most important objective of AEMs with 2/3 of public funds devoted to this aim (Diakosavvas, 2003).

[8] Source: CAPRI Modeling System

[9] IRENA 02 quantifies for each country percentage of relevant agricultural practices/environmental issues covered by GFPs (see EEA, 2005a).

individual economic welfare (Bimonte, 2002). Thus, our primary proxy for the demand of positive externality is the level of development, measured as regional real per-capita GDP. However, because this variable only imperfectly captures the social demand for environmental goods, other proxies have been included in the analysis, as well. Tourism intensity, which is captured by the rate of tourism arrivals per 1,000 inhabitants, should by proxy the direct landscape fruition. Moreover, access to an information network, measured as internet users per 1,000 inhabitants, might indirectly approach similar concerns.[10] Other relevant proxies used to disentangle the demand for positive externalities are the severity of environmental legislation and the green voters share. Clearly, the last variable also proxies for political pressure from environmentalist lobbies. Following Baylis et al. (2006), environmental legislation is measured by the EEA (2005b) ranking, that classifies countries with a score from 1 (worst) to 5 (best). The Regional Green voters share was built starting from the 1999 European Parliament Elections. Among environmentalist parties we include political movements enrolled in the European subgroup 'Greens' and other environmentalist parties without representation in the EU parliament.[11]

Hypothesis 4: *AEMs implementation should be affected by public budget constraints*

Following Glebe and Sahlofer (2007) concern about the AEMs co-financing system, we tested the 'restaurant table effect'[12] by taking into account the 'regional contribution' to the whole EU budget, proxied by the share of regional GDP on EU-15 GDP. In order to smooth the strong regional/national size differences we express such variable in a logarithmic form.

The regional/national budgetary pressure linked to the adhesion to agri-environmental measure is closely related to the public budget deficit, configuring itself like a public administration opportunity cost (Glebe and Sahlofer, 2007). Due to the lack of data on regional deficits, the budgetary pressure variable is indirectly proxy by the previous five years average regional growth rate. An analogous meaning is attributable to the variable indicating the share of farms located in less favoured areas (LFA).

Hypothesis 5: *AEMs implementation should be affected by political institutions*

AEMs regional implementation has many points in common with EU Structural (or Regional) policies. First, the policy is applied at the regional level, thus involving local political bargaining, in addition to national and EU bargaining. Kemmerling and Bodenstein (2006) point to a strong influence of political partisanship and competition in regional funding allocations. These authors refer to a positive effect of left and euro-sceptic partisan ideology in the regional redistribution of EU structural/cohesions funds. These effects are respectively motivated by left-wing parties' traditional preference for redistribution and by the attempt to compensate loser of the EU integration process, like voters who gain little from the common market or monetary policy. Moreover, Hackl et al. (2007) find a positive relationship between AEMs intensity and left parties' share. In their opinion, such results could reveal discontinuity in innovative agri-environmental contracts from long-established income support instruments, put forward by political groups to whom farmers traditionally refer, like conservatives.

To test this hypothesis we collect data from the 1999 European Parliament Election referred to each of the AEMs territorial units considered.[13] Specifically, following Kemmerling and Bodenstein (2006), we point our attention to left ideology and euro-sceptics, including in these categories those parties enrolled in specific European Political Groups. Using EU parliament and national election websites, 1999 EU Parliament elections results have been collected for every EU-15 regions and countries. Then every party has been linked to the respective European Political Group. In the analysis we consider only parties represented with at least one elected candidate at the European Parliament.[14]

A second important political institution dimensions is the degree of political competition. Comparative politics literature (see Persson and Tabellini, 2000) capture this dimension or by using differences in electoral rules (e.g. majoritarian vs. proportional election), or by using the mean electoral district magnitude, i.e. the average number of members of the lower house elected in each constituency. On the one hand, the larger the district magnitude, the greater the

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[10] Internet users and environmental legislation variables are gathered at national level.

[11] 'Greens' is a subgroup into Greens/European Free Alliance (Greens/EFA) political group. For our analysis we exclude EFA regionalist parties.

[12] By 'restaurant table effect' we mean that group members will order expensive meals, if the bill is split among group (see Glebe and Salhofer, 2007; Pokrivcak et al., 2001). In this case we refer to agri-environmental budget.

[13] The choice of utilizing EU Parliament Elections 1999 dataset, rather than national or local elections, is useful because EU results reveal electoral behaviour of every voters at the same point in time. Moreover different national and regional electoral results become comparable with respect to the classification of every local party into an European Political Group (and so to an ideology). Finally 1999-2004 EU legislation covers exactly our dataset on AEMs implementation.
In every case Kemmerling and Bodenstein (2006) demonstrate that regional results of national elections preceding the 1999 European Parliament Elections are not statistically different from the latter.

[14] Focusing on left ideology, we include in this category parties enrolled in the following groups: the Party of European Socialists Group (PES), the Confederal Group of the European United Left / Nordic Green Left (EUL/NGL) and the group of Greens / European Free Alliance (Greens/EFA). Among eurosceptics we assign the Confederal Group of the European United Left / Nordic Green Left (EUL/NGL), Union for Europe of the Nations (UEN), the Group for a Europe of Democracies and Diversities (EDD), Independent Members and also European Democrats (ED) subgroup. For every region the variables left and eurosceptics represent the percentage obtained by parties that are members of above mentioned EU political groups.

probability for minority parties without territorial concentration, like environmentalists, to obtain political representation. On the other hand, the literature suggests that majoritarian elections, characterized by small district magnitude, tend to be associated with political incentives directed towards narrow and concentrated geographical interest and local public goods. Thus, the a-priori effect of the district magnitude variable on AEMs expenditure is unclear. This variable, collected at the national level, comes from the World Bank Database on Political Institutions (see Beck et al., 2001).

4.2 The dependent variable

The basic data to measure AEMs intensity are extracted from the Common Monitoring Indicators collected by the UE Commission for the programmes' evaluation process. For each European country, AEMs have been drawn up at the most appropriated geographical level.[15] Following this logic, some Member States have implemented schemes at the national level, while others realized regional programs. At the former level we find France, Ireland, Sweden, Austria, the Netherlands, Greece, Denmark and Luxembourg. Instead Germany, Italy, Belgium and the United Kingdom, in relation to their institutional differences, chose to apply AEMs regionally. Germany and Italy with their respective 16 länders and 21 regions, worked out a programme for each of them. Diffenrently, the United Kingdom arranged 4 programmes, respectively for England, Scotland, Wales and Northern Ireland, and Belgium 2 programmes, one for the Flemish Region and the other for the Walloon Region. In a few cases, the Member States have simultaneously presented national and regional programmes for particular regions that prefer autonomy. This is the situation of Spain, Portugal and Finland.[16] Overall, to explain the economic and political drivers of the implementation of agri-environmental measures, we use data from 59 EU territorial units observed for the years from 2001 to 2004. Thus, pooling these observation, we work with a total number of 236 observations.

The AEMs implementation intensity is expressed as the ratio between agri-environmental payments and agricultural gross value added.[17] This choice is motivated by two main

considerations. First, the heterogeneous nature of agri-environmental measures, where, for example, several schemes could cover the same surface, have generated problems of double counting in quantifying the physical share of the total utilized agricultural area under agri-environmental commitments (see EEA 2005a). Thus, a measure based on the effective expenditure overcomes such problems. Moreover, by measuring AEMs intensity in terms of expenditure on agriculture value added, we stay close to the literature that has investigated the determinants of agricultural support using endogenous variables, like producer subsidy equivalent. Figure 1 displays the AEMs expenditure intensity across the EU-15. Table 1 shows summary statistics of the explanatory variables described above. Finally, in Appendix A data sources and calculation details of the above described variables are reported.
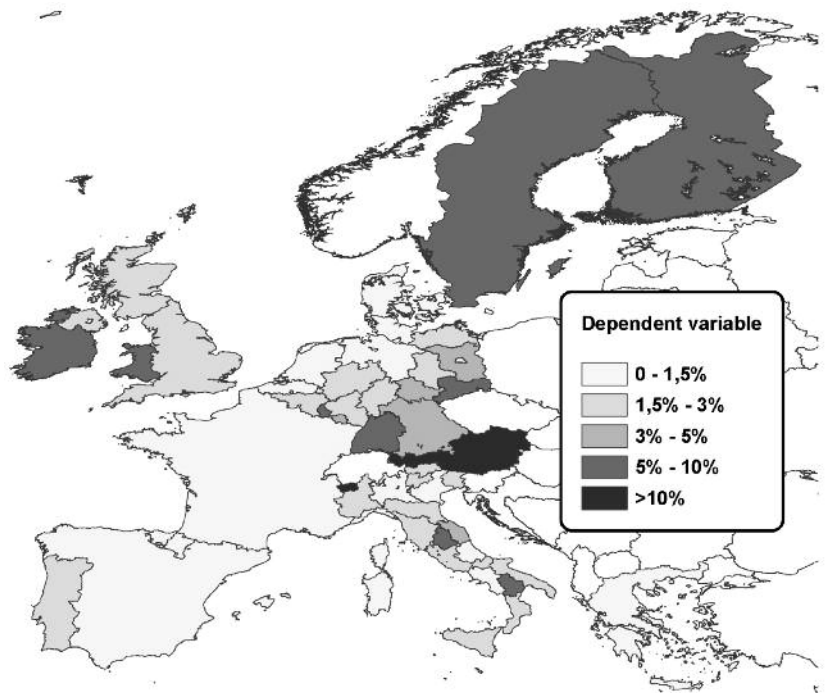
Figure 1. Agri-environmental expenditure on agricultural value added

5. Regression Results

Table 2 displays the regression results of the model specification described in the previous section. In particular, we report the results of two different specifications. Model I is a pooled regression specification where we do not control for country fixed effects, whereas in Model II we control for

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[15] Council Regulation (EEC) No 1257/99 of 17 May 1999, article 41.

[16] Spain has a national agri-environmental programme, with the exception of Navarra and the Basque Country that have their own. In Finland and Portugal there is a programme for the continental portion of the country and specific plans for the Aland Islands, Madeira and the Azores Islands.

[17] Agri-environmental payments include financial funds under the old commitments of Council Regulation (EEC) No 2078/92 and under more recent Council Regulation (EEC) No 1257/99.

Table 1. Descriptive statistics (Number of observations = 236)

	Mean	Maximum	Minimum	Std. Dev.
Dependent variable				
AEMs Intensity	3.12	20.14	0.16	3.34
Agricultural political weight				
Pillar I expenditure	36.46	88.94	2.80	17.61
Agricultural labor share	4.61	14.95	0.36	3.41
Agricultural labor share squared	21.28	223.59	0.13	11.60
Land inequality	58.69	82.03	2.72	12.59
Female	20.46	41.88	7.65	9.95
Young	10.77	18.63	3.89	4.06
Negative externalities limitation				
Nitrogen surplus	56.36	202.00	9.00	44.92
Yield	5.14	9.81	0.84	2.45
Pasture	37.91	99.13	0.92	24.73
Level of good farming practices	59.12	82.00	33.00	9.50
Positive externalities demand				
GDP per capita	24,385.00	59,778.79	10,5636.31	7,873.91
Tourism intensity	1,895.72	10,000.40	504.00	1,745.01
Green voters share	4.71	22.61	0.00	4.60
Environmental legislation	2.85	5.00	1.00	1.46
Internet	25.86	45.60	9.20	7.02
Budget constraints				
Region GDP/EU GDP	1.69	16.85	0.01	3.01
Region 5 year avg GDP growth	4.24	14.96	-0.51	2.39
Less favoured area	55.79	100.00	0.00	26.79
Political institutions				
Left	38.83	64.03	11.64	13.42
Left * land inequality	2,276.34	4,938.82	91.57	948.08
District magnitude	9.17	150.00	1.00	19.14
Eurosceptics	20.45	46.55	0.00	13.31

unobserved country heterogeneities by including a set of country fixed effects. The key differences between the two models, other than fixed effects, come from some variables that lack regional variation. Indeed, we are forced to omit them from Model II due to their perfect collinearity with the country fixed effects.

As a general rule, we include an explanatory variable by means of its significant level and robustness especially with respect to Model II, as it represents a more conservative specification to problems of omitted variables bias.

Following the previous discussion, we organized the results presentation by grouping the set of explanatory variables into five categories, that should represent the main driving forces affecting the level of AEMs implementation.

However, it is important to bear in mind that the borders across these groups are not always so sharp. Finally, for each model, we report the estimated coefficients, and their respective *p*-value. Moreover, we also report the standardized β coefficients, with the aim to address which variable contributes the most to the regression.[18]

At the general level, the explanatory power of the models, measured by the adjusted R^2, appears quite high, also taking into account the cross-sectional nature of the data set. Model I accounts for about 72% of the variation in AEMs expenditure, while in Model II the overall explanatory power reaches 89%. The proxies related to farmer political weight are all significant at the 5 or 10 percent level, with the exclusion of the agricultural employment share squared and

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[18] The β coefficients have been calculated by dividing the standardized estimated coefficients by the standard deviation of the dependent variables, so as to 'purge' the estimated coefficients of their dependence on measurement units.

Table 2. Determinants of agri-environmental expenditure

	Model I			Model II		
	Coefficient	P-value	*B* coeff.	Coefficient	P-value	*B* coeff.
Agricultural political weight						
Pillar I expenditure	0.045	0.000	0.239	0.069	0.000	0.362
Agricultural labor share	0.574	0.006	0.585	-0.368	0.011	-0.376
Agricultural labor share squared	-0.007	0.532	-0.106	0.024	0.007	0.346
Land inequality	-0.073	0.088	-0.274	-0.031	0.376	-0.118
Female	0.177	0.000	0.528	0.099	0.000	0.294
Young	0.144	0.020	0.175	-0.046	0.379	-0.056
Negative externalities limitation						
Nitrogen surplus	-0.015	0.000	-0.202	-0.009	0.043	-0.127
Yield	0.025	0.843	0.018	-0.081	0.480	-0.059
Pasture	0.001	0.909	0.006	-0.013	0.095	-0.094
Level of good farming practices	0.009	0.685	0.024			
Positive externalities demand						
GDP per capita	0.0002	0.000	0.523	0.0001	0.000	0.304
Tourism intensity	0.0005	0.000	0.255	0.0003	0.000	0.153
Green voters share	0.068	0.060	0.094	-0,130	0.002	-0.179
Environmental legislation	0.922	0.000	0.404			
Internet	0.292	0.000	0.614			
Budget constraints						
Log (Region GDP/EU GDP)	-0.227	0.117	-0.099	-0.504	0.000	-0.220
Region 5 year avg GDP growth	0.586	0.000	0.418	-0.050	0.572	-0.036
Less favoured areas	-0.022	0.028	-0.178	-0.012	0.058	-0.098
Political institutions						
Left	-0.184	0.004	-0.741	-0.184	0.000	-0.738
Left * land inequality	0.004	0.000	1,078	0.003	0.000	0.825
District magnitude	-0.036	0.000	-0.205			
Eurosceptics	-0.009	0.493	-0.035	-0.048	0.003	-0.190
Year fixed effects		Yes			Yes	
Country fixed effects		No			Yes	
Nr. observations (Nr. Regions)		236 (59)			236 (59)	
Adjusted R-squared		0.72			0.89	
F-statistic		25.4			53.3	

Notes: OLS regressions, p-values based on cluster standard errors at the country/region level. b coefficient reported in columns 3 and 6 are calculated by dividing the standardized estimated coefficients by the standard deviation of the dependent variables. Country and year fixed effects, included as indicated.

land inequality in Model I and Model II, respectively. The signs of the estimated coefficients are, generally speaking, in line with *a priori* expectations, suggesting that the relationship between the power of the farm lobby and the agro-environmental measures are substantially in line with the vast literature on the determinants of agricultural protection and support (see, e.g., Olper, 2007). AEMs expenditure is strongly, and positively, related to the level of Pillar I expenditure, suggesting that the two policies tend to be complementary.[19] In model II the agricultural labor share displays a U-shaped relationship with agro-environmental expenditure. This means that the relationship is negative for a low level of agricultural labour share but, beyond the

threshold of about 8%, any further increase in the size of the farm group tends to increase AEMs expenditure. The proxy finalized to capture heterogeneity in the farm group, land distribution inequality, affects the level of AEMs expenditure negatively, a result in line with recent literature on inequality and collective action problems (see Bardhan et al. 2001; Olper 2007). Finally, an increase in the share of females and young farmers affects AEMs implementation positively, although the latter variable is only significant in Model I.

AEMs expenditure is not particularly affected by the level of existing negative externalities, namely regions where agriculture is more intensive, causing environmental damage, have not a higher level of agro-environmental

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[19] In some, more parsimonious, specification the share of Pillar I expenditure display an inverted U-shaped relationship with AEMs expenditure, suggesting some degree of substitution between the two policies. However, this result is not robust to the inclusion of country fixed effects.

Appendix A: Data sources and variables definition

Variable name	Definition	Source
Dependent variable		
AEMs Intensity	The regional ratio between AEMs payments and the agricultural gross value added	Authors' calculation from EUROSTAT Database and EU Commission sources
Agricultural political weight		
Pillar I expenditure	The total public transfers to the agricultural sector of Pillar I support (price support plus direct and other payments) as a share of the regional agricultural gross value added at basic prices	Authors' calculation from EU Commission (2001) and EUROSTAT Databases
Agricultural labor share	The share of agricultural employment on the total regional employment	Authors' calculation from EUROSTAT Database
Land inequality	The Gini index of agricultural land concentration (2000)	Authors' calculation from EUROSTAT Database
Female	The share of female farm holders on total farm holders (2000)	Authors' calculation from EUROSTAT Database
Young	The share of 35 yers old or less farmer holders on total farm holders (2000)	Authors' calculation from EUROSTAT Database
Negative externalities limitation		
Nitrogen surplus	The regional nitrogen surplus (Kg per hectare)	CAPRI Modeling System
Yield	The regional yield of wheat (tons per hectare)	EUROSTAT database
Pasture	The share of pasture and permanent grassland over the whole agricultural area	Authors' calculation from EUROSTAT Database
Level of good farming practices	The percentage of relevant agricultural practices/environmental issues covered by Good Farming Practices in each country (IRENA 02 indicator 'Regional levels of good farming practices')	EEA (2005a)
Positive externalities demand		
GDP per capita	The Gross Domestic Product per capita in real terms at regional level	Authors' calculation from EUROSTAT Database
Tourism intensity	The rate of tourism arrivals per 1,000 inhabitants at regional level	EUROSTAT database
Green voters share	The regional share in the 1999 European Parliament Elections of parties enrolled in the EU Parliament subgroup 'Greens' and other environmentalist parties withouth representation in EU Parliament	Authors' calculation from national and EU sources
Environmental legislation	The environmental policy integration degree in national legislation from 1 (worst) to 5 (best)	EEA (2005b)
Internet	The number of internet users per 1,000 inhabitants at national level	EUROSTAT database
Budget constraints		
Region GDP/EU GDP	The regional Gross Domestic Product as a share of the EU one (expressed in a logarithmic form)	Authors' calculation from EUROSTAT Database
Region 5 year avg GDP growth	The regional Gross Domestic Product growth rate of the previuos five years	Authors' calculation from EUROSTAT Database
Less favoured area	The share of farms located in the Less Favoured Areas	Authors' calculation from EUROSTAT Database
Political institutions		
Left	The regional share in the 1999 European Parliament Elections of parties enrolled in the following EU Parliament political groups: the Party of European Socialists Group (PES), the Confederal Group of the European United Left / Nordic Green Left (EUL/NGL) and the group of Greens / European Free Alliance (Greens/EFA)	Authors' calculation from national and EU sources
District magnitude	The average number of Members of the Lower House elected in each costituency	World Bank Database of Political Institutions
Eurosceptics	The regional share in the 1999 European Parliament Elections of parties enrolled in the following EU Parliament political groups: Confederal Group of the European United Left / Nordic Green Left (EUL/NGL), Union for Europe of the Nations (UEN), the Group for a Europe of Democracies and Diversities (EDD), Independent Members and European Democrats (ED) subgroup	Authors' calculation from national and EU sources

expenditure. Furthermore AEMs expenditure is lower in regions where the nitrogen surplus is higher. Thus, from this perspective, even at the regional level we find confirmation of the evidence of Baylis et al. (2006), who show how countries systematically having the largest production of negative externalities are investing the least amount of money in AEMs measures.

In contrast, AEMs expenditure is strongly and positive related to the social demand of positive externalities. More specifically, the level of GDP per capita, tourism intensity, the strength of environmental legislation, the diffusion of internet and, finally, the share of regional votes going to Green parties, all exert a significant positive effect on AEMs intensity. However, the strength of Green parties is not robust to specification changes, e.g. the inclusion of country fixed effects induces a change in the sign of the estimated coefficient from positive to negative. Thus, while these results are broadly consistent with the previous evidence, it also appears that working at the regional level can lead to more complex relationships than previously suggested.

The 'regional contribution' to the EU budget negatively affects the AEMs intensity. Thus, the result tends to give some support to the so-called 'restaurant table effect', namely the tendency of the CAP decision-making process to overprotect agriculture, a result in line with the Glebe and Salhofer (2007) evidence obtained at the national level. The positive coefficient of the real GDP growth of the previous five years (although becoming insignificantly negative in Model II) and the negative coefficient referred to LFAs, give a substantial confirmation to the role played by public opportunity costs in co-financing policies.

The last group of considered variables are political institutions. Both left ideology orientation and the average district magnitude negatively affect agri-environmental expenditure. Moreover, and this is quite interesting, the effect of left-wing ideology orientation is conditional to the level of land inequality, namely an interaction effect between these variables has a significant positive effect on AEMs expenditure. The negative effect of the left-wing orientation on AEMs expenditure contrasts with the hypothesis and results obtained by Kemmerling and Bodestein (2006), who find a positive effect of left orientation on EU structural funds expenditure. However, this result is in line with the notion that farmers are traditionally represented by political conservatives (see Hackl et al. 2007; Olper 2007). Moreover, a possible interpretation of the interaction effect between left-wing orientation and land inequality is that in regions with a strong unequal land distribution, the resulting large fraction of small farmers tends to be affiliated with left oriented farm groups. Examples in this direction exist in some European countries, like France and Italy, where small farmers have their ad hoc organization related to left-wing parties.

On the other hand, the negative relationship between average district magnitude and AEMs expenditure appears in line with the prediction of the recent political economy model about the effect of electoral rules on policy outcomes (see Persson and Tabellini, 2000). Indeed, these models predict that majoritarian electoral rules (*vis-à-vis* proportional ones), characterized by small district magnitude, tend to benefit especially narrow, and not broad, interests, and the production of local public goods.

Finally, columns 3 and 6 of the table display the coefficients, with the purpose of addressing which group of determinants contributes the most to the regression. By taking into account the less than perfect categorization of our proxies in each category, what emerges from the analysis of the   coefficients is that proxies related to farmer political weight, political institutions and, to a lower extent, to positive externalities demand, are the most important explanatory variables affecting AEMs expenditure.

6. Summary and conclusions

In order to better understand the real motivation behind agri-environmental schemes, this paper proposes a political economy analysis of their implementation determinants. To this end we exploit the rich information of 59 agri-environmental programs implemented at both national and regional level, over the 2001-2004 period. Using this information, we test five main hypotheses about the underline driving forces of AEMs diffusion...

Our findings point the central role played by variable proxies related to farmer political weight, political institutions, budget constraints, and the demand for positive externalities. By contrast, AEMs expenditure and diffusion do not appear particularly affected by the level of existing negative externalities, suggesting that regions where agriculture is more intensive, causing worse environmental damage, are only marginally affected by the potential environmental benefit due to the diffusion of agro-environmental measures. This is quite a notable finding, and subsequent policy implications become evident if we observe that 2/3 of the AEMs public funds are devoted to minimizing negative externalities.

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WATER FOOTPRINT IN HUNGARY

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Abstract: More and more news report on water-related extreme environmental phenomena. Some of these are natural, which are often beyond the human race. But others are definitely due to anthropogenic effects. I think the water footprint index is able to highlight national and international water-use processes and gives us the opportunity of organizing a sustainable, consumer-, environmental- and governance-friendly management.

81% of the fresh water withdrawal is from surface water bodies in the EU. In Europe as a whole, 44% of abstraction is used for energy production, 24% for agriculture, 21% for public water supply and 11% for industry. Public water supply is confined to ground waters. To the water resources related human activity caused qualitative and quantitative amortisation will grow worse in the foreseeable future due to the climate change. Beside seasonal differences the sectoral differences are increasingly becoming critical between different areas, such as Southern and Western Europe. The former, wrong agricultural support system has worsened the situation since it gave financial aid for the used improper techniques of water-intensive crop cultivation. By today, this seems to be solved. Public water abstraction is affected by many factors, of which mostly are based on social situation and habits, but technological leakage receives a big role as well. Interesting, that for example the residents' water consumption in Eastern Europe decreased because price were raised and regular measurements were introduced. But in Southern Europe it increased due to tourism in the past period. Industrial water withdrawal decreased across Europe because of the decline of industry and the development of technologies. According to the European Environment Agency (EEA), the Union needs a sustainable, demand-driven leadership which focuses on the preservation and use efficiency. This have already appeared in politics and legal administration as well.

Current research calls the attention to the significance and difficulties of this kind of domestic estimation presented trough the water footprint calculation of bread and pork in Hungary. The received data indicate the domestic water consumption trends in a modern approach. There is no doubt for me about the urgent necessity of water footprint calculation because as a result innovative, sustainability supported environmental, social, economical, and political relationships can be created – not just on local, regional or national level, but on inter-regional, European and even global stage.

Key words: water economics, water consumption, externality management, environmental economics, climate change adaptation

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I. Introduction

"We are living beyond our means when it comes to water. The short-term solution to water scarcity has been to extract ever greater amounts of water from our surface and groundwater assets. Overexploitation is not sustainable. It has a heavy impact on the quality and quantity of the remaining water as well as the ecosystems which depend on it. We have to cut demand, minimise the amount of water that we are extracting and increase the efficiency of its use."

Professor Jacqueline McGlade,
Executive Director of EEA.

Our fresh water recourse is one of the greatest treasures of mankind. Namely, water is the sensitive link between the biosphere and the lithosphere, the life itself. This characteristic makes the fresh water strategically important in all ecological, all economical, environments economical,

all social, and sociological, all though in a political, environment political sense.

Economics rates water among free goods, which serves to satisfy human needs. At the same time also appears at the resources as a natural factor. Meets all relevant criteria, as it can be found in nature, may get exhausted easily, its replacement is very expensive, it's very inflexible (can't be substitute), usually immovable, its utilisation may depend on weather and seasons, and it has a country specific quality and quantity availability.

Water is classified among common goods, its place is among boundaries [fixed], its transportation and storage is complicated and costly (rather happens in the form of a product even at a national or regional level – for example grains, fruits, meat ...). In addition its substantive value is large (often not expressed in money), as it is related to life, beauty, wealth and health. People like the proximity of water. The economic consequence is that we should use it when and where it is available considering that it gravitates, leaks

downward. There is always the threat of market failures in water supply so it has no homogeneous market because it is too expensive – pricing and water rate determination (can) cause extreme social conflicts and tensions. There is no other economic good that has such a complicated combination of characteristics like water (*Savenije* and *Van Der Zaag* 2006).

Considering the Union's water use guidelines very limited data are available in FAO AquaStat and Eurostat databases. The latest data are from 2007 and not available for all countries. According to the existing figures water use of Malta is the typically smallest, and Spain, Great Britain, France, Greece and Germany are the largest. Macedonia emerges from the row where popular and industrial water consumption from 2004 to 2007 has considerably decreased. I have to emphasize that the underlying data are incomplete. European Water Partnership (EWP) has come into existence for the common solution of water problems, which assists in developing strategies and executing measures.

Domestic water use on EU level is low and according to forecasts by 2015 compared to 2004 data despite of the population decline the residential water consumption will show little change while the industrial will show weaker and the agricultural will show stronger growth. Domestic River Basin Management Plan – in our case this covers whole Hungary – in relation to EU Water Framework Directive has to be prepared collaborating with 13 other concerned countries. The International Commission for the Protection of the Danube River (ICPDR) supplied the coordination of this project.

For the complex measurement of our water consumption A. Y. Hoekstra and A. K. Chapagain Dutch professors created as a result of an extensive research work the water footprint. Water footprint is the absolute quantity of the fresh water used during the production of a product or a service which expands on measuring contaminated water as well. This measure allows complex, horizontal and vertical sectoral data integrated multifactoral estimations. With its application still not known, sometimes not even suspected economic, social and political contexts may come to light, which is a new approach to our water-related personal and community attitude. So the water footprint means an all-time complex perception of water. The regular usages of water footprint calculations allow the re-evaluation of current water resource management in social and economic systems and points on the absolute measure of our diverse water demand. Water footprint can be calculated for a product, service, company, sector, nation, geographic unit or the whole humanity.

II. Virtual water and water footprint

Water footprint is the total quantity of water used to produce products and services by a person, company or nation. It consists of two main components: direct and indirect water use. Indirect use of water is measured as virtual water (the amount of water needed for produce a certain product). Water footprint includes blue water (rivers, lakes, water-barrier water), green water (rainfall at primary crop cultivation) and gray water (contaminated water after agricultural, industrial and domestic use). Although water footprint tells us how much water is used, the increase or decrease of the effect of full abstraction depends on location and time. The growth of water footprint in an area where water is abundant, probably does not have adverse effect on the society or the environment, but in a place where water scarcity is already experienced may cause serious problems, such as rivers drying out, habitats destruction, species extinction – besides it has impact on agricultural prices, stocks and local economies (*WWF* 2010).

A product water footprint is similar to the so called 'virtual water content', although water footprint covers not only the quantity but the type of water used (blue, green, gray) and where and when it was used. Thus, contrast to the 'virtual' water the water footprint is a multi-dimensional indicator. A 'virtual' water term is used in the context of international or regional water flows. If a nation or a region exports (imports goods that means water is exported) imported on 'virtual' way. In this context we can talk about virtual water export and import, generally virtual water flow or virtual water trade (*Hoekstra* et al. 2009).

Types of water footprint

Product water footprint can be defined as direct and indirect fresh water requirement during its production. This is an estimation that considers water consumption and pollution of all the elements of the production chain. The calculation is the same for all kind of products coming from the agricultural, industrial or service sector. Product water footprint is divided into blue, green and gray parts.

Water footprint of a consumer is defined as the total amount of fresh water used and contaminated during the production of all the products and services consumed by the consumer. Water footprint of a group of consumers is the same as the total amount of water footprints of the individual consumers of the group.

Water footprint of a business can be defined as the directly and indirectly used fresh water during the operation and supply of the company. There are two main building blocks. Operational (direct) water footprint of a business is the used or contaminated fresh water during its functional operation. Supply chain (indirect) water footprint of the company is the used or contaminated fresh water during its input production, which is needed for the production. 'Business water footprint' or 'corporate water footprint' or 'institutional water footprint' can be used as well.

Water footprint of a given area can be defined as the total fresh water consumption and pollution of the area within its borders. It is extremely important to clearly define the boundaries of the considered area. It can be catchment area, river basin, province, state or nation, or other water or administrative territorial unit (*Hoekstra* et al. 2009).

In the light of the results

Because of the international trade of water-intensive products virtual water flows are moving around the world. Most of these flow in the wrong direction from water-poor areas to water-rich regions. The majority of these flows are food, bio fuel and cotton. Solution of this wrong-way flow could be if the dry areas would discontinue agricultural production, since the responsibility of this sector in water use is the largest worldwide. According to experts the solution is the change of import and export patterns, where tool would be modern water pricing. Nowadays some countries (like China or Saudi Arabia) are already taking steps to buy large and fertile places in Africa, Asia or Latin America. Instead of food, land purchasing. This is the guarantee of the access to water in the future. Land purchaser countries are not alone, directly competing with food production giants like Nestle or Coca-Cola (*Spiegel Online International* 2009).

Water footprint calculation is a useful tool to build awareness around the used water that products consumed in the production value chain. But at this point of the developing method consumer labelling is at best leading to undesirable results or at worst misleading. This is due to underlying complexity behind the numbers of the water footprint of companies and the level of detail considering local environmental, economic and social impacts. The future of companies on water depends largely on their understanding, measurements and involvement. 21st century complex challenges on water are only growing in coming years and companies must be prepared to get involved beyond their own fences and traditional comfort zones to ensure long-term viability of this critical resource (*WFF* and *SABMiller* 2009).

International water-dependence is significant and seems to increase with the continual world trade liberalization. Today, 16% of the world's water use is not for the production of goods for domestic consumption but for export. Considering this significant and increasing tendency according to *Chapagain* and *Hoekstra* (2007.) the national and regional water policy studies in preparation should include international or interregional virtual water flows analysis.

As an indicator of water use water footprint differs in three aspects form the classic water withdrawal (as it is shown at Figure 1):

– Not limited to blue water use, but also includes the green and gray water use.

– Not limited to direct water use, but also include indirect water use.
– Not include the use of blue water if it returns where it was.

Consequently, water footprint offers a wider field of view of the relationship with the consumer or the producer and the use of fresh water systems.

Background

Chapagain and *Hoekstra* (2007) pointed out that the reveal of hidden water use of products can help to understand global nature of fresh water and to quantify the effects of the consumption and trade water resources usage.

Water footprint is a fresh water use indicator, which shows direct and indirect water use of a consumer or a producer. It can be considered as an overall fresh water use index in addition to traditional and simplified abstraction rates. Water footprint of a product is the fresh water volume used during the production measured on the entire supply chain. It is a multi-dimensional index, which shows the water consumption measure to the source and pollution degree by the type of pollution – all the elements of the total water footprint both geographically and in time are determined (*Hoekstra* et al. 2009).

Blue water footprint refers to the consumption of blue water (surface and groundwater) through a product's supply chain. 'Consumption' refers to the water loss from the surface and subsurface water bodies of the catchment area, that happens when the water evaporates and returns to a different catchment area or the sea, and when incorporated into a product. Green water footprint refers to the consumption of green water (stored rainwater in the soil, soil moisture). Gray water footprint refers to pollution and can be defined as the amount of fresh water needed to saturate the processing of existing environmental pollutants in water quality standards.

The four sections of total water footprint evaluation: laying objectives and responsibilities, calculating water footprints, assessing water footprints sustainability, formulating of the results. This means that the water footprint evaluation studies begin with clarifying the objectives and powers. Water footprint evaluation can have a lot of different reasons. For example, a nation's government wants to know the foreign dependence on water sources, or perhaps the sustainability, or maybe is interested in the suppliers of water-intensive products regional water use. The water authority may also wonder whether the total water footprint of the human activities within the catchment area harms environmental conditions and trends or water quality standards. Or it may be wondered what the extent of the incorporation of the scarce water resources into the low-value export crops in the river basin. A company may know its dependence on scarce water resources through his own supply chain, or the exposure of its allowance to the lower degree water system impacts through its supply chain and operation.

	Water footprint of a product or consumer		
	Direct Water Use	Indirect Water Use	
	Green Water Footprint	Green Water Footprint	Water Use
Water Withdrawal	Blue Water Footprint	Blue Water Footprint	
	Grey Water Footprint	Grey Water Footprint	Water Pollution

Source: own editing according to Hoekstra et al. 2009.
Figure 1: Schematic representation of water footprint components

III. Materials and methods

Background of the national research

In 2008 consumption of bread was 44.9 kg/capita – that was more than baker's ware and other cereal products in total. In the same year poultry (17.0 kg/person) was more popular, but I chose pork (15.8 kg/person) because in the light of water footprint calculation the existing data were available (*KSH* 2010).

On the official website of the water footprint calculation wheat's website was not available during the writing of the paper (*www.waterfootprint.org* 2010). Among National Central Statistical Office (KSH) public figures general data were available about water usage; there were no concrete information of the water consumption of wheat production.

In view of the information source (*KSH Gyorstájékoztató* 2010) data relating to wheat production differentiates durum wheat from other wheat. The average of harvested durum wheat was less than 1% of the total wheat gathering (2004–2008) so I did not count with distinguished breed.

During the research I have used CropWat 8.0 software. This decision support computer program is developed by the FAO Land and Water Development Department. Water and irrigation needs of plants data is used for the calculation which were taken from soil, climate and crop data by the tool. It determines a watering schedule for different plants, to evaluate the farmers' irrigation practices (*FAO* 2010/a). The other software I have used was ClimWat: developed by the FAO. It is a CropWat supporting computer program. All over the world, measures more than 5,000 synoptic stations to collect weather data. These stations may be the selection of the salvage program CropWat. (*FAO* 2010/b)

Water footprint of Hungarian bread

Blue and green water footprint of Hungarian wheat

To calculate the water requirement of wheat (crop water requirement – CWR) the used CropWat 8.0 software requested data was provided by several sources of information. Climatic data of wheat growing regions were supplied by the closest synoptic meteorological stations (Table 1), which data were imported from the program ClimWat. During the calculations I used the simplifying assumption used by Water Footprint Manual that the stations represent the same size of crop areas, so in this regard the weight of data are the same.

Considering the sowing of wheat there was no precise data, so for simplicity I dated the total quantity of all regions on the same day. From this the system calculated off harvest date, so it was everywhere at the same time. In this respect I relied on the existing FAO data and other factors in Water Footprint of Nations Appendix (*Hoekstra* and *Chapagain* 2004/a) for example estimates of humidity, root depth, crop coefficient and geological data. After all the required data are entered the software calculates the value of the reference

Table 1: Crop cultivation regions in Hungary and their associated meteorological stations

Crop	Region	Meteorological station
Wheat	Central Hungary	Budapest-Met.
	Central Transdanubia	Hurbanovo (SK)
	Western Transdanubia	Szombathely
	South Transdanubia	Pécs
	Northern Hungary	Miskolc
	Northern Great Plain	Debrecen
	South Plain	Szeged

Source: own editing

evapotranspiration (ETo), the degree of solar radiation (Rs), the plant – in this case wheat – water requirement (CWR) and from these makes irrigation plan (Crop irrigation schedule). (Due to the special case of the water demand of rice the software can calculate only complement additional data, so rice (rice) and non-rice (not rice) plants are distinguished.)

The date I used uniformly for the wheat sown is October 15. from which the software worked with its already existing winter wheat FAO data. Considering the Water Footprint Manual assumption (during the cultivation the crop water requirement is fully satisfied) I determined from the used data that the wheat green and blue evaporation equals total water demand (ETgreen + ETblue = ET = CWR) (*Hoekstra* et al. 2009). The condition of these is the existence of 'ideal circumstances', which means that the plant growth and yield is not limited. During the use of this software it can be deflected.

The resulted estimated value of crop evapotranspiration (ET) must be converted, thus after multiplied by 10 we get wheat green, blue, and total water use (CWU) measured in m3/ha. After this can process water footprint be calculated, where wheat water use is divided by the yield. According to these the estimated process water footprint of a ton of wheat is just 1000 m^3. It is clear from the results that green water footprint is slightly more than blue one. This means that a little bit more than half of the process water needs in growth stage of wheat are obtained from rain and a part of it returns back into the atmosphere during evaporation. And a little bit less than half is provided from surface and ground water. (On national level the water requirement of 1 kg domestically cultivated wheat is 221 mm in the production period – calculated by FAO (*Hoekstra* and *Chapagain*, 2004/b)). It is important to note that this figure does not include blue and green water contents of the harvested plants. Average moisture content of wheat is 12-14%. This means that the water footprint of the crop itself is 0.12 to 0.14 m3 / t, which is negligible in relation to the plant process water footprint.

Grey water footprint of Hungarian wheat

In the case of grey water footprint calculation there was relatively little data available for me, so I used estimations

and conclusions at this relation as well. The effects of pesticides, other nutrients and herbicides beside fertilizers used in agriculture on the environment have hardly or not at all been scanned. In the absence of local, free-flowing water bodies' water quality standards (nitrates content) U.S. EPA (U.S. Environmental Protection Agency) standards were used which were also used by the Water Footprint Manual. According to this assumption the amount of nitrogen is10% which flows back into the water body of the applied fertilizer rate (*Hoekstra* et al. 2009). The data of gray water footprint calculation in connection with wheat production were available by KSH and FAO databases.

Gray water footprint of a ton of Hungarian wheat is an average 267.5 m^3. Wheat grown in Southern Transdanubia has the smallest gray water footprint. The one grown in Central Hungary has the largest one despite of the fact that here is the least amount of estimated water body pollution.

Water footprint of Hungarian wheat

Based on the above I conclude that total water footprint of the wheat grown in Hungary is 1,268 m^3/t. (According to summary tables given by www.waterfootprint.org the average water footprint of wheat which was grown in different places varies from 1,000 to 2,000 m^3/t.)

Water footprint of Southern Plain's wheat is 10%, Northern Great Plain's is 12%, and Central Hungary's 27% higher and Southern Transdanubia's 12% and Western Transdanubia's 16% lower than the national average.

From 1 kg of wheat average 0,76 kg flour is made, the rest is mostly wheat bran ($\approx$ 0,228 kg) and wheat germ ($\approx$ 0,012 kg) according to FAO data related to Hungary. (Less than 1% is lost, but it's so little rate that I have not counted separate thus. In addition, wheat germ has a very small share of the products, so it combined counted with wheat bran.) As additional data was not available for me I estimated the value fraction of the resulting flour based on Italian example at 0.88, which means that the 88% of the total value of mill products is flour (*Hoekstra* and *Aldaya* 2009).

Based on the above the water footprint of flour, which can be estimated by the amount of green (WF$_{green}$), blue (WF$_{blue}$) and gray (WF$_{grey}$) water footprint of wheat regard to Hungary is (1268 × 0,88/0,76 =) 1,468 m^3/t.

There is no significant difference between the water footprints of wheat flour and bread. In Hungary, on average **1,014 liters** of water is needed to produce 1 kg bread. Central Hungary has the largest water needs (1290 l/kg) in this respect. This should be reduced (for example with technological change, development or production redistribution). Western Transdanubia (847 l/kg) and South Transdanubia (892 l/kg) have the smallest ones. This means that the domestic 'bread production" should rather focus on these regions. (In the lack of the regional share of "bread production" data the national average is based on the previous calculation, not a weighted average of the regional water footprints of bread.

Of course, bread production has many specifics so regional optimization appears pointless, but wheat and bread water footprint data clearly show where and what to produce and consume if we basically want to be water-efficient. It can be important in the light of the calculations to prefer mainly on the production sites of export wheat production where water footprint has the lowest values.)

The calculations and KSH figures show that the estimated annual water footprint of bread consumption per capita in Hungary is 45528,6 l/kg. At this point, I find it important to emphasize again that a very large part of the data used is based on estimates and conclusions.

Water footprint of Hungarian pork

Background

Official website of the water footprint of the products of animal origin page was still under construction during the research (www.waterfootprint.org, 2010/a.). From FAO (2003) data can be stated that in our country 100 sows get 1891 pig every year. The picking rate annually is also 133%. (A number of animals are taken from the total national herd for slaughter, or for live export in the same year. Here expressed in total percentage of same species including newborn animals.) Average slaughter weight of swine is 117 kg, average amount of meat weight is 97 kg (more than 80%, which is a very high rate). An average 3,6 kg of edible swine offal which is about 3% of the slaughter weight. The slaughter fat is 5 kg an average, it is roughly 4,3% of the slaughter weight. Skin has no data. In addition, the Agricultural Economics Research Institute (Hungary) records data including the swine breeding and slaughter on the slaughterhouses, too (*www.aki.gov.hu* 2010).

Water requirement of a pig farm can be detected on the simplest way on the relation of yield of pork and the water meter. This method does not count only with the water demand of the swine in biological sense, but reflects the technology water withdrawal also in which for example cleaning or process water losses are also shown. In addition, the topic can be complicated by differences of feeding habits of each swine species, differences of keeping technologies, of transport and ensiling habits of forage, by the diversity of nutritions' components (in which selection the price-value ratio has a major role as well) and quality standards (which should be considered in different stages of swine growth), or by the differences of watering.

Direct consumption of swine's drinking water is changing at different stages of its life in proportion to the live weight and the water demands of sows even differ from these. There are technologies to measure the storage of environmentally harmful and/or pollutant liquid end-product from metabolism but their application may vary like keeping technologies. Measuring household swine water demand is difficult; probably there is no separate water meter for this.

My oriental calculations for the estimation of the pork water footprint are shown below. According to the KSH

calculated data approximately seven percent of the national swine stock is sow, so I did not deal highly with them, especially their water needs is highly dependent on their physiological trait.

On the count of swine water footprint the following assumptions have been calculated:

– Swines are kept in optimal conditions (vitality is good, no need for medical treatment, nutrients supply is nonstop, et cetera).
– Genotype and keeping technology are the same (such as comfort – crowd, lack of water or oxygen ...).
– Feed intake and feeding technology are optimal (for example, the regular feeding time, specific rations, et cetera).
– The quality of the food is the same as human's.
– Pork is a secondary product in terms of calculation, since processing is required – just like butter or sausage (*Chapagain* and *Hoekstra* 2003).

According to *Chapagain* and *Hoekstra* (2003) and the conversation with *Dr. John Gundel* (former college of Agricultural Economics Research Institute - Hungary) the following data were based on for the calculation.

– Live weight a full-grown swine: 120 kg
– Daily drinking water needs of adult swines: 7,5 l
– Daily drinking water needs of 5-month-old piglets: 6 l
– Daily technological water needs of adult swines: 40 l
– Daily technological water needs of 5-month-old piglets: 10 l
– The slaughter age is 10 months.
– The water requirement of the feed consumed by swines is suspected 50%.

The determination of the amount of feed consumed to reach adulthood is assumed linear growth in feed consumption. This quantity is multiplied by the appropriate crop types' specific water needs, so we get the data on daily virtual water consumption of animals. Following *Dr. Gundel* (2005) I did not dealt with "... such – in some conception possibly listed here – feeding technology issues as feed storage, processing, handling and distribution, chemical composition ...."

Methodology

The formula used to calculate according to *Chapagain* and *Hoekstra* (2003):

$$VWC_a = VWC_{drink} + VWC_{serv} + VWC_{food} =$$

$$= \frac{\text{water from drinking}}{W_a} + \frac{\text{water from servicing}}{W_a} + \frac{\text{water from feeding}}{W_a}$$

Where:
VWC_a = virtual water content of the live animal (m³/ton)
VWC_{drink} = virtual water content of drinking (m³/ton)
VWC_{serv} = virtual water content of keeping (m³/ton)
VWC_{food} = virtual water content of feeding (m³/ton)
water from drinking = consumed water with drinking (m³)
water from servicing = used water for servicing (m³)

water from feeding = consumed water with feeding (m³)
W_a = live weight of animal (tons). In our case W_a = 0,12 t.

Table 2: Water from drinking

	Piglet	Swine
Age (month)	2	10
Daily consumption (l/animal)	2	7,5
Average daily consumption (l/animal)	4,75	

Source: own editing

From Table 2 can be calculated the average water demand of drinking, which is in this case (the average daily consumption [l/animal] x time [days] =) 1448,75 litres for a swine.

Table 3: Water from servicing

	Piglet	Swine
Age (month)	2	10
Daily consumption (l/animal)	5	40
Average daily consumption (l/animal)	22,5	

Source: own editing

From Table 3 can be calculated the average water demand of servicing, which is in this case (the average daily consumption [l/animal] × time [days] =) 6862,5 litres for a swine.

Table 4: Water from feeding

Crop	Food quantity (tons/year)			SWD (m³/t)	Crop water requirement (m³/year)
	Swine	Piglet	Average food quantity		
Barley	0,39	0,003	0,197	247	48,7
Peas	0,018	–	0,009	1879	16,9
Wheat	0,069	0,001	0,035	898	31,4
Corn	0,221	0,013	0,117	731	85,5
Total	0,698	0,017	0,358		182,5

Source: own editing

Where:
SWD = specific water demand
(plant water requirement [m³/month] / plant yield [t/ha])

SWD result has been counted according to CropWat calculations from KSH and FAO data. The estimates of the quantities of feed based on *Chapagain* and *Hoekstra* (2003) calculations.

From Table 4 can be seen that the annual water consumption of swine is 182,5 m^3. The water consumption of animal feed can be extracted from this data, which is in our case (age of animal [year] × annual water consumption from feed [m^3/year] =) 152,1 m^3.

Table 5: Water use for prepare feed

	Average	
Food quantity	0,358	ton/year
Used water of preparation (about 50%)	0,179	m^3/year
Total quantity (in the animal's life – 10 month)	0,149	m^3/animal

Source: own editing

From the results of Table 4 and Table 5 can be calculated the virtual water content of swine feed (152,1+0,149=) 152,25 m^3/animal.

According to these the virtual water content of pork is found below:

$$(1448,75 / 0,12) + (6862,5 / 0,12) + (152,25 / 0,12) = = 1\ 338\ 010\ (l/t)$$

This means that about 1338 m^3 of water is required to the "production" of 1 ton of swine. This calculation is illustrating actually the direct water demand of the process. *Chapagain* and *Hoekstra* (2003) estimate that worldwide average of this value is 3,5 m^3/kg. The above finding also inferred that direct drinking water consumption is low, less than 1% of this value and the technology water consumption is hardly more than 4%. Water content of consumed plants is responsible almost 95% of the virtual water content of 1 kg "swine".

Counting on the calculation above water footprint of 1 kg pork (VWC$_p$) with help of the amount of virtual water content of live animal (VWC$_a$) and process water requirement (PWR) can be figured out. [VWC$_p$ = VWC$_a$+PWR × (vf/pf)] Based on *Chapagain* and *Hoekstra* (2003)

Table 6: Product fraction and value fraction of swine products

	Product fraction (pf)	Market price (thousand HUF/t)	The value on 1 ton of live animal (thousand HUF)	Value fraction (vf)
Primary products: swine carcass				
Swine carcass	0,82	600	492	0,96
Edible offal	0,03	250	7,5	0,01
Fat	0,04	185	7,4	0,01
Skin	0,05	80	4	0,01
Total			**510,9**	
Secondary products: pork				
Pork	0,83	1250	1037,5	0,95
Eating fat	0,17	250	42,5	0,04
Total			1080	

Source: own editing according to Agricultural Economics Research Institute (Hungary), FHO and own estimation

processing water demand was calculated with 10 m^3/ton by the live weight of the animal.

From Table 6 can be estimated through swine carcass' water demand [(1338+10) x 0,96/0,82 = 1578 m^3/t] the water footprint of pork as well:

$$(1578+10) \times 0,95/0,83 = \textbf{1818 m}^3\textbf{/t}$$

Summarizing the above, we can say that virtual water content of 1 kg pork extracted from an (industrial range) 120 kg scaled swine as an example I took is 1,818 litres. That's almost double of the previously calculated value of 1 kg of bread.

IV. Results

The water footprint of bread has been successfully calculated at national level, this is 1014 l/kg. The investigation covered separately the seven statistical regions. As a result, I found that bread has the smallest water footprint at Western Transdanubia (847 l/kg), while the largest at Central Hungary (1290 l/kg). In addition, the context has become clear, that water footprint of flour is about the same as it is needed to produce finished bread.

Calculations proved and it is also shown above, that the largest water footprint of wheat is at Central Hungary of the seven statistical regions. South Transdanubia and Western Transdanubia have the best data.

The result of the domestic pork water footprint calculation is 1818 l/kg. In my experience the data required for these types of calculations have difficult availability.

Furthermore, it can be concluded from the calculations that the directly consumed drinking water is low, less than 1% and the technology is hardly more than 4% of the consumption of a swine. The consumed water content of plants is responsible for almost 95% of the virtual water content of 1 kg "swine".

V. Conclusions and recommendations

On reviewing the literature my conclusions, recommendations are the following:

1. Hungary would have to fulfil voluntary data service to the EU as soon as possible. If each member state do the same we can get a picture of our own competitiveness, because – although we know that only same properties can be compared – there is also a competition among different areas, regions.
2. In addition, we can get a more realistic picture of our position in terms of hydrology – both the Union and in Central and Eastern European region. As a result, more accurate forecasts can be made both economically and in terms of the effects of climate change, providing safer living conditions for residents.
3. The data got in this way may present current

disadvantaged areas in a novel approach, which could reduce the enormous economic and social differences at Hungary between the central region (Budapest and the agglomeration, Győr-Budapest axis) and 'rural' areas or the periphery.

4. As a result of more accurate and more widely available hydrological surveys should be recognized that in the (near) future Hungary can become a central, strategic area in hydrological sense. In my view, the spread of water footprint index could revalue current market prices of land and property. We have to make the best use of these positive potentials at national, regional and smaller regional levels.

5. The publicity of data service can not only serve community interests, gives also rise to exploiting speculations which can be influenced and should be kept at bay with adequate political infrastructure.

6. Water footprint calculations reveal a new dimension to agriculture, but we must recognize that the real bogeyman is the consumer himself. If one does not need clothes, coffee and other products coming from water-poor countries the global problem of water flow processes can be solved involving the local markets, which are closely related to sustainable consumption as well. At this point, pricing has a very important role with the support of local agricultural production to the local market. The key of this question is also in decision-makers hands.

7. In addition, spreading of voluntary standards systems across sectors (for example manufacturing, engineering, tourism, transportation) and appropriate information (developing sign and label system) related to water footprint would emphasis the liability of consumers and bring closer water footprint reduction case to the user.

8. However one must see that the responsibility of agriculture is not a few drops of water in the case of irrigation with fresh water. Building a non-potable irrigation-based structure could be considered, which even after the initial investment can be more cost-effective and sustainable than the current solution.

On the results my conclusions, recommendations are the following:
1. In my opinion, these few results now can clarify water resources in a new way as a national environmental one. Water footprint indicator encourages new thinking of sustainable consumption and careful use of environmental resources.

2. Most data come from foreign databases, which were concluded from international data (for example FAO data). These and the used generous estimations of CropWat program consistently make water footprint indicator inaccurate.

3. The adjustment of numerical values and replacement of the estimated data would significantly clarify existing results. It would be essential to clarify

roundings, thus we could get a fuller picture as a result. Over or undervaluation could cause environmental problems, social conflicts and economic effects.

4. As I see this is based on highly responsible data service and database update both at national and international, for example, at EU level. If this would be resolved other nations' water footprint related results would be available for us.

5. Other products' water footprint calculations would make the current results more complete, and in correlation with each other would light the domestic production and consumption trends from a new perspective.

6. Based on the results, the water footprint of wheat should be reduced by the Central Hungarian region. New (irrigation) technologies could be introduced. Perhaps plants should be emphasised which growth has much less strain on water bodies, which are much more favourable to the local environmental conditions. In parallel, at the Southern Transdanubia and Western Transdanubia regions wheat cultivation should be encouraged to.

7. Activities related to bread production should be arranged at the Southern Transdanubia and Western Transdanubia regions where the main raw material is locally available to manufacturers. These may induce additional positive environmental, economical and social outcomes.

8. The need of efficient, "water-friendly" agricultural innovations (at local, regional and national level) is also supported by virtual water content of swine. The typically consumed crop of swine is responsible for 95% of direct and indirect water use. This rate, even if it is estimated is too large to ignore.

9. In my opinion (with the hope of total availability of necessary information), beside national water footprint calculation other calculations which are similar to mines can give a more complex and consistent picture of the domestic water consumption. This is important not just at sectoral level, but also gives important information about examined geographical, spatial, infrastructural, economical, technological, environmental, and sustainability issues.

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AGRICULTURE OF THE COUNTRIES OF THE WESTERN BALKANS AND EUROPEAN INTEGRATIONS

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Abstract: The paper presents the results of research of agriculture of the countries of the Western Balkans in the period of 2002–2009. Specifically, general economic (GDP per capita, share of agriculture in GDP, inflation rate, and unemployment rate), resource (share of arable land in the total utilized agricultural land, of employees in agriculture in the total number of employees, and of rural population in the total population), and value indicators (value added of agriculture in % of GDP, value added of agriculture per employee in agriculture, producers' prices of wheat, corn, and bovine milk, share of agriculture in the values of export and import) were compared.

Key words: agriculture, general, resource, and value indicators, the Western Balkans

1. Introduction

The Balkan countries have acceded to the European Union at different paces. Greece became an EC/EU member way back in 1981. Compared to Bulgaria and Romania, Slovenia had much more efficiently and faster overcome all the obstacles and became a full member of the European Union in 2004, while the other two countries achieved that in 2007.

Where have the other Balkan countries been in this process in the meantime? In April 1997, the Council of the European Union adopted the so-called Policy of Regional Accession for the countries of the „Western Balkans". The "Western Balkans" is the term that denotes the territory of the former Yugoslavia, excluding Slovenia, but including Albania.

The Policy of Regional Accession set political and economic requirements for commencement of bilateral cooperation with the above states. The established approach was supplemented by the initiative that came about three years later (in May 1999) when the European Commission came out with the project, which was called the Process of Stabilization and Accession.

Unification of Europe will not be completed until the countries of the Western Balkans are included as well. At the Summit in Thessaloniki, in June 2003, member states of Council of Europe solemnly stated that the future of the Balkan countries is in the European Union. Thereby they gave a strong endorsement to the integration of the countries of the Western Balkans in the EU.

However, the requirements for accession are numerous and demanding and long-lasting for the majority of the counties of this region. Delay in the process of joining the EU has additionally deepened the gap in the development level and economic potentials of the countries from the territory of the former Yugoslavia, on the one hand, and of the European Union, on the other. In addition to the problems of legal-political/institutional nature, there are also economic obstacles for the Western Balkans. Trade incentives provided by this process (first of all, opening of the market of the Union by abolishing the duties) have not been used in the best way in view of the fact that the counties in the region, due to poorly developed economic systems, insufficient competitiveness, and non-harmonization with the standards and qualities of their respective goods and services with those in the EU, have not increased their respective export capacities in the EU market. The reasons for that should be looked for in the modest national production, poor competitiveness, and pronouncedly unstable market and business environments, which turn foreign investors off. All of the above limitations are also related to agriculture as the economic activity of outstanding importance in this region.

The subject matter of the research in this paper includes the state and problems of agriculture in the countries of the

Western Balkans. The aim of the paper is to compare the levels of development and preparedness of agricultures of these countries for the European integrations. For the purpose of detailed analysis of the subject matter and the aim of the research, the paper analyzes the indicators of economic development, resource potentials, and values of agriculture development indicators. Comparison between the countries of the Western Balkans is applied in order to point to the differences between the countries of the region, in the context of their future integration with the EU. The time period of research is 2004–2009 because of comparability of the available statistical data. Sources of data are Eurostat, FAO, CIA, the World Bank, as well as the so far research works on this topic.

2. Results of research and discussion

2.1. General economic indicators

According to the economic theory, there is a tight correlation between the level of agricultural and economic development. The higher the level of economic development, the higher is level of agricultural development, and vice versa. For that reason, in this chapter, the authors are investigating the main indicators of economic development, based on which the levels of economic development of the countries of the Western Balkans are analyzed. They are: GDP per capita, inflation rate, unemployment rate, and the share of agriculture in GDP.

Table 1: GDP per capita u zemljama Zapadnog Balkana u eurima

Countries	2004	2005	2006	2007	2008	2009
Albania	1,881	2,088	2,175	2,476	2,785(p)	2,661
Bosnia and Herzegovina	2,103	2,279	2,561	2,896	3,287	3,192
Croatia	7,380	8,043	8,807	9,656	10,683	10,246
Montenegro	2,684	2,912	3,443	4,280	4,908	4,720
Serbia	2,549	2,729	3,144	3,899	4,546	n/a
Macedonia	2,130	2,298	2,564	2,919	3,283	n/a
UNMNIK Kosovo	1,473(p)	1,482(p)	1,520(p)	1,612(p)	1,784(p)	1,790(p)

p = provisional value
Source: Analysis by the authors on the basic of the data of Eurostat

According to the available statistical data in Table 1, it follows that Croatia has the highest level of economic development, measured by the level of GDP per capita, while UNMNIK Kosovo has the lowest one. In the observed period, the growth of GDP/pc has been noticed in all the countries up to 2009, in which the fall in the region as a whole was recorded, due to the well known reasons (the world economic crisis).

The inflation rate varies from country to country and it is the highest in Serbia, which cannot be appraised positively.

The reasons for such a high inflation should be looked for in excessive public spending. The lowest inflation rate, observed in the entire period was recorded in Croatia (Table 2).

Table 2: Inflation rate in the countries of the Western Balkans in %

Countries	2004	2005	2006	2007	2008	2009
Albania	2.2	2.0	2.5	3.1	2.2	3.5
Bosnia and Herzegovina	0.4	3.8	6.1	1.5	7.4	–0.4
Croatia	2.1	3.3	3.2	2.9	6.1	2.4
Montenegro	n/a	n/a	n/a	n/a	7.4	3.4
Serbia	11.4	16.2	11.7	7.0	13.5	8.6
Macedonia	–0.4	0.5	3.2	2.3	8.3	–0.8
UNMNIK Kosovo	–0.8	–2.1	–1.5	2.8	12.4	9.7

* Annual average inflation rate in Harmonized Indices of Consumer Prices (HICPs)
Source: Analysis by the authors on the basic of the data of Eurostat

Although declining, the highest unemployment rate in the observed countries is recorded in UNMNIK Kosovo and FYROM (over 40% and 30% respectively). From the data in Table 3, it can be stated that the lowest unemployment rate is in Croatia, which, in resent years, approached the average unemployment rate in the EU-27.

Table 3: Average annual unemployment rate in %

Countries	2004	2005	2006	2007	2008	2009
Albania	14.4	14.1	13.8	13.5	13.0	13.8
Bosnia and Herzegovina	41.8	43.9	31.1	29.0	23.4	24.1
Croatia	13.6	12.6	11.1	9.6	8.4	9.1
Montenegro	27.7	30.3	29.6	19.3	16.8	19.1
Serbia	18.7	21.1	21	18.3	13.6	16.1
Macedonia	37.2	37.3	36.0	35.0	33.8	32.2
UNMNIK Kosovo	39.7	41.4	44.9	43.6	47.5	45.4

Source: Analysis by the authors on the basic of the data of Eurostat

In addition to the above stated, an important indicator of economic development is also the share of agriculture in generation of GDP. Today, majority of economists value branches of economy according to their share in the gross domestic product and thus agriculture is at the bottom of the priority list. As opposed to that, a high share of agriculture in BDP indicates that other economic sectors are insufficiently developed. It is the developed countries that have a low share of agriculture in generation of BDP, because the main agents of economy in those countries are other sectors. That share amounts to up to 3% with the dominant service sector (Beg et al., 2010).

Table 4: Share of agriculture in GDP

Countries	1994–1996	1999–2001	2005	2006	2007
Albania	32.0	25.7	21.6	n/a	n/a
Bosnia and Herzegovina	26.3	10.2	8.7	8.4	8.3
Croatia	7.7	7.0	6.1	5.9	5.7
Montenegro	n/a	11.3	11.3	11.3	11.3
Serbia	n/a	17.7	n/a	n/a	n/a
Macedonia	10.7	10.0	9.1	9.2	8.5

Source: Analysis by the authors on the basic of the data of FAO Statistical Yearbook 2009

From the data in Table 4, it is noticeable that the situation in the region of the Western Balkans is different, even when compared with the world average of the share of agriculture in forming BDP. The highest value of this indicator is recorded in Albania (as the least developed country in the region) and the lowest one in Croatia.

2.2. Resource indicators

The region of the Western Balkans has production and manpower potentials, first of all, arable land, forests, waters, favorable climatic factors, developed science and technologies, skilled manpower, diligent farmers, etc. Continental, moderate continental, and Mediterranean climates collide in this territory. Moreover, the region has low-land, rolling country, hilly, mountainous, and littoral regions, in which versatile agricultural production can be organized (*crop, vegetable, fruit, grape, animal production*). Major capacities of foodstuff industry are located there (Tomi , 2008). For the purpose of understanding the state and problems of agriculture of the Western Balkans, it is necessary to analyze the available resources in this region.

If the share of arable in the total used land is observed, it is noticed that certain countries (Croatia and Serbia) have a relatively high share in the observed period. However, that share is close to average values for the EU-12 (Csaki, Jambor, 2010).

In addition to the physical resources, which include arable and agricultural land, a very important factor of development is also the human capital, or human resources. In knowledge-based economy, human resources, or intellectual capital as a factor of new economy plays the key role in the 21st century, first of all in raising the productivity and competitiveness (price and non-price competitiveness). Intellectual capital creates added value. In addition to the increase of total revenues and profit, permanent increase of added value

Table 5: Share of arable land in the total utilized agricultural land (000 ha)

Countries	2004	2005	2006	2007	2008	2009
Albania	51.51	49.95	52.14	52.09	50.17	48.71
Bosnia and Herzegovina	32.40	32.30	32.35	33.29	33.17	31.70
Croatia	71.51	71.43	70.97	70.46	66.38	66.38
Montenegro	36.44 (p)	36.57 (p)	36.58	36.78	36.67	36.61
Serbia	65.89	65.61	65.49	65.29	65.32	64.76
Macedonia	36.44	36.45	35.84	40.01	39.85	41.42
UNMNIK Kosovo	n/a	n/a	n/a	n/a	n/a	n/a

Source: Analysis by the authors on the basic of the data of Eurostat

Table 6: Employment in agriculture (share in the total employment in %)

Countries	2004	2005	2006	2007	2008	2009
Albania	58.54	58.48	57.97	47.91	44.61	44.05
Bosnia and Herzegovina	n/a	19.59	20.59	19.76	20.56	21.19
Croatia	16.96	17.29	14.23	12.99	13.55	14.05
Montenegro	10.92	8.63	6.79	8.09	7.57	6.46
Serbia	24.02	23.32	20.54	20.81	25.12	23.89
Macedonia	16.96	19.53	20.11	18.25	19.66	18.52
UNMNIK Kosovo	n/a	n/a	n/a	n/a	n/a	n/a

Source: Analysis by the authors on the basic of the data of Eurostat

must be the motive for business operation of economic operators. That is actually the indicator of success in business operation in a longer time period.

Table 6 shows the share of employees in agriculture in the total number of employees, which quite differs and varies from country to country, being the highest in Albania, somewhat lower in Serbia, Bosnia and Herzegovina, and in Macedonia, and significantly lower in Croatia and particularly in Montenegro.

Table 7: Share of the rural population in the total population

Countries	Rural population (000)				Share in total (%)			
	1999–2001	2005	2006	2007	1999–2001	2005	2006	2007
Albania	1,788	1,717	1,703	1,689	58	55	55	54
Bosnia and Herzegovina	2,089	2,051	2,031	2,008	57	54	54	53
Croatia	2,002	1,934	1,921	1,907	44	44	43	43
Macedonia	746	703	694	685	37	35	34	34
Montenegro	n/a	n/a	244	246	n/a	n/a	39	40
Serbia	n/a	n/a	4,758	4,741	n/a	n/a	48	48

Source: Analysis by the authors on the basic of the data of FAO Statistical Yearbook, 2009

It can be noticed from the data in Table 7 that the share of rural population in the total one in the region of the Western Balkans was insignificantly reduced in the period of 1999-2007. That share is still high if we compare it with the data from former research works (Csaki, Jambor, 2010), according to which 34% of the population of the new EU member counties live in rural regions.

2.3. Value indicators

Value added of agriculture in the percentage amount of GDP for the observed period is shown in Table 8. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The origin of value added is determined by the International Standard Industrial Classification (ISIC), revision 3.

Table 8: Agriculture, value added (% of GDP)

Countries	2004	2005	2006	2007	2008	2009
Albania	23	23	22	21	20	21
Bosnia and Herzegovina	11	11	10	10	9	8
Croatia	7	7	6	6	6	7
Montenegro	11	10	10	9	9	10
Serbia	15	17	15	13	13	13
Macedonia	13	13	13	11	11	11
UMNIK Kosovo	n/a	n/a	12	12	12	12

Source: Analysis by the authors on the basic of the data of World Bank

Agriculture value added per worker is a measure of agricultural productivity, which measures the output of the agricultural sector (ISIC divisions 1-5) less the value of intermediate inputs.

The data in Table 9 indicate that the highest productivity in agriculture is achieved in Croatia, then in Bosnia and Herzegovina. However, these statements of the authors must be taken with a pinch of salt due to limitations with respect to the available data. Productivity in agriculture in less developed countries represents a small share of the total productivity. Raising of agricultural productivity is the key for income growth of employees in this sector.

If we analyze the available data on the producers' prices of the main agricultural products, we can notice that they are the highest in Albania, and the lowest in Serbia, with the emphasis that there are no available data for Montenegro and UMNIK Kosovo for the period of 2005–2007 (Table 10). This indicates that the price competitiveness of the analyzed agricultural products is the highest in Serbia.

The CEFTA Agreement, which was signed by the countries of the Western Balkans plus Moldavia, enabled consolidation into one agreement of the existing level of

Table 9: Agriculture value added per worker (constant 2000 US$)

Countries	2005	2006	2007	2008
Albania	1,663	n/a	n/a	n/a
Bosnia and Herzegovina	9,151	10,258	11,647	13,301
Croatia	13,523	14,767	16,123	17,836
Montenegro	n/a	2,104	2,196	2,563
Serbia	n/a	n/a	n/a	n/a
Macedonia	4,135	4,431	4,644	5,165
UMNIK Kosovo	n/a	n/a	n/a	n/a

Source: Analysis by the authors on the basic of the data of World Bank national accounts files and FAO, Production Yearbook and data files

Table 10: Producers' prices, average for 2005–2007 (US$/ton)

Countries	Wheat	Corn	Cow's milk
Albania	264	283	412
Bosnia and Herzegovina	177	206	326
Croatia	167	171	360
Macedonia	190	193	357
Montenegro	n/a	n/a	n/a
Serbia	163	160	271
UMNIK Kosovo	n/a	n/a	n/a

Source: Analysis by the authors on the basic of the data of FAO Statistical Yearbook 2009

trade liberalization achieved through a network of bilateral agreements on free trade that had been previously concluded between the members. In addition to the above stated, conditions for further stimulation of investments, expansion of trade in goods and services have been improved through equitable, clear, stable, and predictable rules. Circulation of goods and services in this region has been facilitated and fair conditions for competition as well as protection of intellectual property rights have been provided. Based on the former research works by authors from the region (Vuković & Vizjak, 2001, Krizmanić; 2007; Tomić et al., 2008; Ćejvanović et al., 2009), it can be stressed that the CEFTA Agreement has a positive impact on the structure and volume of foreign trade between the member countries. Additionally, it indirectly contributes to the harmonic development and expansion of trade at the international level.

Based on the data presented in Table 11, it can be concluded that Albania, B&H, and Macedonia have significantly higher shares of agriculture in the total import than Croatia and Serbia. At the same time, in the structure of the total exports of Macedonia and particularly Serbia, agriculture still has a high share – which is the consequence of deindustrialization of economy in those countries in the course of the past decades.

Table 11: Share of agriculture in the total import and export (%)

Countries	Import				Export			
Zemlje	1999–2001	2005	2006	2007	1999–2001	2005	2006	2007
Albania	22.6	17.0	17.2	15.6	6.7	6.1	5.8	5.7
Bosnia and Herzegovina	17.9	18.3	17.2	16.0	6.1	7.6	6.0	6.3
Croatia	8.5	7.5	8.2	7.9	8.8	9.6	10.2	9.6
Macedonia	12.9	12.8	11.7	17.3	17.2	16.6	16.3	12.9
Montenegro	n/a	n/a	n/a	6.6	n/a	n/a	n/a	2.2
Serbia	n/a	n/a	6.5	5.5	n/a	n/a	19.7	19.1

Source: Analysis by the authors on the basic of the data of FAO Statistical Yearbook 2009

Conclusion

Based on the conducted research, the following conclusions can be drawn:

The countries of the Western Balkans have a rather low level of economic development measured by the main economic indicators (GDP per capita, inflation rate, unemployment rate, and share of agriculture in generation of GDP).

Physical and intellectual capital in this region is significant, but insufficiently exploited. The number of employees in agriculture and the number of rural population are rather high. That means that other sectors of economy are insufficiently developed.

The level of productivity of manpower and land in agriculture of these countries is also rather low. That is also reflected on the level of competitiveness of agriculture, which is also very low.

If they wish to speed up the processes of integration in the EU, the countries of the Western Balkans must improve the indicators of the level of economic development, faster implement the international norms and standards, develop market economy, ensure legal security, and reduce administrative limitations. These are the preconditions for a more efficient doing business, raising of the level of economic development of the region, improvement of the quality of life, faster rural and regional development – without which there shall be no successful integration in the European Union.

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THE ECONOMIC PERFORMANCE OF TOURISM IN NORTHERN HUNGARIAN REGION, WITH SPECIAL REGARD TO HEVES COUNTY

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Abstract: The study shows the economic performance of public accommodation establishments (especially in Heves County) in the period of 2000–2008 in the context of basic touristic indicators like the number of public accommodation establishments, capacity, arrivals, bednights, average length of stay, revenue (structure of revenue), and the role of local tourism tax revenues. According the study, we can conclude that on the basis of the capacity, number of guests and number of bednights of public accommodation establishments, Heves County (as compared to other counties of the region) played a pivotal role in the tourism of Northern Hungary in the studied period. Knowing these facts, it is worthwhile to make further investments and developments in tourism in the county.

Key words: economic performance, public accommodation establishments, tourism indicators, tourism tax, Heves County

1. Introduction – The economic role of tourism

The tourism sector has important economic and social embedding, the sector has complex effects on the national economy's development. It plays partial role in the shaping of market situation of several other national economy sectors (like transportation, telecommunication, trade, financial services, health care, cultural and sport services), while the demand of tourism sector is just indirect in case of the products or services of other sectors (in agriculture, industry, building industry, environment protection). According to tourism organizations and experts, in the third millennium's first decade the health tourism travels (within the tourism travels) shows the most dynamic development. The preservation of health, relaxation and beauty care, body and soul maintenance in healthy environment has become an increasingly important motivation, so the demand for wellness tourism will grow. In the field of traditional medicinal tourism, the increase of the aging European population could grow the demand. The health tourism is the most desirable tourism form: predictable, not seasonal, it has long average stay, generates high income (guest spendings), generates workplaces, can easily be placed with the principles of sustainable tourism.

In practice convergence can be observed between the two main branches of health tourism: in the medicinal tourism complexity is increasingly important, the high level of service and the wellness items. Wellness tourism also highlights the health references and the scientific grounding. Overall, health tourism is a fast growing tourism segment throughout the country.

The economic impacts of tourism can be analyzed from the sending- and the hosting area's correlation. In both cases it is an important condition to have regular and reliable data (statistical database and standard interviews) from the field of tourism, for the researchers to define the real impacts of tourism.

The following factors play an important role in the variations of economic impacts of tourism:
– Economic level of the sending- and hosting area
– Life cycle of the touristic destination
– Touristic capacity of the hosting area
– Quantity and structure of tourists' spending
– Seasonality of tourism
– The use of revenues from tourism (tourism taxes)
– Legal and economic regulations of local tourism (*Mundruczó* and *Stone* 1996)

The target groups of health tourism:
– Traditionally, (especially but not only) elderly patients who basically use the medicinal services;
– The middle class (health-conscious, with high-income) with attention to prevention;
– Families with children, in spas and swimming pools, (enjoy experience elements);
– Youth preferring sports, swimming, fitness and wellness programs, services;
– „Self-healer" guests, holiday makers from elderly age groups (RMC 2006)

I have divided the public accommodation estabishments into two different types under my hypotheses and the

analysis, such as „hotel type public accommodation establishments" and „other type of public accommodation estabishments". The different levelled hotels come in the first group (from 1 to 5 star hotels), including spa, wellness and apartment hotels. To the second group „other" accommodation types were rated like: boarding houses, tourist hostels, youth hostels, bungalows and camp sites.

2. The economic performance of public accomodation establishments in Heves County

The quantity and quality of accommodations play determining roles in how effectively the basic supply elements of tourism can be sold. There are several high levelled public accommodation establishments in Heves county, those added to the basic services, also providing wellness services.

2.1. Hypotheses

Before I begin to analyse the data of the analysed period, I take the following assumptions:
– The capacity, the arrivals, the bednights and the average length of stay are almost the same (during the analysed period) in Borsod-Abaúj-Zemplén County and Heves County.
– At the structure of revenues at public accommodation establishments (in Heves County) the role of room revenues are significantly higher than the other revenue types.
– The tourism tax revenues from „hotel type" accommodations are significantly higher than the tax revenues from „other type" accommodations.

2.2. Accommodation supply in Heves County as compared to other counties of the region

The accommodation supply (capacity – bed place for tourists) of the counties in the region assigns the region's potential touristic arrivals. The figure below represents public accommodation establishment capacity of the counties in the region.

In Figure 1 it can be seen that the capacity of Borsod-Abaúj-Zempén county is much higher than the capactiy of Heves county. But if we compare it to the place (in km²) of the county, or to the population of the county (see at Figure 2), it can be seen that the bed place capacity per inhabitant is much higher in Heves county than in Borsod-Abaúj-Zempén county.

Across the public accommodation establishment business, analysing the indicators of local tourism, the capacity (number of the bed place for tourists), the tourist arrivals, and the number of tourist night (nights spend by the guests) are significant data. From those data other indicators can be calculated, like room capacity utilization, bed place
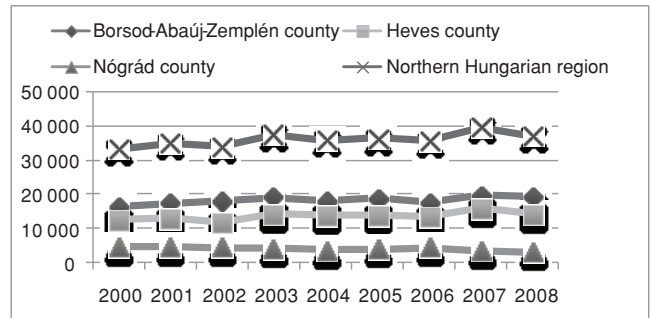
Figure 1: Capacity of Public Accommodation Establishments (in bed places)
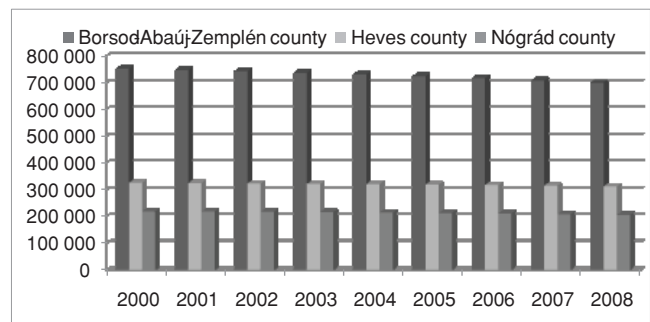Source: (KSH 2009) according to KSH database, own design

Figure 2: Population of the Northern Hungarian Region (in persons)
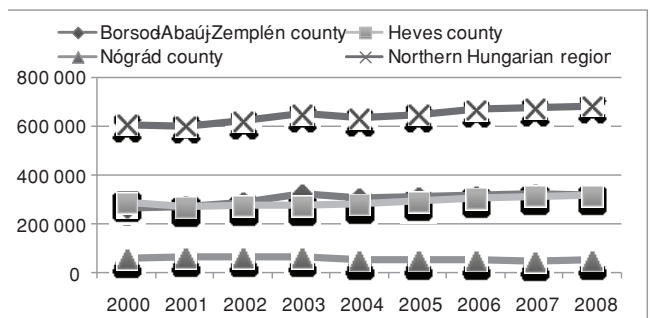Source: (KSH 2009) according to KSH database, own design

Figure 3: Arrivals at Public Accommodation Establishments – number of tourist arrivals (in persons)
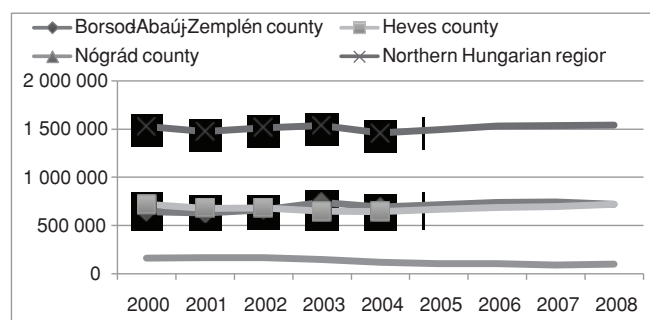Source: (KSH 2009) according to KSH database, own design

Figure 4: Arrivals at Public Accommodation Establishments – number of bednights (in nights)
Source: (KSH 2009) according to KSH database, own design

capacity utilization, revenue capacity utilization, average length of stay, average revenue per guest, etc. (*Fazekas et al.* 2005)

According to Figure 3 and 4 we can find out that although Borsod-Abaúj-Zemplén county has better position than Heves County in bed place capacity, in the number of tourist arrivals and in the number of bednights, their performance were nearly the same during the observed period.

The average stay indicator can be calculated easily, we simply have to divide the number of total tourist nights by the number of total tourist arrivals. The average length of stay is one of the indicator of success of the destination, which shows how long the guests would stay at the destination (and so, how long they will spend money there). At Figure 5 it can be seen that the average length of stay at the region's public accommodation establishments changes between 2,2 to 2,4 bednights, which is true for the average of the region, too.
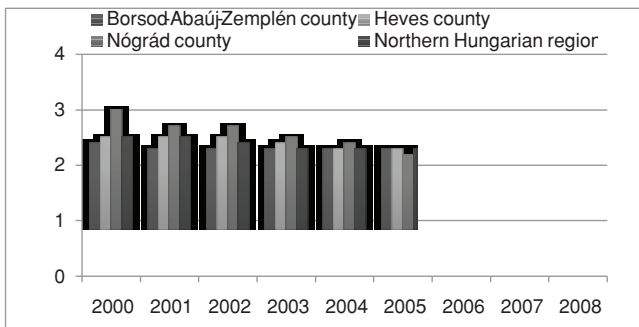
Figure 5: Average length of stay at Public Accommodation Establishments (in nights)
Source: (KSH 2009) according to KSH database, own design
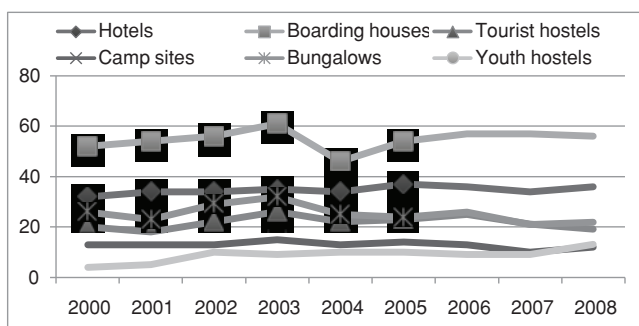
Figure 6: Number of the different Public Accommodation Establishments in Heves County (in units)
Source: (KSH 2009) according to KSH database, own design

2.3. Revenues of public accommodation establishments in Heves County

Figure 6 shows below the number of units of different public accommodation establishments and how it changed between the period of 2000 and 2008. It can be mentioned that in the unit number of the hotel type accommodations there were not any significant changes. In 2004 there was a little increase, but to 2007 it fell back to the level of 2004.

Dramatic decrease happened in case of the boarding houses from 2003, and they could not reach that level during the analysed period again.

The number of public accommodation establishment units influences the created revenues in the county. Figure 7 represents the revenues of the county's public accommodation establishment, and also shows the structure of revenue compostitions. According to Figure 7 it can be mentioned that little more than 50% of the revenues came from the room prices, an important amount came from the catering services, but the „other" revenue division takes half of the revenues average from catering.
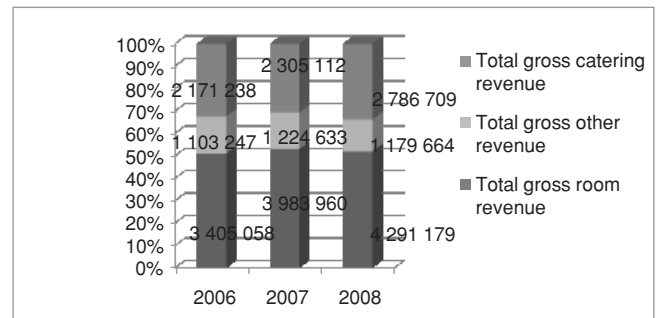

Figure 7: Structure of revenues at Public accommodation Establishments in Heves County (in thousand HUF)
Source: (KSH 2009) according to KSH database, own design

2.4. The role of tourism tax in tourism economy in Heves County

In order to ensure the positive effects of tourism at the hosting area, and decrease the negative effects of those retarding the development and growth of tourism at the same time, it is necessary to determine the state level frames.

Among these the most important ones are the following:
– natural
– legal
– economic and financial conditions (taxes)

The financial disponibility significantly determines the possible directions and enforces the different effects of tourism development. (*Kaspar* 1997)

To provide the financial frames is also necessary to come in for a share in revenues in indirect ways (as positive economic effect) for the local government, local touristic enterprises and enterpreneurs, employees in tourism and those inhabitants and enterprises who are not concerned in tourism. It is necessary to create the qualitative tourism, so the revenues from the tourism have to revolve back, and in that way we have to finance the new developments. This way, the development of tourism would influence positively the quality of life of most inhabitants, enterprises and tourists. (*Jandala* 1992)

In Hungary such financial frame is provided by the tourism tax, which belongs to the group of local taxes and the year 1990 Act C. ensures its legitimacy terms. (*Kaspar* 1997)
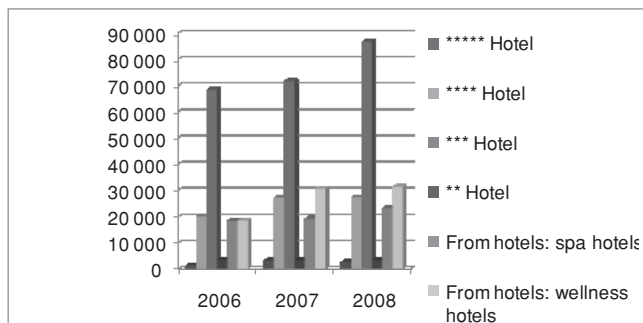
Figure 8: Tourism tax revenues from Public Accommodation Establishments (hotels) in Heves County (in thousand HUF)
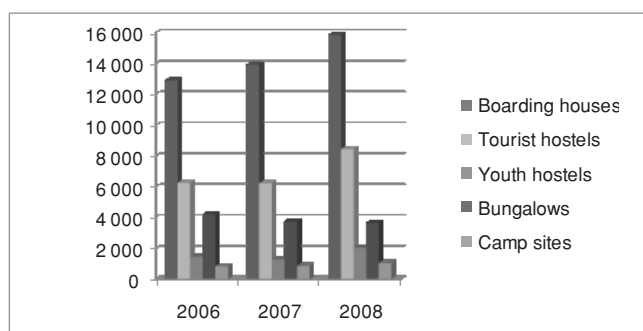Source: (KSH 2009) according to KSH database, own design

Figure 9: Tourism tax revenues from Public Accommodation Establishments (other accommodations) in Heves County (in thousand HUF)
Source: (KSH 2009) according to KSH database, own design

The Figures above demonstrate the tourism tax revenues from the hotel type (Figure 8) and the other type (Figure 9) public accommodation establishments. We can be observe that during the period the 3 star hotels, the boarding houses and the tourist hostels payed the highest (ranking the first three places) tourism tax amount to the local government. The amount of payed tax has grown year by year. It is important to mention that the tourism tax revenue from the spa and wellness hotels is also significant.

3. Results and conclusion

According to the above demonstrated results, I received the following answers to my hypotheses:

– Despite the smaller capacity of public accommodation establishments in Heves County, the arrivals, bednights and average length of stay are almost the same in Heves and Borsod-Abaúj-Zemplén County. Heves County is thus a more attractive destination than Borsod-Abaúj-Zemplén County.

– As in Heves County, more than 50 percent of the revenue earned by public accommodation establishments comes from room charges, development plans should concentrate on improving their quality and increasing their capacity in order to maximize profit.

– As a significant amount of tourism tax revenue derives from „hotel type" accommodations, and especially from three star hotels, public and private investors should prioritize the development of this type of accommodations.

Finally, we can conclude that on the basis of the capacity, number of guests and number of bednights of public accommodation establishments, Heves County (as compared to other counties of the region) played a pivotal role in the tourism of Northern Hungary in the studied period. Knowing these facts, it is worthwhile to make further investments and developments in tourism in the county.

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ERP SYSTEMS IN HIGHER EDUCATION

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Abstract: In the past few decades data processing and in-company communication has changed significantly. First there were only a few computers purchased at companies, therefore departments developed applications that covered corporate administration which lead to so called isolated solutions.

These days with the spread of electronic data processing the greatest problem for companies is not gaining information – since they can be found in all sorts of databases and data warehouses as internal or external information – rather producing information that is necessary in a given situation. What can help to solve this situation? It is informatics, more precisely ERP systems which have substituted software that provided isolated solutions at companies for decades. System based thinking is important in their application beside the fact that only data absolutely necessary for managerial decisions must be produced.

This paper points out why we consider practice oriented teaching of ERP systems in higher education important.

Key words: Information technology, higher education, EPR system

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Introduction

Highly responsible economic decisions required data and information in the past just like these days. The challenge for companies is not data collection it is rather data selection from a huge information set and to produce them in the required form and content. In the case of a large company, and even with medium sized companies it can be advantageous to invest in an integrated corporate information system that can safely store data connected to corporate processes and when needed it can present them in the required form for the users. Naturally, the investment costs of such systems present a heavy financial burden for companies; however, these expenses can be reduced as it is possible again in 2011 to apply for funds.

Literature review

Data, **information**, and **knowledge** are inseparable notions. In compliance with this WORMELL (1998) writes about data – information – knowledge spectrum, while SÁNDORI (2001) calls it data – information – knowledge ladder. In our opinion these three notions make their influence felt – defining it in the latter order – when a manager has to make a decision in an economic situation. In order to make a decision one needs **data** that appear in an interpretable form – **as information** – and together with the already accumulated experience they become **knowledge** and trigger action. Some authors deduce a definition from other definitions: "data is interpretable knowledge. Information is data interpreted as knew knowledge, and after the interpretation of new cognitions knowledge represents a

reflection in the human mind of the real world, and the objects, facts, events, occurrences in it, as well as the connections and the relations of cause and effects amongst them" (RAFFAI, 2003/b).

Companies are sets of systems and resources that become existent after individuals and teams contribute part of their resources to an independent organising principle (FUCHS, 1979; KIESER, 1995).

Information is the basis of economic decisions. It informs managers about processes within the company, about the relations between the external environment and the enterprise, and also about the efficiency of the enterprise. Furthermore, information must also refer to opportunities, and protect the company from risks, i.e. it must support planning, controlling, and not least internal controlling by means of creating an internal control system (FICZERÉNÉ et al. 2009).

The most difficult question of the assessment of requirements at the managerial level of information-system planning is what information does a manager need? By no means is it certain that the higher we go up in the hierarchy the more a manager has to "see" (DOBAY, 1997). Therefore the question may arise why information systems give vent to unrequested information. BARACSKAI (1997) answers this question in two different ways:

on the one hand, it is because owing to the badly structured problems that surface at top managerial levels managers say that they cannot tell in advance what information might be needed,

and on the other hand, managers might list anything that comes to their mind. This will consequently become part of the system which will provide data that might not be necessary and therefore be disturbing.

Table 1. The order of managerial skills in 1996, 1999, and 2004

1996.		1999.		2004.	
Managerial skills N= 325	**Value**	**Managerial skills N = 321**	**Value**	**Managerial skills N = 301**	**Value**
Practicality	4,15	Practicality	4,16	Practicality	4,10
Professional knowledge	3,99	Professional knowledge	4,06	Professional knowledge	4,09
Problem solving	3,78	Problem solving	3,91	Problem solving	3,97
Business sense	3,71	Business sense	3,83	Business sense	3,87
Communicational skills	3,61	Organisational skills	3,76	Organisational skills	3,78
Organisational skills	3,61	Managerial skills	3,74	Managerial skills	3,78
Idea representation	3,60	Communicational skills	3,73	Communicational skills	3,74
Managerial skills	3,54	Idea representation	3,69	Idea representation	3,69
Risk taking	3,47	Analytical skills	3,57	Analytical skills	3,64
Analytical skills	3,46	Risk taking	3,53	Risk taking	3,46
IT knowledge	2,93	IT knowledge	3,04	IT knowledge	3,17

Source: WIMMER, Á. – ZOLTAYNÉ, P. Z. (2006)

We also believe that **the manager is not properly familiar with the information system of the company. Consequently they are not able to produce reports and accounts on the basis of which decisions could be made.** The research of WIMMER- ZOLTAYNÉ, (2006) supports this thought since they pointed out that the weakest point of managers is information technology (table 1).

Albeit even the most recent data in this particular research originate from seven years ago we have to consider that during the eight years between 1996 and 2004 IT skills did not improve significantly. It is highly likely that IT skills have not been able to make their way into the first half of this list during the last seven years.

CHIKÁN (2003) states that corporate operations are interlaced by information systems, which have been revolutionised but their more traditional elements have retained their importance from interpersonal communication to strictly compulsory accountancy rules.

MICHELBERGER (2002) approaches the notion of information systems not only from the aspect of technology. According to him "the main components of an information system are people – as decision initiator and decision maker, external and internal information, as well as external and internal hardware and software elements and corporate solutions".

On the basis of the reviewed literature we can state that **data evolving during the operation of a company have an ever increasing role**. These data are turned into information and subsequently knowledge after careful interpretation. Since an increasing amount of date are produced during the operation of a company in an electronic or other forms, **the use of new technological achievements – computers, ERP systems – is indispensable**. In order for these devices to supply the necessary data for decision making in the required form, structure, and content, **a properly practice oriented training on their applications is necessary**. This way not

only the IT knowledge of career-starters would be further developed but also there would be a shift towards labour market expectations.

Connections between companies and higher education institutions and expectations on the familiarity of undergraduates with integrated systems

The information for the analysis stated in the title was gathered in field research by means of questionnaires. Altogether **181 questionnaires were returned** of which 155 were electronic and 26 paper based. 58**% (105) of the returned questionnaires were fully completed**, in the case of the remaining ones respondents did not give answers to the last set of questions, nevertheless their answers were recorded.

159 companies declared cooperation with an educational institution, 38 of them have connections with a higher education institution and 8 of them have a cooperation agreement. The importance of the connection reached the value of 4.1 on a 5-degree scale. Figure 1 shows the ratio of the different forms of connections.

It can be considered advantageous that 42% of the respondent companies provide internship opportunities especially as practice oriented training is becoming more and more important. Were internship opportunities continuous rather than offered to a very limited number of under-graduates, it would have a greatly beneficial effect on the employment statistics of graduates.

The chart shows that companies significantly contribute towards the financing of higher education since 30% of the respondents claimed that they support it financially. **Unfortunately none of the companies participate in mutual projects** with a higher education institution, which does not necessarily depend solely on the companies as higher education institutions should be able to provide research topics that are connected to the business activity of a company.
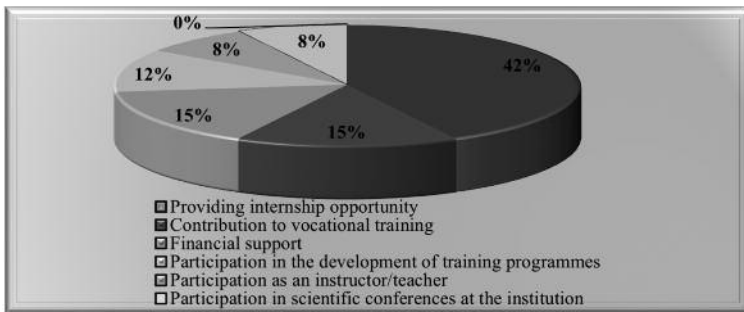
Figure 1. Cooperation forms between companies and higher education institutions
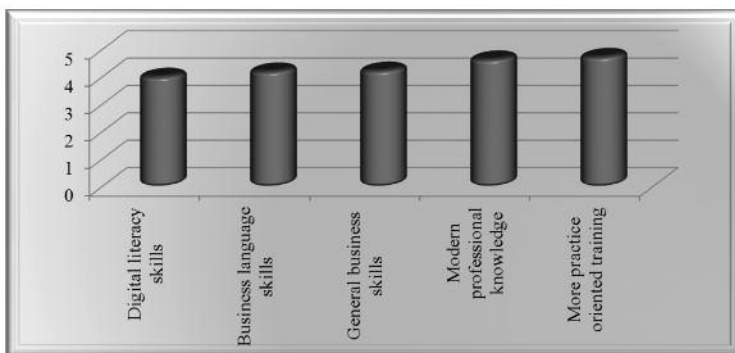Source: own edition

Figure 2. Areas that should be strengthened according to companies
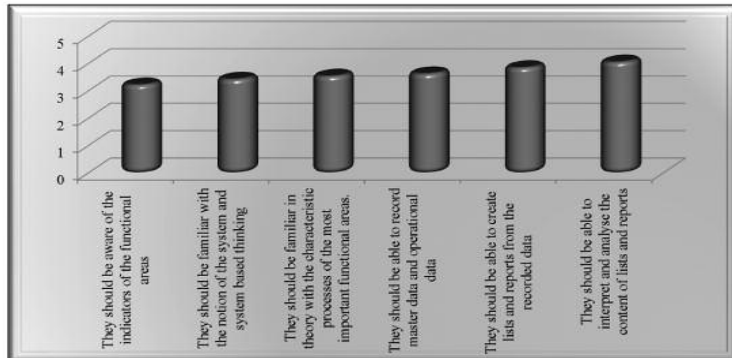Source: own edition

Figure 3 Company expectations about the use of corporate information systems
Source: own edition

Respondents indicated their opinion on a 5-degree scale about the areas higher education institutions should focus and the importance of the areas. The results are summarised in figure 2.

The value falls between 4,0–4,8. **IT knowledge and skills are important factors in the labour market.** In order to get into a good position one needs sound professional knowledge, must be able to communicate in at least one foreign language, and IT skills are also indispensable. Respondents expect to a lesser extent that higher educational institutions to focus significantly on two of these areas– on the basis of simple average. In another respect they place the greatest emphasis on the implementation of practice oriented training which, according to the above mentioned facts, could be solved by providing internship placements and by organising practical trainings.

The possible links between the variables of pictures 1 and 2 – do expectations about graduates depend on the existence of a partnership with a higher education institution – was examined by Mann-Whitney test (table 2).

Cooperation can be an important and determining aspect at the selection of educational areas. Respondent who had connections with higher education institutions emphasized the conveyance of modern professional knowledge. On the other hand **the reinforcement of digital literacy and business foreign language teaching were deemed important by those who had no connections with educational institutions.** This estimation validates the thought that some firms do not even want to cooperate directly with higher education institutions; they expect to have graduates with up-to date knowledge (digital literacy, foreign language skills) so that after being employed these employees could be trained according to the own specifications of the firm.

Figure 3 shows the expectations concerning the use of corporate information systems.

The values in this graph vary between 3,2–4,1, which indicates that expectations are quite identical

Table 2. Expectations concerning undergraduates in relation to cooperation with a higher education institute

Test Statistics[a]

	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Exact Sig. [2*(1-tailed Sig.)]
Modern professional knowledge conveyance	884	2837	−1,78	0,075	
Business foreign language teaching	**658**	**1324**	**−3,426**	**0,001**	
Reinforcement of digital literacy	**612**	**1207**	**−3,605**	**0**	
Development of general business skills	1018	2971	−0,8	0,424	
More practice oriented training	1072	1738	−0,463	0,643	

[a]Grouping Variable: Does the company have connections with a higher education institute?
Source: own edition

about the use of corporate information systems. It is expected to a lesser extent that a fresh graduate could record economic events in an unfamiliar system. **What they consider important is that the candidate should be able to interpret and analyse the content of lists and reports and also that the candidate should be able to produce such lists and reports.**

Considering that the expectations about how a fresh graduate can use ERP systems can be properly described, **the efficiency of teaching could be enhanced if the training areas of these systems were determined and the study focussed mainly on them**. To verify this notion we examined whether there are any connections between the different teaching possibilities and the ability to use information systems. The results of the Kruskal – Wallis test is presented in table 3.

institutions. We thought it important to examine whether expectations about different skills depended on work experience (table 4).

It is distinctly visible that with a 5% limit of error it can be proved **that expectations are mainly raised by employees who have been working for the company for 9-15 years about the creation of lists and reports**.

In the following parts we attempt to answer **what software application should be taught** since this question is not relevant in the case of a word processing or spreadsheet program since overwhelmingly one type of program is used by companies. However, the market of ERP systems is quite diverse. Both Hungarian and foreign software can be found in the market. At the beginning of the practical teaching of information systems it might cause some dilemma to decide which system to teach. Companies naturally expect the

Table 3. The analysis of the connections between applied teaching opportunities and the ability to use information systems

Test Statistics [a,b]

	Chi-Square	df	Asymp. Sig.
We do not need any support as we are fully familiar with the system we use	1,65	4	0,799
I and my colleagues maintain our knowledge by self-teaching and and helping each other	5,74	4	0,219
By means of organised courses	3,73	4	0,444
By supporting efforts to gain a degree (programmer, information system manager, etc.) that is necessary to operate the system	1,61	4	0,806

[a]Kruskal-Wallis Test
[b]Grouping Variable: Value your knowledge on a 1-5 degree scale about the use of corporate information systems!
Source: own edition

Table 4. Expectations about career-starters in relation to work experience

Test Statistics [a,b]

	Chi-Square	df	Asymp. Sig.
They should be familiar with the notion of the system and system based thinking	6,11	3	0,106
They should be familiar in theory with the characteristic processes of the most important functional areas.	2,21	3	0,529
They should be aware of the indicators of the functional areas	4,61	3	0,203
They should be able to record master data and operational data	3,65	3	0,302
They should be able to create lists and reports from the recorded data	**15,45**	**3**	**0,001**
They should be able to interpret and analyse the content of lists and reports	4,36	3	0,225

[a]Kruskal Wallis Test
Grouping Variable: How long have you been working at the company?
Source: own edition

Since the null hypothesis is valid in 21,9–80,6% we can state that **the ability to use corporate information systems does not depend on the form of teaching**. It follows from this that the necessary skills to use corporate information systems can be gained even individually after the basic skills to use integrated systems – which are adjusted to the expectations of employers – are mastered in higher education

teaching of systems that they themselves use. We wanted to find out if it was not necessary to name a corporate information system what the opinion of company representatives' would be. The results are shown in figure 4.

On the basis of this data it can be stated that only 17% of the respondents expect the teaching of the information system that they use. They believe it is much more important
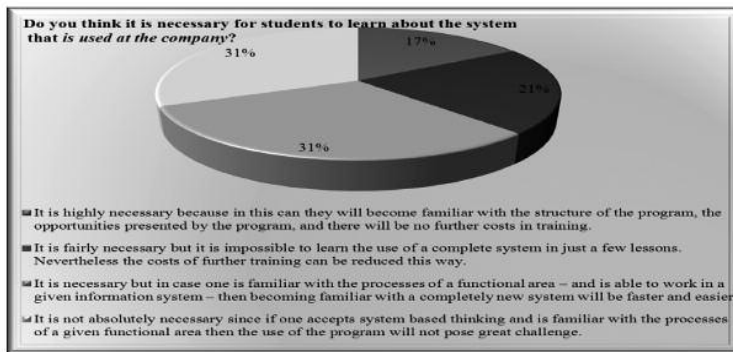
Figure 4. The expectations of the company about the use of corporate information systems
Source: own edition

to be familiar with internal economic processes and their interconnections. There are almost as many people who prefer system based thinking.

Other surveys prove that no corporate information systems work for years without alterations therefore the knowledge of the employees must also be developed continuously. On the basis of an overseas survey a mere 2.8% of the responding companies did not change their original system (INTERNET1). 56% of the companies we surveyed updated their system annually. Therefore the teaching of a given system might represent up-to-date knowledge for a short time. It seems to be more useful to develop skills and this was student will be able to follow changes and remain conversant.

Teaching the use of ERP systems in higher educational

We supposed that out of the 81 Hungarian colleges and universities 2**6 higher education institutions teach corporate information systems** mainly the ones that are involved in economics, business, technical and IT sciences. On the basis of the information presented on the websites of the institutions there are 17 colleges and universities. According to the trends of teaching information system there are three clearly distinguishable subject groups:

- mainly management subjects,
- mainly agricultural subjects,
- mainly technical and IT subjects.

Subjects are mainly taught at bachelor level but they can be taught at master level in certain institutions. **The number of subjects in connection with information systems changes at different institutions**. There is an institution where it is taught in one major in only one subject, at other institutions it is included in the syllabus of more than one major with different number of lessons and credit numbers. Course descriptions reveal that there are certain overlaps and **the most varied areas are mentioned in different institutions even in case of subjects with similar titles taught at identical majors**. Almost all institutions provide

theoretical and practical training. The number of lessons taught varies greatly. Considering the total number of lessons taught the theoretical and practical lessons are almost identical. This might indicated that practice oriented teaching has been established.

Beside all this differences might be noticed among the courses offered by institutions according to the above mentioned guidelines. In the case of IT majors there is a difference not only in the number of the subjects taught but also in keeping track of practical aspects. It can be understood as it will be the task of the graduates of different majors to develop information systems as programmers, to communicate expectations about the system in the language of informatics as information specialists in economics or engineering, and to be able to carry out simple developments. In the case of **economics and agricultural specialisations** student become familiar with the functions, structure, and roles of information systems. In most cases students observe the operation of certain systems in seminars. We believe that **if we categorise information as a resource factor then the hands-on training of practical tasks should be emphasized just as in the case of financial management and HR majors**.

During our secondary research we gained a limited amount of information on how different institutions teach information systems. Nevertheless it provided good basis for the commencement of primary research during which we attempted to answer the following questions:

- What are the exact subjects during which information systems are taught, primarily in majors connected to the disciplines of economics and agriculture?
- To what extent do institutions satisfy labour market expectations in educational standards? Are there subjects in which student create and perhaps analyse lists individually?

Of the 26 higher education institutions that offer majors in the disciplines of economics and agriculture 21 responded. Table 5 shows how many institutions teach corporate information systems in certain majors.

On the basis of table 6 it can be stated that in the case of the two academic specialisations which are often offered by higher education institutions and are tightly connected to two economic areas of science (economics and management; finance and accountancy) institutions lay great emphasis on the introduction of how to manage information by means of information systems.

In the case of informatics disciplines a complete educational ratio can be observed in management areas. In the case of agricultural sciences very few institutions actually teach ERP systems. Besides, it is important to note that higher education institutions have recognized that information systems are coming into general use at logistic companies and they have adjusted their training programmes accordingly. In our opinion **the syllabus should be revised in the case of the commerce and marketing and the management and organisation academic specialisations**.

Table 5. The number of higher education institutions teaching information systems by academic specialisations

Academic specialisation	The number of institutions with the academic specialisation:	The number of institutions teaching information systems	%
Human resource management	7	4	57
Economics and management	16	13	81
Economics and rural development agricultural engineer	9	3	33
Business informatics	8	8	100
Informatics and managerial agricultural engineer	6	3	50
Commerce and marketing	**14**	**5**	**36**
Environmental engineering	7	1	14
Public services	6	2	33
Logistics	**6**	**6**	**100**
Marketing	1	1	100
Information specialist engineer	5	5	100
Technical manager	1	1	100
International management	7	1	14
International economics and management	1	1	100
Finance and accountancy	11	10	91
Tourism and catering	11	6	55
Business development	6	6	100
Management and organisation	**9**	**1**	**11**
Rural development agricultural engineer	7	0	0

Source: own edition

In the case of the former this statement is supported by the fact that according to our earlier survey a large proportion of trading companies apply corporate information systems and these companies – compared to other sectors – employ a larger proportion of degree holders. In the case of the major of management and organisation it is indispensable to further develop and master IT knowledge.

Conclusions, suggestions

ERP systems will provide the required information only if there are **properly trained professionals**. We are convinced that higher education institutions active in business and management sciences cannot avoid teaching how these systems are structured, work, and applied. It can be established that **most higher education institutions focus on theoretical knowledge laying a less significant emphasis on the application and practice oriented teaching of these systems.** Unfortunately it holds true in specialisations where professionals are trained for national economy sectors in which according to our survey the ratio of companies using corporate information systems is fairly large. Furthermore, on the basis of our career tracking examination a large number of graduates are employed by companies operating in these sectors.

What labour market players primarily expect from the teaching of ERP systems is that **graduates should be able to produce –** and perhaps analyse **– lists and reports that are vital for decision making**, and should be familiar theoretically with the processes of the most important functional areas. If they can follow all this in a corporate information system, they will have a better position in the labour market. We believe that in order to achieve this **corporate information systems should be taught not only within the framework of the classical IT subjects in economics and agricultural majors but also in subjects that are not directly connected to information management** – corporate economics, logistics, accountancy, e-business, etc. – by means of discussing different economic problems and situations. As a result of this **the improvement of managerial IT skill results** presented in this paper could also be achieved. Furthermore, **by using corporate information systems student will become familiar with internal processes**, their stages, relations, and not least with the benefits and use of integrated systems.

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COMPARATIVE YIELD RISK CALCULATIONS OF SOUR CHERRY AND PEAR VARIETIES REGARDING RISK AVERSION

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Abstract: Fruit production in the world is increasing continuously. Though in the past few years China and some South-American countries have extended their fruit producing areas, Europe remains to be one of the greatest fruit producers in the world. In the middle of Europe Hungary has to face several challenges as competing for market. Since yield risk has an important role in Hungarian fruit production we investigate the yield risk of two of the most important sour cherry varieties ('Újfehértói fürtös' and 'Oblacsinszka') grown in Újfehértó (1984-2005), moreover, two of the most important pear varieties ('Bosc Beurre' and 'Williams') grown in Bánfa and Zalasárszeg (1984-2009). In the examined periods we analyse yield risk with different comparative methods such as E,V-efficiency, first and second degree as well as generalized stochastic dominance methods. We conclude that the production of sour cherry variety 'Oblacsinszka' in Újfehértó is more preferable compared to the other sour cherry varieties and pear variety 'Bosc Beurre' in Bánfa is more advantageous than the other pear varieties and sites.

Keywords: sour cherry, pear, yield risk, mean-variance efficiency, stochastic dominance

1. Introduction

Sour cherry production has traditionally developed on the Northern Hemisphere, in the cold temperate zone, however, it has appeared in the Southern Hemisphere, too, during the last few years (*Szabó* 2008). Yearly sour cherry production of the world is about one million tons. Sour cherry is regarded as specially East-European, since Poland, the East province of Germany, Belarus, Moldavia and the Balkan Peninsula, together with Hungary are significant sour cherry producers.

In 2003, 41.8% of the Hungarian sour cherry production had its origin of the North-Great Plain, 34.7% of Szabolcs-Szatmár-Bereg county while in 2002 the role of the North-Great Plain was determining (51.2%). The role of production is relevant on the South Great Plain (17.2%) region with Bács-Kiskun county (13%). The production in Central-Hungary, in Central-Transdanubia and in North Hungary runs up similarly to about 5 thousand tons, while it is approximately 4 thousand tons in Pest county and 3.2 thousand tons on Veszprém county.

In Hungary there are sour cherry plantations on 18750 hectares (KSH 2007). Szabolcs-Szatmár-Bereg country has ascendant position considering the area and yield. 60% of the total yield account for four counties (Bács-Kiskun, Heves, Pest and Budapest, as well as Szabolcs-Szatmár-Bereg

county). The quarter of the yield of the country is produced in Szabolcs-Szatmár-Bereg county on 5500 hectares. Amongst the East-Hungarian sour cherry growing sites Debrecen, Újfehértó, Nyíregyháza, Mátészalka, Kisvárda and their neighbourhood are remarkable.

After apple sour cherry is the second most important fruit in Hungary with yearly 40-55 thousand tons yearly yield (FAO 2010). National sour cherry production has been fluctuating in the past ten years because of unbalanced economic policy and market conditions. It resulted a yield decrease to about its 50% compared to the yield of the eighties (*Soltész* 2004). In Hungarian sour cherry plantations the most favourite varieties are '*Újferhértói fürtös*', '*Érdi bőtermő*' and '*Kántorjánosi 3*'. The main problem is that 28 % of Hungarian sour cherry plantations are over 15 years and only the third of them are in productive age. The average yield is usually 3-4 tons per hectare, but in 2005 it did not achieve even 3 tons because of phytopathologic problems.

Pear production has been changed considerably in recent years. While 40 percent (some 3.7 million tons) of the world production had European origin till 2000, this ratio has been decreased by half (about 3 million tons) in the past ten years.

As pear producer countries China (55-60%), Italy (5-6%) and the USA (4-5%) are super powers together with Argentina, Chile, South-Africa and Spain which also have

dominant roles in the market. Considering Europe, Italy has the most significant impact both on production and sales with about 1 million tons per year production and 15-18 kg yearly consumption per capita. Italy is followed by Spain (700 thousand tons/year), Germany (400 thousand tons/year), France (250 thousand tons/year), Portugal (150 thousand tons/year) and Greece (75 thousand tons/year). The greatest exporters are Argentina (18%), China (17%) and Belgium (13%).

Though Hungary has excellent climate for good quality fruit production, it is not belonging to the greatest European pear production counties. The area of pear plantations is only 8-10% the size of the total area of the apple orchards. Moreover, Hungary has relevant shortfall regarding the level of the production. The most plantations are located in the Great Plain and North region (32% and 33%). Pear was grown on 2252 hectares in 2001 and on 2878 hectares in 2007 (KSH 2007).

Since *Drimba* and *Nagy* (1997; 1998; 2000) as well as *Drimba* (1997; 1998) have pointed out, that yield risk has remarkable role in Hungarian fruit production, we analyse the yield risk of two sour cherry varieties (*'Újfehértói fürtös'* and *'Oblacsinszka'*) in Újfehértó and two pear varieties (*'Bosc Beurre'* and *'Williams'*) in Bánfa and in Zalasárszeg considering also the risk aversion of the decision maker.

2. Material and methods

Sour cherry yield data from 1984 to 2005 were taken from the Institute of Research and Extension Service for Fruit Growing at Újfehértó. The experimental site Újfehértó is one of the most important areas of cherry production of Hungary. Pear yield data (1987-2009) were taken from Gyümölcskert Zrt., Nagykanizsa.

2.1 The examined sour cherry varieties

'Újfehértói fürtös'

'Újfehértói fürtös' is officially recognized by the state since 1970. Its fruit is not susceptible to falling down, grows ripe late, in July which extends a long time. It is good for fresh consumption, industrial processing and deep-freezing, too. Its slightly flat-rounded fruit's size is middle big or big (5.3 g). According to the fruit amount the fruit's diameter is between 18-23 mm. The colour of the skin is shiny claret-red. The flesh is hard, blood-red, moderately colouring and its flavour is harmonious sweet-sour. The tree has strong growth, growing upwards but the top is smaller than the *'Pándy'* sour cherry variety. The buds are middle big, slicking to the rods. The leaves have middle size. The tree that yields well turns into productive early. Its drought resistance is good and its ecological resistance is excellent. *'Újfehértói fürtös'* can also be cultivated on humus-sand soil with good results. Flowers have middle size and the petals are white. Its blooming is late, bursts into bloom at the same

time as the other late blooming variety. It is susceptible to monilia and medium susceptible to blumeriella *(Szabó et al. 2008)*.

'Oblacsinszka'

This is a variety of unknown origin which got to Hungary from Yugoslavian area. In the last few years this unknown variety has played a big part in the cultivation of sour cherry in Europe. Its ripening is in the second part of June. Fruits are small (2.5 g), average diameter is between 16-17 mm. Its shape is rounded the ventral suture can hardly be recognized. The deep, thick, red coloured peel is not susceptible to cracking. Its flesh is succulent, juicy, red, the flavour is sweet-sour. The seed can easily be removed from the red flesh. The stalk which has middle length and thickness can be separated at the time of ripening. The tree has middle vigorous growth, the top is small, its shape is rounded and thick. The tendency of ramifaction is good. This variety yields very well and turns into productive early. Flowers are mostly self-fertilizer and bloom late.

Owing to the small top, 'Oblacsinszka' can be planted close (5 × 2-3m) *(Takács* and *Szabó* 2006). It's mostly good for industrial processing, excellent raw material for sweets but also good for bottled fruit and juice.

2.2 The examined pear varieties

'Bosc Beurre'

'Bosc Beurre' is the most widely cultivated variety in Hungary. It is well-known worldwide, with its distinctive characteristics being its brown skin, which holds a delicious, sweet-spicy flavoured and slightly firmer flesh, which while a bit crunchy, remains tender. It has a long, curved stem with a neck that widens gradually into a round shape *(Göndörné 2000)*. Russetting may cover the entire surface of the pear *(Soltész 1998)*. Harvest is usually in mid September. The tree is medium sized or slightly weak. The size of the fruit is large or extra large (180-280 g), showing little colour change as it ripens.

'Williams'

In Hungary, this is the second most important variety after the '*Bosc Beurre*'. It has a classical "pear shape": a rounded bell on the bottom half of the fruit, with a definitive shoulder and a smaller neck or stem end *(Göndörné 2000; 2001)*. This pear is extremely aromatic. The size of the fruit is large or extra large (160-220 g) *(Soltész 2004)*. It is harvested from late August to early September. This pear is unique, in that its skin colour brightens as it ripens, unlike other varieties. Its flavour is sweet delicious when it reaches a golden yellow ripening stage. In addition to eating it fresh for its smooth texture, '*Williams*' is also traditionally known as a canning pear variety.

2.3 Efficiency criteria

The first breakthrough in modern risk analysis is due to *Friedman* and *Savage* (1948) with introducing the concept of utility function. *Pratt* (1964) and *Arrow* (1965) used earliest the notions of absolute and relative risk aversion. *Anderson* and *Dijjon* were pioneers in application of risk analysis in agriculture and the first monograph in this topic was published by *Hardaker* et al. (2004). They have proved that growers are mostly risk averse and suggested the forms of utility functions regarding the degree of risk aversion.

E-V efficiency criterion is used for helping to decide which alternative has its higher or equal expected value with less or equal variance, namely which is preferable regarding risk. The rule can well be illustrated in a two-dimensional E-V space. The efficient set contains the alternatives having no alternative in its north-west quadrant. Alternatives of efficient set dominate the alternatives not contained by the efficient set. However, there is no ordering of preference between alternatives within the efficiency set (*Ladányi* 2008; *Drimba* and *Ertsey* 2003).

First and second degree stochastic dominance criteria are useful in ordering alternatives which cannot be ordered by the simple E-V efficiency criterion. For case studies in crop production studies see *Ladányi* and *Erdélyi* (2005), for fertilization alternatives *Drimba* (1997) for soil cultivation problems *Drimba* and *Nagy* (1998) and for setting the number of plants *Drimba* (1998). Alternative *A* dominates alternative *B* (that is to say *A* is more preferable than *B*) in first order stochastic sense if for the distributions functions of *A* and *B* inequality $F_A(x) \leq F_B(x)$ holds for all $x \in \mathbf{R}$ (*Ladányi* 2006; 2008). The second degree stochastic dominance holds for these alternatives if the integral functions of their distribution functions have an ordering of the same direction ($Int\_F_A(x) \leq F_B(x)$ for all $x \in \mathbf{R}$).
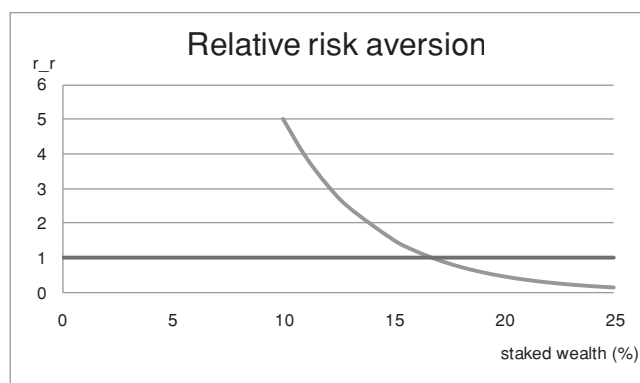

Figure 1: Relative risk aversion as the function of wealth (%) the decision maker is ready to stake

Generalized stochastic dominance is a criterion with an assumption about risk aversion. As can regard the risk attitude of the decision maker, it has a stronger discriminatory power than the criteria above (*Goh* et al. 1989; *Hardaker* et al. 2004). For this we used the most widely applied utility function, the so-called negative

exponential utility function ($U:w \rightarrow U:(w) = 1-\exp(-cw)$, $c \in \mathbf{R}^+$). The utility function can be set to the decision maker's attitude to risk with the help of constant . For a fixed wealth the greater the ratio of the second and first derivative of the (concave) utility function is, the greater the risk aversion of the decision maker is. In case of the negative exponential utility function this ratio is equal to the constant which is called absolute risk aversion (r_a). Relative risk aversion is defined as the function of wealth: r_r: $\mathbf{R} \rightarrow \mathbf{R}$ $w \rightarrow w r_a(w)$.

In Figure 1 we can observe relative risk aversion as the function of the rate of current wealth the decision maker is ready to stake for a 0.5 chance of 20% increase in wealth where $r_r(w)$ means a somewhat normal risk averse (*Anderson* and *Dillon* 1992).

Negative exponential utility function has its advantage that it contains the information on the constant absolute risk aversion due to the decision maker and also on the relative risk aversion which is an increasing function as increases; the speed of increase is characteristic.

According to *Bernoulli* theorem two-parameter ($c = r_a$ and w) utility function can be formulated with the help of density function (f_A) of alternative *A* as

$$U(x, r_a) = \int_0^x U(t, r_a) f(t) dt, \text{ so (for a fixed } x \in \mathbf{R})$$

we can calculate the *certainty equivalent CE* as $CE(x, r_a) =$

$$= \frac{-\ln[1 - U(x, r_a)]}{r_a}. \quad \textit{Generalized stochastic dominance}$$

criterion says that if (for a fixed $x \in \mathbf{R}$) we plot the function $CE(ra)$ then the higher curve assigns the more preferable alternative.

3. Results and discussion

3.1. Comparisons of production of sour cherry varieties regarding risk aversion

According to the E-V efficiency diagram, the efficient set contains both the alternatives as their north-west quadrant is empty. For an ordering we go on with the calculation of the
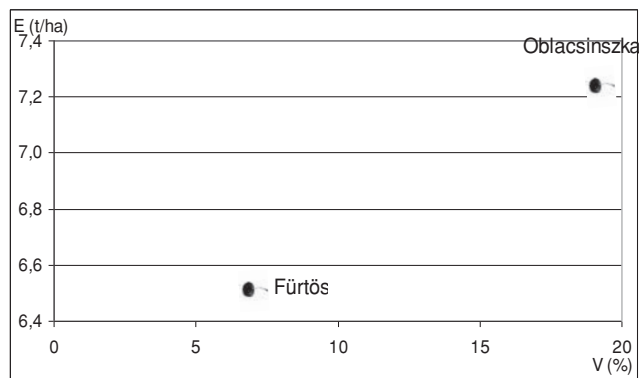

Figure 2: E-V efficiency of the yield of sour cherry varieties '*Újfehértói fürtös*' and '*Oblacsinszka*' produced in Újfehértó (1984-2005)
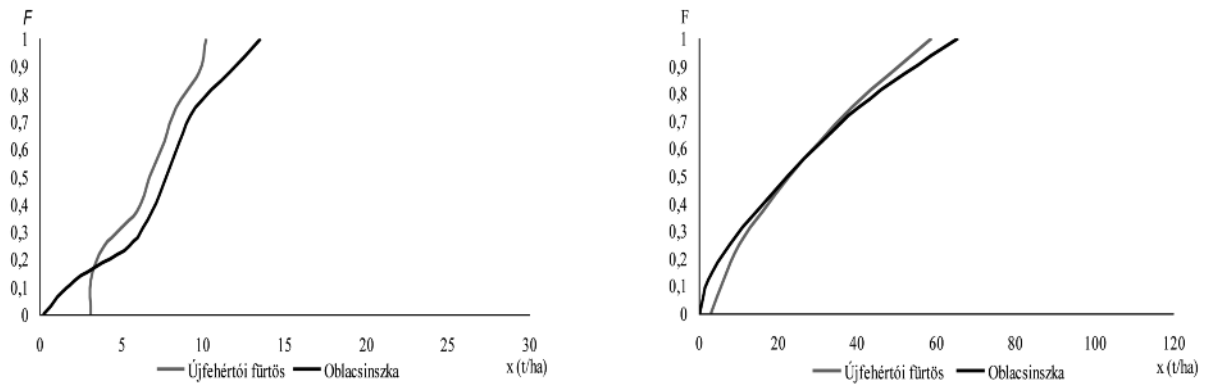
Figure 3: First (left panel) and second (right panel) degree stochastic dominance of the yield of sour cherry varieties '*Újfehértói fürtös*' and '*Oblacsinszka*' produced in Újfehértó (1984–2005)

first and second degree stochastic dominance (*Persely* et al. 2010).

In Figure 3 we can see the results of the first (left panel) and the second (right panel) stochastic dominance. Both the distribution functions and their integral functions cross each other, so we cannot define the most preferable alternative. We call for the general stochastic dominance method (*Persely* et al. 2010).

The curves of certainty equivalents () are represented in Figure 4 according to the general stochastic dominance method. With this method the two sour cherry varieties of Újfehértó became to be comparable, regarding their yield risk (Figure 4). We can see that variety '*Oblacsinszka*' is more preferable than '*Újfehértói fürtös*' as the curve of '*Oblacsinszka*' lies higher than the one of '*Újfehértói fürtös*' which indicates less risk of yield.

Figure 4: Certainty equivalent curves as functions of the absolute risk aversion () for the yield of sour cherry varieties '*Újfehértói fürtös*' and '*Oblacsinszka*' produced in Újfehértó (1984–2005)

Note that '*Oblacsinszka*' is a young plantation (1996) while '*Újfehértói fürtös*' was planted in 1978.
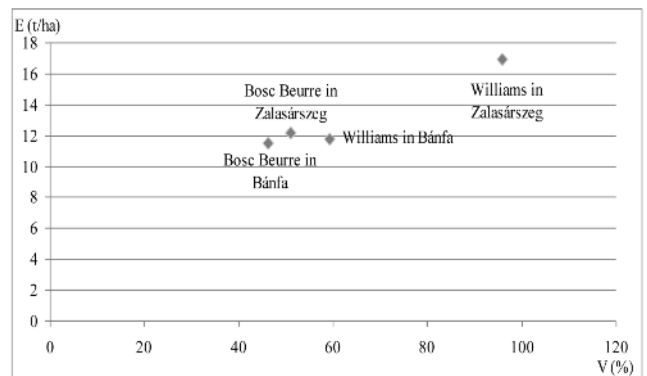
3.2. Comparisons of production of pear varieties regarding risk aversion

Again, we used the E-V efficiency criterion to compare the yield risk of two different plantations (Zalasárszeg and Bánfa) and two pear varieties ('*Bosc Beurre*' and '*Williams*', Figure 5).

Figure 5: E-V efficiency of the yield of pear varieties '*Bosc Beurre*' and '*Williams*' produced in Bánfa and Zalasárszeg (1987–2009)

We can find out that variety '*Williams*' cultivated in Bánfa does not belong to the efficient set as it has a more efficient variety ('*Bosc Beurre*' of Zalasárszeg) in its north-west quadrant. For a more accurate ordering we calculated the first and second degree stochastic dominances (Figure 6).

Variety '*Bosc Beurre*' of Zalasárszeg is more preferable compared to variety '*Williams*' in Zalasárszeg whereas its distribution function as well as the integral function of its distribution function lies right to the one of '*Williams*' of Zalasárszeg.

Variety '*Bosc Beurre*' of Bánfa seems to be the most preferable alternative since its distribution function as well as the integral of its distribution function lie everywhere below and to the right of the other curves. Both the distribution functions and the integral functions of the distribution functions of the other three alternatives, however, cross each other, so again only partial dominance can be proved between the alternatives with this method.
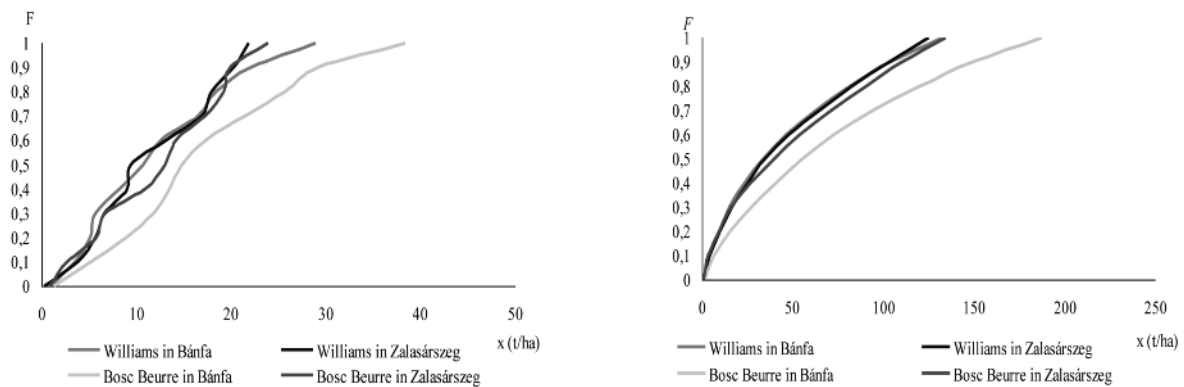
Figure 6: First (left panel) and second (right panel) degree stochastic dominance of the yield of pear varieties *'Bosc Beurre'* and *'Williams'* produced in Bánfa and Zalasárszeg (1987–2009)

General stochastic dominance method should be applied not only for the total ordering but also for considering the risk aversion of the decision maker.
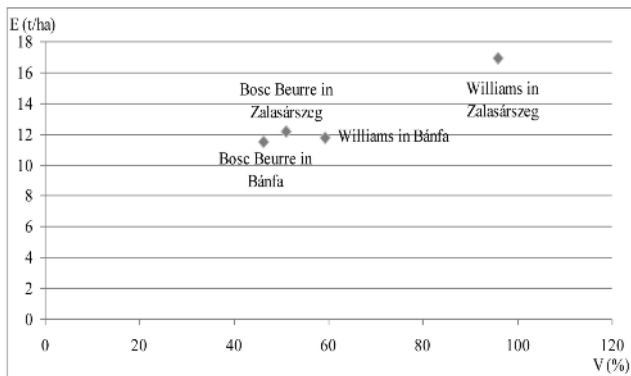

Figure 7: Certainty equivalent curves as functions of the absolute risk aversion () for the yield of pear varieties *'Bosc Beurre'* and *'Williams'* produced in Bánfa and Zalasárszeg (1987–2009)

If we represent the certainty equivalent () curves with the help of the general stochastic dominance method, we can compare the two different plantations and the two pear varieties according to their yield risk (*Persely* et al. 2010).

As it can be seen in Figure 7 the curve of variety '*Bosc Beurre'* from Bánfa lies the highest, so this alternative has the lowest yield risk. This alternative is followed by '*Bosc Beurre*' from Zalasárszeg, '*Williams*' from Bánfa and finally, as the less preferable alternative '*Williams*' from Zalasárszeg.

Thus, comparing the varieties '*Bosc Beurre'* is less risky while comparing the plantations Zalasárszeg is more risky regarding the yield with considering absolute risk aversion.

In agro economy, year by year more and more decision problems arise in which the decision maker has to consider, besides profitability and sustainability, also the risk of the issue (Ladányi 2006).

In our study we ascertained that, regarding yield risk with considering the risk aversion of the decision maker, in Újfehértó sour cherry variety '*Oblacsinszka*' (planted in 1996) is more favourable to grow, compared to the variety '*Újfehértói fürtös*' (planted in 1978).

Moreover, growing of pear variety '*Bosc Beurré'* is the most advantageous in Bánfa which may be explained by the following:

– The plantation in Zalasárszeg is extensive; most of the trees were planted in 1958 with planting design 9 × 5 m. The other orchard on that site (planted in 1977) has its planting design 6 × 4 m. The orchard in Bánfa is younger, it was planted in 1978, and the planting design is 6 × 4 m.

– Calculating risk it is also important how successful the installation was and how the trees could use their growth energy in the first years. The trees in Bánfa are more vigorous and that is why the '*Bosc Beurre'* has the lowest yield risk.

Acknowledgements

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KNOWLEDGE AND ACCEPTANCE RESEARCH OF USE OF VINE-BRANCH IN MICRO REGION OF GYÖNGYÖS

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Abstract: Significant quantity of renewable plant biomass comes into existence in Hungary year by year. Nowadays there are different well-know possibilities for utilization. However these methods are not widely accepted. The most important obstacle is frequently caused by lack of knowledge of farmers. Without the necessary information the farmers become distrustful, and in many cases significantly decrease the efficiency of reclamation.

Targeted communication method should be used to improve the rates of utilization. It should include appropriate content to their knowledge. This study research the knowledge and the acceptance of vine-branch utilization circle of wine-grower in micro region of Gyöngyös by questionnaire survey.

We will know why the use of by-products has not spreaded yet circle of wine-grower and where they get their information from. The typically fragmented farms do not utilize because they do not know the process for doing or other people cultivate their vine-yard so they have not necessary machine. The questionnaire ask the farmers they want to offer their vine-branch a user factory.The questionnaires was completed by personal request. The reason of methods was the bigger rate of query. The questionnaire include question about the farm, the use of vine-branch and data of farmers. The villages were asked the rates of wine-grower.

The aim of the research the rational utilize of by-product by wine-growers year by year. With the results of questionnaire survey we can inform the farmers with the appropriate method about the necessary knowledge.

Key words: renewable energy resources, vineyards, use of by-products, social acceptance

Introduction

Hungary imports more than 77 percent of the fossil energy. This is excessively negative from energy security and climate protection considerations. The renewable energy production is very low. It was only 4,1 percent in the full energy consumption in 2005 and the way was environmentally unsustainable to this (NÉS 2005). In the meantime, significant amounts of renewable energy sources, within plant biomass can be obtained as a by-product of agricultural activity.

Today's agriculture is much more than a simple commodity production. Due to multifunctionality the nature conservation and the agricultural sector must work together and the agriculture will have regard to environmental and conservation aspects. However, this can only be achieved if farmers are interested in complying with rules (Nemzeti Környezetvédelmi Program 2004).

The current recovery is not significant, most of the procedures limited to only a few reference plant. Bigger utilize assumes ecological, technical and economic conditions (Kacz and Neményi 1998). But it is untenable, that the agriculture is exclusively energy-consuming. Energy

producer agriculture should have created. After this new period open in the power generation (Az agrárgazdaság, A vidékfejlesztés és a területfejlesztés stratégiája 1999).

In the other micro regions of Hungary is along different regional and economic conditions different cultures are grown in higher rates. After this have mapped we should specify the possible utilize methods. Then we should examine the rate of acceptance of farmers.

Materials and methods

The micro region of Gyöngyös is at the southern foot of the Matra. The specific agriculture sector is the vine-growing. Resultant from vine growing is the waste of energy, because the vine-growers do not utilize the vine-branches. We can see some initial efforts to utilize but these are not current. Before the new method elaboration we should know the wine-grower circle, their farm conditions and machine supply (Baros 2004; Patkós and Baros 2004). These information and the different utilize method were asked by questionnaire survey.

The questionnaires was completed by wine-grower in wine-region of Matra. It happened the rates of wine-grower.

The questions were in three themes: farm data, use of vine-branch and private data of farmers. The answers were evaluated by rate calculation in Microsoft Excel.

Three reason are why the farmers do not utilize the vine-branch and it was important to emphasized. The most basic, they have never heard of this possibility. But possible that contractor growing the vine-yard of farmers. In this case they have not machines. It is also possible that they have bad experience. After the further possibilities analysis, context were had to analyze between the machines and the size of vine-lands. The applied method were to analyze the strenght of relationship:

– Pearson Chi-square,
– Probability Ratio,
– Linear relationship.

The applied program was the SPSS.

Results and discussion

In the micro region of Gyöngyös the men are in higher rates (60%) than the women. The younger generation is not typical, the ageing age structure is observable in the age breakdown. Most people aged between 40 and 69 and within that the highest ratio of 50-59 year olds (24,5%). In contrast the 20-29 year olds represent only 5 percent.

The structure of land is fragmented and this is prevent the new technologies dissemination in full circle. In the most cases one man have between 0-5 hectares vine-lands. This is 28 percent of farmers only between 0,3–1 hectare.

Today these farmers after the cutting in the biggest rates (51,5) burn the vine-branch at the end of vineyard while they are polluting the environment. At similar rates they return it

1. figure: Size of vineyard of responders
Source: Own editing based on questionnaire survey.

to the soil with extra cost. Minimal rates of responders (4,5%) put aside without annihilation, because they do not want to pollute the environment and they think that the return it to the soil is harmful.

In the region the mechanical works of vine are done by local service in many cases (141 people). But only a few service annihilation the vine-branch so remains the responsibility to the farmers. As a result, the small areas are in vulnerable situation.

You can see the examine of relationship between available machine and the size of vine-lands In table 1.

1. table: Chi square test

	Value	Various factor	Significance level
Pearson Chi- square	26,286(a)	2	,000
Likelihood ratio	24,898	2	,000
Linear relationship	26,084	1	,000
Valid number of cases (N)	200		

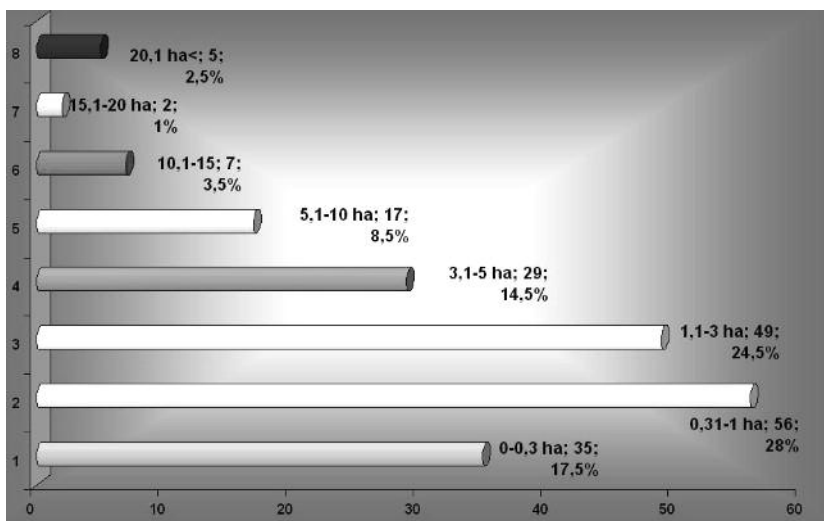Source: Own editing based on questionnaire survey.

So the larger the size of the economy, the greater the likelihood that they have agricultural machinery. This fact can be explained by over 10 hectares the machine cost is too high and it is not worth buy new machine to utilize. On the other hand the areas increasing with the expend time increases proportionally. Therefore it must provide permanent employment opportunities for the farmers.

The result of their knowledge research about the use of vine-branch that 96 percent of the respondents have heard about use of vine-branch. In most cases, home heating connection (67,5%).

58,5 percent of respondents have heard, that vine-branch was burned in power station. 40 percent were aware that the use of them in public institutions. This result is due to different information (TV, radio, printed media). Glass or film house heating only 23,5 percent have heard. One respondent chose other uses, he ticked the garage heating.

In many cases the respondents despite they don not know how can they use the vine-branch, they know that somebody collect it or get to other status. For example 63,5 percent of farmers heard about vine-branch balers. In some wine-growing villages were baler dealers and they tried to baler and the farmers were invited there. The questionnaire result can be explained by this. Nearly 50 percent are aware that chips, briquette and pellet production. The pellet was ticked by only 35 percent.
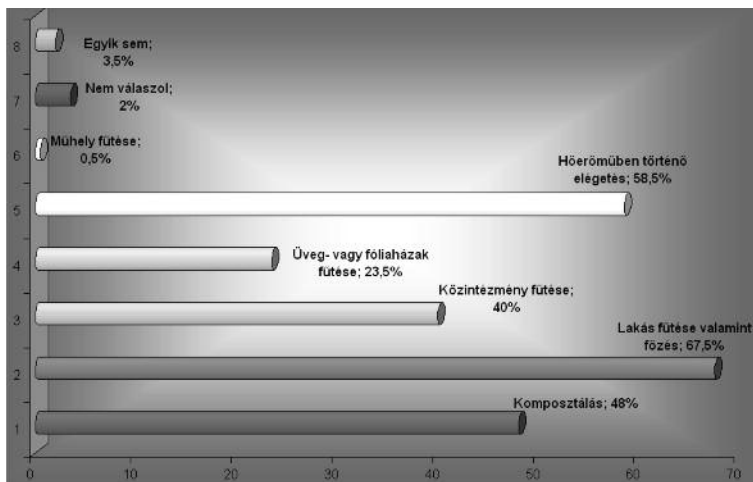
After the survey about their knowledge the questionnaire asked their opinion about the vine-branch utilize. Most people associated it with the environment (68,5 %) and they think it is cheap energy and maybe it will be opinion for local energy production (57 %). About 45 percent of respondents think, that it is demand high investment and the technology is still
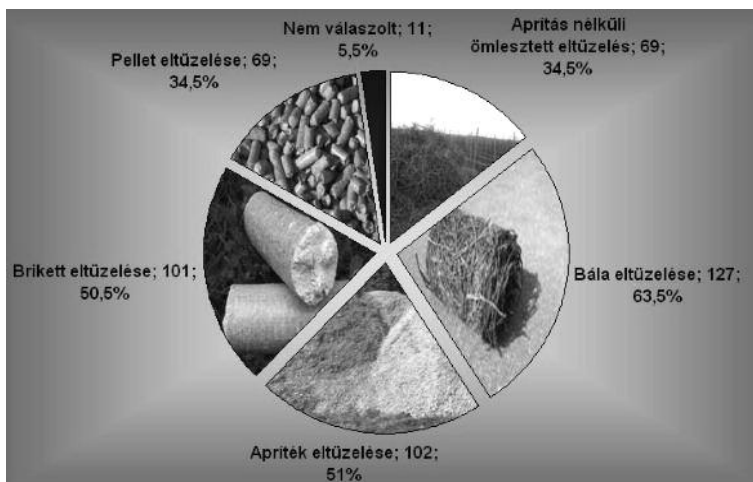
2. figure: The level of knowledge of uses of vine-branch
Source: Own editing based on questionnaire survey.

3. figure: The level of awareness about method of Vine-branch utilize
Source: Own editing based on questionnaire survey.

unformed (39,5 %). They think that the government should support for this implementation (43 %). Some farmers think that it will provide employment but the policy decisions are not found necessary.

The acceptance level was analyzing at the end of the questionnaire survey. The question was the following: „If there is a factory where utilize the vine-branch would you offer it?". 84 percent of the respondents would give it. Significantly fewer people, 4,5 percent would like to use it themselves in the future.

Some farmers would hand over the vine-branch in that case if it does not mean additional cost. They considered to important that they take away the vine-branch from the vineyard as soon as possible. Otherwise they can not start the necessary spring work.

The results of study show that the most of the farmers belong to older age group. Despite this typically they are well-informed and open to new things. At the same time as you can see that most of them have only a few areas and it is cultivated by service. So not worth develop a machine park for utilize the vine-branch. Overall they are not averse to. The problem is the organization and the additional cost of achieving.

From the point of view of logistics expedient to look at the number of farms and the size of farms in one hand because very important to find the polarity. Accordingly in the future make the plan of the steps of realization of utilize.

If the bigger parts of areas are only some farmers hand in that case they can collect their vine-branch with their own machines on their own vineyard. So only some area missing from the collecting which are own by some small-holder. They are easily accessible as in person.

If the vine-lands consist of small farms then one bigger service has to organize and solve the task. In this case the farmers can be informed by posting of flyers, using a loudspeaker and information evenings.

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IS IT THE RIGHT DIRECTION?
THE AUDIT OF BUSINESS STRATEGY

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Abstract: In the audit the process of strategic planning the management focuses the social expectations, threats and opportunities of the environment as well as the expectations of the owners. The main question is how much are the strategic tasks is matching with the environmental and corporate resources and capabilities. The answer which raised in strategy audit evaluates the ability to break the implementation barriers. A strategy is worth to realize only if we get satisfying answers to the questions related to the audit. A complex strategy audit method helps to appraise how the planning process is integrated.

The continuous adaptation to the competitive market environment and enhancing the ability to compete require a strategic approach in firm governance, even from the directorate of lesser enterprises. According to the classic definition of strategic management this is "the process of specifying an organization's objectives, developing policies and plans to achieve these objectives, and allocating resources so as to implement the plans. It is the highest level of managerial activity, usually performed by the company's Chief Executive Officer (CEO) and executive team." (Thompson). Another definition says "Strategic management: strategic analysis, strategic choice and strategic implementation." (Johnson) So, by the quoted definition of **strategic management** the focus is on approaching the problems by system thinking, and within this, on developing **the organization, the resources and the corporate culture**. Consequently, strategic management is supporting **adaptation to the changing environment** by realizing conscious change by concentrating on the fundamental tasks and long-term future of the organization, and it ensures that the everyday activity is goal-oriented, pliable and conscious.

Strategic approach helps and strengthens foresight and the correlation to the competitors. *Approach* chiefly means a leading style that "forces" management to ask itself questions about

- what is the competition about,
- who are the competitors,
- what acquired capabilities, distinguishing resources usable in the competition does the given organization have?

By virtue of understanding the process of strategic management we can formulate the most important requirements of the business strategy. Accordingly, the *right* strategy **defines a behavior**, which is a series of actions and activities of the firm, by which – assigning milestones and liabilities – we decide about what exactly to do, based on scaling the goals and expected results. Marking the *right* goals **gives us a guideline** at the same time, thereby it serves as a guide to our decisions and helps us to choose between alternative opportunities. All of these require **foresight**, because we want not just to react on problems with our behavior, but we want to avert, influence or use them taking shape.

As a special **style of handling problems**, strategy helps to rank and qualify problems of strategic nature. Right responses given on important/less acute questions make it possible to bring in a verdict that causes a worthwhile change, which makes the long-range goals of the organization reachable and considers the position relative to the competitors. Accordingly, management tasks related to strategic programming and action planning come to the front.

As a **coordinating activity**, strategy makes the recognition and coordination of the expectations of various outer and inner "assigned" groups (stakeholders) possible. The challenges of the outer environment, the intentions of the affiliates of the firm, the expectations of the owners, and the employees draw up different interests, and these can be approached to each other through a strategic plan. As a function of leading, strategy is a basic element of strategic management. It embraces a more complete circle of functions, so partial strategies (e.g. human strategy, financial

Ranking of problems by strategic consideration, and typical management measures:

Type of problem	IMPORTANT	LESS IMPORTANT
ACUTE	CRISIS type of problems	TACTICAL type of problems
	require quick measures of great consequences.	require operative tasks to be carried out, often based on outer stimulus.
	(e.g. natural disaster)	(e.g. supplying of data, making offers)
LESS ACUTE	STRATEGIC problems	OPERATIVE type of problems
	require a carefully prepared system of measures causing significant changes.	OPERATIVE type of problems
	(e.g. composing middle-range development plans)	(e.g. maintaining relationships)

strategy), corporate culture, strategic goals and the organization's coordination become parts of the strategic approach and planning, and of the change in management which makes strategic implementation possible.

The strategy determining the long-term operation of the organization is given by matching the strategic system of goals (system of tasks) deduced from the present to the vision of future. The audit of strategy can help in judging how much a business strategy meets the requirements.

The goal of strategy reconsideration is that the leaders get method, instrument and information for evaluation the business plan and recognizing the advantages and risks offered by current strategies. The strategy reconsideration includes the evaluation of the firm's development goals and the evaluation of the adaptability to the changing environment. The effective direction of a firm's development is basically determined by what steps it makes or doesn't make, how much the organization supports strategy, and how much this strategy is competent in view of the intentions of the competitors and the steps already was done. These two categories, the evaluations of inner and outer strategic factors are composing the main elements of strategy reconsideration. The goal of a strategy audit is to get a clear picture about what steps are needed regarding plan correction, or where there is a need for change in the action program and the allocation of resources. What are the main steps of strategy audit?

1. Environment audit

In evaluating the **outer environment** we start from the analysis of the competitors, and the ways in which the firm's (or substitute) products and services are related to the buyers and deliverers. The business environment of the organization is never static, and successful firms do not just understand processes taking place in their environment, but they are trying to influence these processes. During a strategic evaluation it is recommended to investigate the following questions in examining the environment of the organization:

In the **macro level evaluation** of the environment we

should measure the basic knowledge, the tendencies and the problems, which can change significantly, and which are influencing the productivity of the economy's particular branch. Such elements are, for example:

- capital market
- capacity of the particular branch
- technological factors
- new participants' effects on the market
- economic factors
- political factors
- conditioning environment, social customs
- regulations of environmental protection

We can judge how much a firm's strategy considers these macro level factors by direct management interviews or by the analysis of data and information. We need answers for such questions as, for example:

What are the factors that determine the long-term viability of the particular branch?

Who is the leader of the particular branch?

What are the macroeconomic factors that determine the productivity of the particular branch?

What are the critical areas of regulation?

The integration of **the results of the environment analysis** includes the data processing of stakeholder analysis, competitor analysis and consumer survey by the means written above, in order to get a whole picture about the characteristics of the particular branch. Integration is made in two steps. The first step is the development of a general picture by primary filtration and summation of the information; then the second is the analysis of the factors significantly influencing the strategical goals and the operational environment. The former step is made basically by a qualitative processing of information; and the latter means basically quantitative methods and financial modeling in order to evaluate what effect the changes of chosen macroeconomic indicators' values have on the profitability of the firm's activity, and on the business value of the firm. The examination of the outer factors – the influencing ability of which presumes a mapping of the firm's resources – and the adaptation to the environment lead us to the evaluation of the firm's competences.

In the analysis of the **competitors' strategy** we are looking for answers about, for example, what are the main elements of the competition, "in what are they better than us", what are the characteristics of the "champions" of the particular branch? What are the "entrance barriers" that new participants have to take into account, and what effect have these on our own market share?

2. Resource and competency audit

The starting point for this part of the strategy audit is the understanding of the dynamics and **inner components of the particular branch**. The spine of the investigation is the

relationships between competitors, buyers and interested participants (stakeholders), and these contain the following dimensions.

During the examination of the **financial questions** we should evaluate, for example, the need of funds and the characteristic operational cycle of funds. We get a picture about the typical/acceptable level of indebtedness and the special conditions (e.g. cover) of getting resources in the particular branch. In a benchmark analysis we can get a picture about what is the typical construction of resources and funds of the leaders of the particular branch, and what instrumental efficiency are they operating with.

In mapping the **characteristics of the organization** we search answers for such questions as, for example, what is the typical operation model of a corporation group like, are the characteristic decision processes centralized or decentralized, how is ownership control realized? Examining human resources includes efficiency analysis and the measuring of knowledge bases. It's important for the leading participants of the particular branch to get to know the fundamental elements of these.

3. evaluation of the strategic plan

After the environment examination of the firm, there comes the audit of the enterprise itself, regarding how much the inner competences and resources serve the realization of strategic goals. In the same time this stage means a feedback about the quality of the strategic plan, because by criteria analysis we can get an idea about having the required inner resources and competences, and about what increase in value and efficiency comes from the realization of the program plans. One of the most widespread, intuitive and heuristic methods for examining strengths and weaknesses is the SWOT analysis, and it is important that the action plan defined by this should be in accord with the primer evaluation (the SWOT analysis).

Main steps of the competence evaluation of the firm:

Evaluating the intelligibility of the strategy sheds a light on how clear the vision of the firm's future is, what the most important strategic goals are, and what the basic criteria of success are. If any of these is not clear enough, it's impossible to compose a team fully committed to the firm in favor of success.

During **manageability examination** we can get a picture about what factors can hamper the realization of the strategic plan. By risk analysis we can filter out those market and financial factors that may endanger the realization of the goals, and we can also check it out that how ready the management is to prevent or handle the consequences of unexpected events and damages.

The **examination of the business processes** shows that in what degree each element of the value chain contributes to the firm's added value, how efficient the use of resources is, and where reorganization is needed to make processes serve the realization of the strategic goals better.

The weighing of **the abilities** means the accounting of such value increasing knowledge base and special knowledge that add to the business value as strategic resources. The survey has two parts: Which abilities serve the execution of the strategic plan, and which competences are required to maintain a market position. To manage the change successfully we need to know what capabilities we can depend upon, and where further development is needed.

Reconstructing the organization and allocating the resources are parts of the change management process. Changes, namely the coordination of processes, organization and resources has to increase the efficacy significantly, otherwise strategy remains only a collection of wishes.

Measuring corporate culture includes the knowing of the fundamental values, the evaluation of the style of leading, and the review of those prejudices and beliefs, which may hamper or help the waking the strategy.

4. Summary

There are four questions we need to give a definite answer for. They are these:
1. Does our strategy fit to the environmental changes and requirements?
2. Are our resources, abilities and improvement opportunities in accord with our goals?
3. Based on the answers to the questions above, which are the most important indexes marking the achievement of our strategic goals, and how these indexes change, and is this change acceptable by the owners?
4. Is the management able to start and lead changes, and is the *whole* company ready for the change?

As a matter of fact, with the answer for the first three questions we audit the process of strategic planning, and the result of this process. We should get a picture about how much the management payed respect for the social expectations, threats and opportunities of the environment as well as the expectations of the owners. These also show us how efficiently the management leaded the organization through the tasks of strategic planning.

The **mission**, which defines the place of the firm in the society, and the **vision of future** based on the mission, which contains the system of developmental goals for long-term subsistence, should give a clear and clean-cut guidance for everyone in the enterprise.

In the next step the current (environmental, resource and organizational-operational) **status characteristics** of the firm can be defined to uncover the strengths and weaknesses of these. The main question is how much are the strategic tasks – defined for development toward strengths and for fencing off weaknesses (dangers) – in accord with the environmental and corporate preferences and capabilities.

Partial strategies meant for realizing strategic goals should be in accord with the system of strategic goals and

with each other. By using strategy and the system of strategic goals (partial strategies) management composes the middle-term strategic plan of the organization. It is important that the action plan serving the realization of goals helps to manage and control the changes by appointing tasks, liabilities and deadlines.

Changing and making changes mean completing the tasks appointed by the strategy, that is to say, making the strategy come to life. And this can be the way for the realization of some overall goals. Changes in the organization go hand in hand with, for example, the reallocation of resources, the conquest of new markets/buyers, the development of efficiency. Typically, leaders should make changes having effects on the whole organization to reach a higher stage of corporate life cycle. Generally, there is a strong opposition against changes. Employees are afraid of the unknown. Many of them have doubts about completing organizational changes can be really effective, and goals opposing these changes often evolve inside the firm. The answer to the fourth question

evaluates the ability to break through these barriers. We can say: A strategy is worth to realize only if we get satisfying answers to the questions related to the audit.

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CONSUMER POTENTIAL ANALYSIS
OF FEASIBILITY CRITERIA OF GEOTHERMAL
PROJECTS

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Abstract: The University of Debrecen, Faculty of Engineering, has been conducting a research program in geothermal energy since 2008. This program enabled me to devise an analytical study of the monetary and non-monetary criteria of geothermal projects. The monetary criteria of a region or a location for geothermal energy production cover the investment costs of the surface installations and the cost of the drillings. Non-monetary criteria include the geological and geothermal evaluations of a reservoir and the evaluation of consumer potential. This paper represents a small part of the larger study and focuses on consumer potential.

Keywords: geothermal energy, consumer potential, district heating, matrix, scoring

1. Introduction

In order to better understand this article, a definition of geothermal energy is necessary. Geothermal energy is heat (thermal) derived from the Earth (geo). It is the thermal energy contained by the rock and liquid that fills the fractures and pores in the rock in the earth's crust.

Geothermal resources can be classified as
- low temperature (less than >90 ºC)
- moderate temperature (90 ºC –150 ºC)
- high temperature (greater than 150 ºC)

The utilization to which these resources are applied is also influenced by temperature. The highest temperature resources are generally used only for electric power generation. Uses of low and moderate temperature resources can be divided into two categories:
- direct uses,
- ground source heat pumps.

Direct use, as the name implies, involves directly applying the heat in the water (without a heat pump or power plant) for a variety of uses, such as the heating of buildings, industrial processes, in greenhouses, aquaculture (the farming of fish) and resorts. Direct use projects generally operate with resource temperatures between 40 ºC to 150 ºC.

Ground source heat pumps use the earth or groundwater as a heat source in winter and a heat sink in summer. Applying resource temperatures of 4 ºC to 40 ºC, the heat pump is a device which moves heat from one place

to another, transfers heat from the soil into the house in winter and from the house into the soil in summer. This national resource is significant from both the points of view of potential and perspectives. Hungary has favourable geothermal conditions, as in other countries, the temperature increases by 30–33 ºC per kilometer downward, while this value is 42–56 ºC in Hungary. At a depth of 2,000 meters, the temperature of rock (and water in porous rock) usually exceeds 100 ºC. The estimated volume of Hungary's thermal water is 2,500 cubic kilometers, and the heat energy stored is 604 000 PJ (petaJoule). Presently, the number of licensed, thermal water producing wells *(table 1.)* registered at the

Table 1. Hungarian geothermal well data

Utilization		Temperature range						
		40–50 °C	50–60 °C	60–70 °C	70–80 °C	80–90 °C	90–100 °C	>100 °C
Number of wells	Agricultural	14	14	15	18	28	20	1
	Industrial	13	14	14	4	3	1	0
	District heating	2	2	1	3	1	5	1
	Multi purpose	17	12	28	14	1	0	0
	Balneological	89	39	29	8	3	4	0
Total mass flow rate kg/s		659	665	955	841	696	811	62
Mass flow rate per well kg/s		14,32	15,83	16,47	21,56	21,09	25,85	31
Total thermal capacity Mw		95,19	125,9	219,92	228,88	215,65	292,03	23,62
Thermal capacity per well Mw		2,07	2,99	4,87	4,87	6,53	8,59	11,81

Mining Bureau of Hungary exceeds 100. They are widely used for heating of agricultural facilities (greenhouses), public and residential buildings, and the water supply of baths and swimming pools.

Geothermal power requires no fuel and is therefore immune to fuel cost fluctuations; but in contrast, capital costs tend to be high. Drilling accounts for over half of the costs and exploration of deep resources entails significant risks, as well. Since the identified geothermal resources in Hungary are low to medium enthalpy, 50 °C to 200 °C, they are better suited for heat supply. Therefore, there is still no current utilization of geothermal energy for electricity production. Several projects for the construction of geothermal power plants are, however, currently underway.

Until now, geothermal energy has been used mainly for balneological purposes and for the heating of the bath facilities. In the last 10 years, several projects were also the south-eastern part of Hungary involving greenhouse and district heating.

Water here has the role of an energy source; the suitable placement of cooled salt waters is presently one of the biggest problems with the utilization of thermal waters. On the Great Plain, a great part of waters with temperatures higher than 50 °C are used for heating gardening and stock keeping sites. The majority of the 170 hectares of green-houses and several hundred hectares of plastic greenhouses in the country are situated here.

The study area is situated in the Great Plain, which is the largest flatland of the Carpathian basin. The Great Plain covers nearly 100-thousand km^2 and is divided into two main regions, the Southern Great Plain and the Northern Great Plain (a smaller territory penetrating into the Central Hungarian and Central Transdanubian region).

This article provides a contribution towards objectifying the basis for decisions on implementing geothermal energy projects. Furthermore, a detailed and comprehensive evaluation of geological/geothermal, technical, economic, legal and administrative conditions is carried out for such projects in Hungary.

Elaboration of geological/geothermal evaluation methods for the suitability of hydrogeothermal reservoirs aims to objectify the basis for decisions on the implementation of geothermal energy projects. On the one hand, different possible locations become comparable and, on the other hand, the investigation of technical, consumer, legal and administrative conditions, as well as economic feasibility studies, can be restricted to regions with a certain degree of suitability.

In benchmarking and comparison of geothermal energy production conditions, the geological, geothermal and energy technical criteria of reservoirs or locations can be divided into monetary and non-monetary criteria.

Non-monetary criteria
– The geological, geothermal and reservoir mechanical evaluation of the reservior (e.g., well productivity, reservoir temperature, reinjection risk, and fluid salinity, gas content).
– Evaluation of the consumer potential.

In the following pages, we deal with the evaluation of consumer potential.

2. Analysis of consumer potential

The evaluation of the consumer potential for geothermal heat cannot and should not be done independently from the selection of the regions or sites which are geologically relevant for geothermal supply. Against this background, the order of the respective investigations and the extent of the evaluation of the consumer potential are defined as:
1. Selection of regions and sites under geological aspects.
2. Evaluation of the consumer potential in selected regions or at the sites.

When geothermal power generation is taken into consideration, then infrastructural aspects have only minor importance. In this case, possibly high thermal water temperature and flow rates are more significant. At this point, only the possibility of supply into a medium-voltage grid within the area of extension of the geological resource needs to be checked.

Just as with the geothermal cogeneration of heating and power, the use of a geothermal heat supply presupposes the assessment of local heating sales. Basically, heat is a stationary form of energy.

The
– bigger the connected load of a heat consumer/district heat supply network is
– more favourable the demand characteristics (number of full load utilization hours) are
– lower the heating network temperatures are, in particular of the return flow temperatures, the more favourable the conditions are for geothermal heat supply.

Geothermal energy is typical base load energy. The total costs are essentially determined by the fixed capital costs. The specific costs (HUF/GJ) decrease almost proportionally with the increase of the heat sales (service life of the plant).

Clear factors with measurable quantities, which can be determined apparently and serve as the basis for a classification of a region according to an evaluation matrix, cannot be indicated.

Thus, the existence of a district heating supply system in the region concerned is not of decisive importance – the history of such systems' development has to be understood under certain administrative and economic aspects, which are familiar to existing large individual consumers (e.g. in agriculture, greenhouses) outside of the district heating supply systems.

The evaluation must be more general and also include decisions supporting infrastructural aspects about the investment in geothermal energy utilization. Along with the mere capacity of consumer systems, the qualities of the infrastructure and of course of the qualification structure of the population are concerned. Many aspects, some of them

also described here qualitatively, can be decided basically and finally only within the framework of assessments of the economic profitability.

Principally, the following aspects have influence on the geothermal heat supply:
– Consumer concentration in the catchment area of the resource (characterising the potential capacity)
– Typical building in the catchment area of the resource as a measure of the expenditures on the development
– Condition of the buildings

– Characteristic external conditions determining the heat consumer behaviour (e.g., outdoor temperature behaviour curve in terms of time)

The following key parameters were chosen for the evaluation matrix:
– Specifics of the surrounding field
– Settlement specifics
– Condition of the buildings
– Annual Heating Degree Days (HDD)

No.	Criteria	Indicator	Share	Scoring	Points*	Weighting
C1.	Specifics of surrounding field		Share of building areas			
		Large towns(>50 000 inhabitants) and the near surroundings or areas essentially marked by the above towns	0%	30		
		Medium-size towns (20 000–50 000 inhabitants) and the surroundings or areas essentially marked by the above towns, very large industrial and agricultural consumers (greenhouses > 25ha)	0%	27		
		Small towns (5000-20 000 inhabitants) and the surroundings or areas essentially marked by the above structure, very large industrial and agricultural consumers (greenhouses > 10ha)	100%	20		
		Very small towns or large villages (<5000 inhabitants) and the surroundings or areas essentially marked by the above structure		10		
		Small villages or areas essentially marked by the above structure		1		
						35%
C2.	Specifics settlements					
		Arrangement of big multi-family houses in rows, block- and city-type building, large public or industrial or agricultural special consumers (e.g., hospital, greenhouses)	30%	30		
		Row houses, settlements with small multi-family houses, arrangement of small and big multi-family houses in rows	60%	15		
		Stand-alone buildings, loosely and openly built areas village cores	10%	1		
						35%
C3.	Condition of buildings					
		New buildings or modernized old buildings with standard insulation at high level	70%	20		
		Old buildings	30%	30		
						10%
C4.	Annual heating degree days (HDD)					
		>4 000		30		
		4 000-3 501		28		
		3 500-3 001		25		
		3 000-2 500		20		
		<2 500		15		
						20%
						of 30 points

* Share x Scoring (Source: Rödl&Partner)

3. Matrix – Consumer potential

In the first step, the parameter to be evaluated is chosen. Then, the conditions at the site have to be classified and the percentages of the respective indicators to be allocated at the site (e.g., building structures, levels of modernization) have to be determined (estimated, as a rule). The product of this share and the respective value from the scoring table then leads to a score for this parameter which contributes to the total result of the geological benchmarking according to its weighting (in the last column).

The weighting is based on the experience from already implemented projects or project studies.

The parameters allow for the evaluation of the regions or specific sites, in the sense of the classification below.

Classification and scoring of the specific characteristics of the surrounding field

Basically, this parameter considers the general consumer capacity which is available in the investigated area for the geothermal development, via the district heating supply network.

The concept of large communities, "Many inhabitants" in this sense means "large walled-in space to be heated", which refers to the heating of flats, but also other heating supply to e.g., places of employment, service and recreational facilities.

The scoring is based on the network capacity of 5–30 MW determined in numerous projects under different boundary conditions. This mega wattage is a minimum requirement so that the favourable conditions can be provided for the operation of geothermal plants. In other words, high numbers of full utilization hours are typical. In towns with more than 50 000 inhabitants and their surroundings, such network capacities are very realistic – which is similar to medium-size town. Under certain conditions, a small town with surroundings marked by agriculture may serve as the lower limit of acceptable system capacities. Capacities within the range from 3–5 MW appear to be feasible. At the margins of bigger networks, the integration of even very small consumers (value assigned to those: 1) may be interesting. This value of "1" is mainly due to the fact that no knock-out criterion shall be provoked from the point of view of the consumer systems, where exclusively geothermal power generation is relevant.

Under many aspects, the parameter of "Specifics of the surrounding field" is a general parameter, same as the following parameter of "Settlement specifics" which are interlinked in many respects. Large towns also have a dense building structure – with certain differentiations. However, the parameters also evaluate other infrastructural factors in the right directions (e.g., qualification structure, quality of development, connection to the system of public conveyance) principally influencing geothermal systems, in particular through costs.

Surrounding field specific	Scoring
Large towns(>50 000 inhabitants) and the nearby surroundings or areas essentially marked by the above towns	30
Medium-size towns (20 000–50 000 inhabitants) and the surroundings or areas essentially marked by the above towns, very large industrial and agricultural consumers (greenhouses > 25ha)	27
Small towns (5 000-20 000 inhabitants) and the surroundings or areas essentially marked by the above structure, very large industrial and agricultural consumers (greenhouses > 10ha)	20
Very small towns or large villages (<5 000 inhabitants) and the surroundings or areas essentially marked by the above structure	10
Small villages or areas essentially marked by the above structure	1

(Source: Rödl&Partner)

Classification of settlement specifics

This parameter aims to evaluate consumer density. It is substantial for the efforts required by the implementation of a certain size of the network. This parameter is also connected with the parameter of "Specifics of the surrounding field". However, it allows a certain differentiation by regional or country specifics of the building structure.

Settlement specifics	Scoring
Arrangement of big multi-family houses in rows, block- and city-type building, large public or industrial or agricultural special consumers (e.g., hospitals, greenhouses)	30
Row houses, settlements with small multi-family houses, arrangement of small and big multi-family houses in rows	15
Stand-alone buildings, loosely and openly built areas village cores	1

(Source: Rödl&Partner)

Classification and scoring of the condition of the buildings

A qualitative factor is introduced which aims to record the reduction of the heat demand of the buildings. While this reduction is of course desired, it cannot be implemented - predominately for economic reasons. The dimensioning of this scoring is difficult, due to the manifold influencing factors and the specifics of the stock of buildings. An orientation is given by the assumption that through improvement measures affecting efficient heat transfer and distribution at the building, an average of savings up to 30% would be possible. This would mean a reduction in heating sales with the consumer situation remaining the same – while scoring would decrease.

Condition of the buildings	Scoring
New buildings or modernized old buildings with standard insulation at high level	20
Old buildings	30

(Source: Rödl&Partner)

Classification and scoring of annual heating degree days

This factor investigates the influence of the regional or typical domestic climate on the evaluation of the efficiency of the geothermal energy use. Under identicall conditions of the stock of buildings, the potential sale of geothermal heat increases or decreases depending on cooler or warmer ambient temperatures. Other climate factors (solar radiation, wind) of course influence the heat demand as well, but as a rule to a lower degree or in the same direction as the temperature. In addition, long-term measured data characterising a climate situation are for the temperature available at many sites.

To determine the heat consumption in a heating period at a special site, often the number of the "Annual Heating Degree Days" (HDD) is applied in heating engineering, which considers both the values of the outdoor temperature and the temperature behaviour throughout the year. In fact, the doubling of the HDD means the doubling of the heat demand of a consumer.

Annual Heating Degree Days (HDD)

$$HDD = \sum_{1}^{z}(Tbase - Tam)$$

With

Tbase = indoor temperature
Tam = average daily outdoor temperature
z = number heating days

Number of heating days (z)	Tbase	Tam	z(Tbase-Tam)
15–31 October	22	10,5	172,5
01–30 November	22	4,4	528,0
01–31 December	22	–0,2	688,2
01–31 January	22	–2,4	756,4
01–28 February	22	–0,5	630,0
01–31 March	22	4,5	542,5
01–15 April	22	10,7	169,5
181 days	–	–	3 491,6

Annual Heating Degree Days (HDD)	Scoring
>4 000	30
4 000–3 501	28
3 500–3 001	25
3 000–2 500	20
<2 500	15

(Source: Rödl&Partner)

The examples given in the following table exist in two towns. These towns are located in the North Great Plain Region. One of them is Berettyóújfalu, a typical Hungarian small town; the other one is Hajdúböszörmény which is a middle sized town. Both towns differ considerably in their extension, population structure and density. In these towns no district heat supply structure exists. At Hajdúböszörmény, geothermal energy has already been used for balneological purposes.

Table 2. Scoring of the benchmark parameter

No.	Criteria	Points of		Weigh-ting	Total points of	
		Berettyó-újfalu	Hajdú-böször-mény		Berettyó-újfalu	Hajdú-böször-mény
C1.	Specifics of surrounding field	20	27	35%	7	9,5
C2.	Specifics settlements	13,7	21,1	35%	4,8	7,4
C3.	Condition of buildings	28	24,5	10%	2,8	2,5
C4.	Annual heating degree days (HDD)	25	25	20%	5	5
	of 30 points				19,6	24,4

(Source: own calculations)

The heat consumer potential of the two towns in possession of geothermal heating is shown in Table 2. Hajdúböszörmény has a better consumer potential, which is mainly due to the "Specific of surrounding field" and "Specifies settlements". The results of the evaluation matrix do not exist as knock-out criterion for geothermal heat projects. Towns, regions with unfavourable conditions such as sparse population or unfavourable consumer characteristics, are expected to have high specific expenditures on developments. Consequently, the economic profitability will be influenced negatively, but the implementation of the technology will not be hindered principally.

4. Conclusion

Geothermal heat production is a supply technique for the base load of large consumer systems. The high expenditures on the development must be refinanced by heat sales with possibly high numbers of full load utilization hours. Geothermal energy use is closely connected to district heat supply, within a higher capacity range.

Hungary has approximately 225 towns, with about 65 having more than 20 000 inhabitants. Such an order of magnitude justifies the assumption of acceptable conditions

for district heating supply, not taking into consideration other concrete boundary conditions. However, there exist more than 3000 communities with less than 1000 inhabitants which do not form a reasonable basis for the installation of district heat supply systems.

Large industrial, but above all agricultural plants (greenhouses), offer considerable consumer potentials, too. Particularly for the latter ones, a high degree of flexibility has to be assumed with regard to site selection, which should be a place where good conditions are offered for production, which will be decided by favourably priced heat. From the point of view of site selection, geothermal energy projects do not have to consider the existence of respective consumers. The heating price will be determinate, and each site will be a good agricultural site, as a rule. In the South-East Plain Region, this coexistence has largely already been put into practice.

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THE EFFECTS OF THE GLOBAL ECONOMIC CRISIS ON THE MARKETS FOR FOSSIL AND RENEWABLE FUELS

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Abstract: The 2008/2009 world economic crisis had significant impact on oil and fuel markets. This crisis has been developed from the meltdown of the American mortgage and financial market and spread throughout the global economy. As each country reacted differently to the crisis, the changes in the fuel market have also shown significant geographic variation. In our present research, the changes of the US, German and Hungarian fuel markets were analysed, looking for answers to the reasons behind different crisis reactions. We examined the tendency of fuel consumption, the changes of gasoline and diesel price elasticity and the possible effects of the crisis on the regulatory system.

Keywords: global economic crisis, fuel market, biofuels

1. Introduction

Crude oil is a key core pillar of the modern economy, thus activity on the crude oil market are in close connection and interaction with events in the global economy. This was also true during the 2008/2009 world economic crisis. Under the early stress of the global market recession, prices rose to a great extent and accelerated the process of collapse, before then falling to their lowest level. They only began to recover with the first post-crisis economic boost. *Figure 1* illustrates the tendency of crude oil prices.

This tendency is being slightly modulated by the presence of a higher rate of biofuels, both in the national and
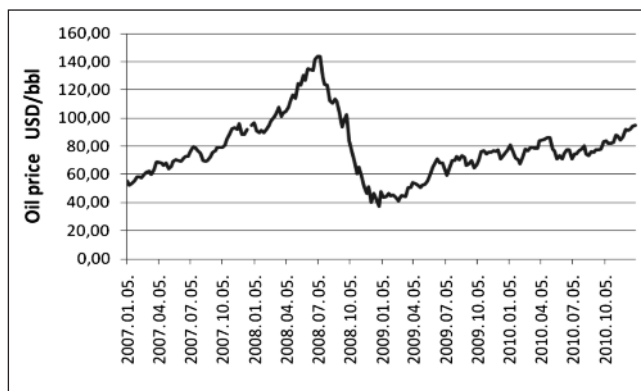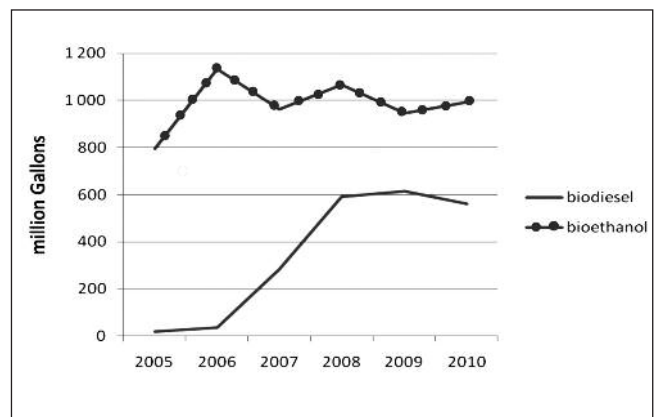

Figure 2: Development of biofuel trade
Source: FAPRI, 2011

global markets (*Figure 2*). These, as substituting products, considerable subsidy and compete with fossil fuels. The figure clearly demonstrates that the recession particularly affected the bioethanol trade; turnover from biodiesel was diminished to a much lesser degree. In one respect, the reason for this development was that ethanol is present aon the global market in a significantly higher volume. From another aspect, biodiesel's biggest exporter, Brazil, is flexibly handling the incorporation of bioethanol, while regulating – considering world economic tendencies – the quantity of bioethanol getting into the world market.

Figure 1: Crude oil prices between 2007 and 2010
Source: Energy Centre Ltd, 2011

Regulation system

Markets for biofuels are strongly regulated by developed countries. The regulation is primarily for environmental protection purposes; therefore, it mostly finds expression in minimal incorporation quotes, tax allowances and penalties that are to be paid in cases of non-observance of quotas. We essentially verified that regulation increasingly inclines towards the latter system-completing with requirements for the motor industry and sustainability – as support for increased biofuels turnover imposes a significant burden on the budget. Below, we introduce the regulation systems of major world market operators.

The market for traditional biofuels is basically determined in Brazil by the incorporation rate, which must be directly changed by 20–25% annually; in the U.S.A by the RFS (Renewable Fuel Standard, 2007) modified by the EISA (Energy Independence and Security Act, 2010); and in the EU by the renewable fuels rate expected for 2020 by regulation no. 2009/28/EC.

The EU law limits the emission quantity of various biofuels during their life cycle (over the applicable agricultural/industrial technologies), in case of import biodiesel the sustainable requirements for production, too. In pursuance of this limitation, biofuels are only included in requirement fulfillment and can only be supported from 2011 (in the case of factories launched before 2008, from 2013) if their production and utilization decrease the emission of GHGs by at least 35% compared to fossil energy sources. By means of the currently applied general technologies, this drop exceeded 35% can be reached only by the utilization of rape (–38%) and corn (–47–49%). In the case of biofuel imports in the EU, social (work safety) criteria have already been specified that make it difficult for exporter countries (e.g. Brazil) to export biofuels to the EU (Popp et al, 2010).

Table 1 shows the most important expected results for the near future.

Table 1: Expectation on biofuels

Expected quantity	2010		2012		2020 (EU)	2022 (US)
	total biofuel	2nd gen. biofuel	total biofuel	2nd gen. biofuel	total biofuel	2nd gen. biofuel
EU (energy %)	5.75	–	–	–	10	–
USA (million l)	–	25	–	1893	107.47*	3785
Expected green-house gas emissions	1BE[2]	1BD[3]	1BM[4]	2CE[5]	2FTD[6]	2DME[7]
EU (g CO_2eq/MJ)[1]	24–70	37–68	15–23	13–25	4–6	5–7

Source: IEA, 2010; 2009/28/EC Directive; Coyle, 2010
Symbols: * million tons
1: depends on raw material and technology,
2-4: 1st generation biofuels (2: bioethanol, 3: biodiesel, 4: biomethane)
5-7: 2nd generation biofuels (7: cellulose based ethanol, 8: Fischer-Trops diesel, 9: dimethyl-ether)

In Brazil, the obligatory incorporation rate of biodiesel was increased from 2% of year 2008 to 3% in 2009. Tax allowance on biodiesel production fluctuates between 0-100%, depending on the kind of raw material, the kind of territory and the type of holdings (family or joint) producing biodiesel. In the U.S.A., there is a 0,12 USD/l tax allowance on corn-based fuel production while on new generation biofuels there is 0,27 USD/l tax allowance(Coyle, 2010), while in the EU, figures vary, as the allowance is not differentiated per fuel.

Regulation on biofuels has an impact on the motor industry, too. Fulfillment of the specifications of the RFS would be possible by raising the current 10% incorporate norm; however, this increases the risk to the motor industry too, which gives warranties on its cars only up to 10%. In the EU, in the case of diesel, only 7% of biofuel can be incorporated to the standard fuel, while for petrol, this figure is 10% (and 15% ETBE). However, this has not been published in national legislation yet. As of June 2010, a mere four Member States (Austria, France, Germany and the Netherlands) had complied. Naturally, E-85 and B-100 standards also exist, which can safely be used only with FFV functioning at an extremely low rate.

2. Materials and methods

2.1. Objectives

Following objectives were settled in the course of our examinations:
1. searching for possible correlations between increase of real GDP and oil utilization
2. analyzing relation between fuel prices and consumption at national level
3. examining price elasticity on fuel demand
4. analyzing the affects of the possible changes resulted in regulation systems on biofuel market

2.2. Target areas

We chose three countries: the U.S.A, Germany and Hungary, as target points of the analyses. The reasons for our choice are as follows:
1. The global financial and real economy crisis started in the U.S.A and most bioethanol is produced there (Popp et al 2010), thus it has an important role in biofuel sector
2. Germany is the leading EU and European biodiesel producer and consumer; its market actions determine the biofuel market of all Europe, especially as concerns those Central-Eastern European biofuel producing countries with commercial relationships with Germany
3. Hungary is the typical example for indirect effects of the crisis on the biofuel market, and its ethanol market development is in contrast with American and German tendencies.

2.3. Databases and methodology

We used the databases of the EIA (Energy Information Administration), the BAFA (Bundesamt für Wirtschafts- und Ausfuhrkontrolle), Energy Centre Ltd, the Hungarian Customs and Finance Guard, EUROSTAT and FAPRI. We prepared analyses using MS Office 2010 Excel and SPSS Statistics 17 programs.

In the course of our research, we applied Pearson's correlation analysis and price elasticity calculation of demand; their methods are briefly introduced as follows:

- Pearson's correlation: Values of r correlation coefficient can fluctuate between –1 and + 1 depending on the strength and direction of the relation. If r=0, linear relation between X and Y can be excluded, though non-linear relation between variables can be existed as r is inadequate to measure that. The definition of Pearson's correlation coefficient (r) in a supervised n sample, takes place as follows (Malhotra, 1999):

$$r = \frac{\sum (X_i - \overline{X})(Y_i - \overline{Y})}{\sqrt{\sum (X_i - \overline{X})^2}\sqrt{\sum (Y_i - \overline{Y})^2}}$$

- Price elasticity of demand: we examined the price sensitivity of fuel demand by defining the curve elasticity. Price elasticity gives the percentage change in quantity demanded in response to a one percent change in price. Calculation is by the means of the following formula, where Dg is the demand, Pg is the fuel (on the basis Brons et al, 2007):

$$\varepsilon D_g = \frac{\delta D_g}{\delta P_g} * \frac{P_g}{D_g}$$

3. Results and discussion

3.1. Correlation between the change in real GDP and consumption of petroleum products

As we explained in the introduction, interaction can be observed that is expressed both in prices and consumption. As GDP is the most widely accepted indicator of economic increase, we compared its alterations in the cases of the U.S.A and selected European countries to changes which occurred in petroleum products consumption. *Table 2* contains starting data of correlation analysis.

The performed correlation analysis has shown significant and relatively strong (r= 0.604 – 0.694) correlation between real GDP and change in petroleum products consumption in 2007 and 2009. It can be stated that strong correlation is not typical of that two indicators as developed countries are striving for the reduction of CO_2-emission-by this means among others- petroleum utilization thus less growing or decreasing petroleum utilization can be realized by growing real GDP. However, the world economic crisis diminished the economic operation insomuch as it resulted in the reduction of petroleum consumption in an expressly verifiable and provable way.

3.2. Analysis of fuel prices and consumption in chosen countries

Since fuels are rather inelastic to price, it is difficult to present an obvious correlation between the prices and consumption within a country; however, in the case of the international outlook, it can be proved that in those countries (e.g. the U.S.A, Canada) applying lower fuel prices, fuel consumption per capita is basically higher than in typically more expensive countries such as EU Member States (Litman, 2011).

Table 2: Consumption of petroleum products in selected countries (1000 bbl/day)

Country	2007	Change % 06/07	Real GDP growth rate 06/07 (%)	2008	Change % 07/08	Real GDP growth rate 07/08 (%)	2009	Change % 08/09	Real GDP growth rate 08/09 (%)
United States	19964.6	–0.12	1.90	18788.2	–5.89	0.00	18096.1	–3.68	–2.60
Czech Republic	206.6	–0.48	6.10	208.6	0.97	2.50	203.7	–2.35	–4.10
Hungary	159.9	–1.24	0.80	160.9	0.63	0.80	156.9	–2.49	–6.70
Poland	510.4	3.78	6.80	533.9	4.60	5.10	533.9	0.00	1.70
Romania	223.2	4.35	6.30	205.1	–8.11	7.30	176.9	–13.75	–7.10
Slovakia	61.9	5.09	10.50	63.4	2.42	5.80	59.7	–5.84	–4.80
France	1857.3	–0.85	2.40	1874.3	0.92	0.20	1769.5	–5.59	–2.60
Germany	2448.9	–8.21	2.70	2546.1	3.97	1.00	2415.2	–5.14	–4.70
Italy	1650	–3.16	1.50	1602.1	–2.90	–1.30	1517.1	–5.31	–5.20
Nether-lands	671	–1.11	3.90	654	–2.53	1.90	626.9	–4.14	–3.90
Spain	1426.7	1.45	3.60	1383.3	–3.04	0.90	1312.4	–5.13	–3.70
United Kingdom	1555.7	–3.66	2.70	1530.6	–1.61	–0.10	1493.9	–2.40	–4.90

Source: OPEC, 2010; EUROSTAT, 2011, own calculations

It can be stated as a whole that fuel prices in the three examined countries followed the tendency of petroleum prices during the analyzed period; primarily exchange rate fluctuations (USD – EUR; USD – HUF) are responsible for the small extent of deviation in tendencies. Fuel consumption per capita loosely followed the prices, although the above-mentioned territorial differences (the U.S.A vs. the EU) can be clearly seen in *Figure 3*.
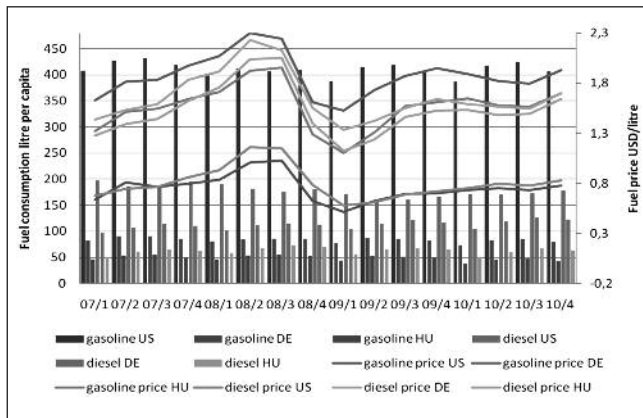

Figure 3: Fuel prices and consumption in the USA, Germany and Hungary
Source: EIA, 2011; BAFA, 2011; VPOP, 2011; Energy Centre Ltd., 2011

Figure 3 clearly demonstrates that, while in the U. S. A, a decrease in consumption per capita was primarily significant in 2008, in Germany and Hungary, due to the delayed arrival of the crisis, significant decline took place in 2009.

3.3. Evaluation of biofuels consumption
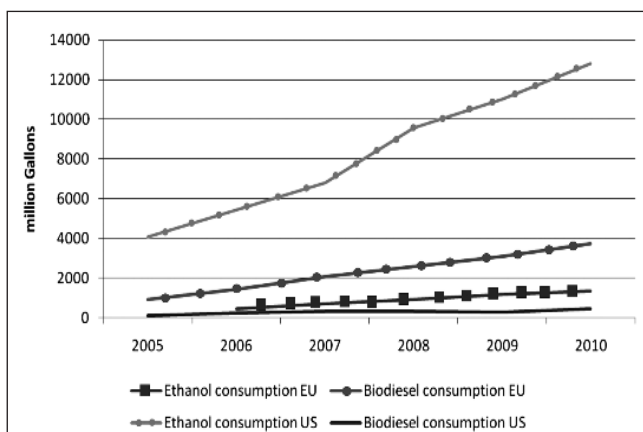
Figure 4: Biofuel consumption of the EU and the USA
Source: FAPRI, 2011

On the whole, biofuel consumption independent of the crisis shows a growing tendency both in the U.S.A and in the EU (*Figure 4*); however, significant fluctuation was experienced in consumption at a monthly level during the crisis.

Major fluctuation was experienced on the German market, whereas the Hungarian ethanol market for most of the examined period has shown steep growth (the reasons for
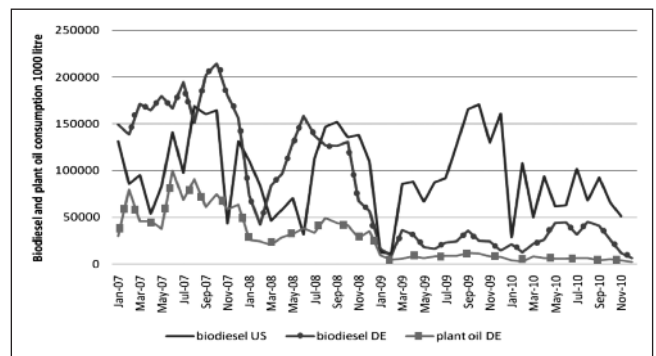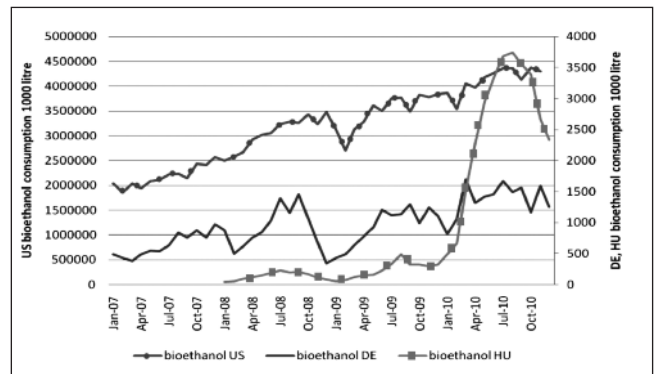
Figure 5: Monthly bioethanol and biodiesel consumption in the examined countries
Source: EIA, 2011; BAFA, 2011; VPOP, 2011

this are discussed in details under chapter 3.5.). Biodiesel and plant oil consumption were the most unstable in the examined period (*Figure 5*). This instability was due to the extremely high oilseed prices, which had just increased the net cost of biodiesel when petroleum prices hit their historical low. In this way, significant state support was not able to compensate for the price difference either.

3.4. Price elasticity of fuel demand

As fuel prices do not correlate with consumption, price elasticity of demand is the only indicator by which their effects can be quantified. *Tab. 3* contains price elasticities of demand. It is remarkable that values for elasticity are mostly different from bibliographic data (–0.1 – –0.38; GOODWIN ET AL, 2004; DAHL, 2011). The reason for these significant deviations is the chaos caused by the crisis, which disarranged petroleum prices and exchange rates.

Table 3: Fuel price elasticities in the USA, Germany and Hungary

Year	gasoline price elasticity			diesel price elasticity		
	US	DE	HU	US	DE	HU
2008	-0.25	0.71	0.22	-0.58	3.05	2.99
2009	0.01	0.84	1.16	0.27	-0.66	-1.04
2010	0.04	-0.10	-0.71	-0.18	0.02	0.81

Source: own calculations

Furthermore, the crisis has bankrupted several enterprises and has caused significant increases in unemployment, thus reducing the purchasing power in the household sector. The combined effect of many special factors has disarranged the traditional price-consumption relationship on the fuel market.

3.5. Effects of alteration in regulation systems on biofuels market

The most important change in the U.S.A was that on 13 October, 2010, the incorporation rate of bioethanol was increased by 15% for cars and vans manufactured in 2007 and after this date. This change affected approximately 1/3 of the entire fuel consumption (TÓTH, 2010). Change on regulation practically had no impact on examined period as it was carried out at the end of that given period. As the regulation system was practically unchanged in the period 2007-÷2010, fluctuations in the American biofuel market were due to the economic situation.

Development of regulation was completely foreseeable in Germany, too. Bioethanol is tax-free, whereas the tax allowance on biodiesel dropped from 0.3994 EUR/l to 0.3034 EUR/l in the examined period. It can also be stated that the regulation system did not change in a drastic or unforeseeable way, thus biofuel fluctuation can be traced back to the market conditions. (See chapter 3.3.).

The Hungarian regulation system has changed several times during the crisis. Regulation for biofuels was not affected (these were only changed in 2010 (CVII. law of 2010), but due to the crisis, the excise duty rate and VAT rate were increased. Therefore, the excise duty on fuel has risen from HUF 130.5 to HUF 120, duty on diesel rose from HUF 88.9 to HUF 97.35 (SZARVAS, 2010). Considering that the excise duty is also the basis of VAT, the effect of price increase was more significant-in case of petrol it was HUF 20.6, regarding diesel it was HUF 10.6. This sudden price increase greatly influenced turnover of E-85 in the country (*Figure 5*) as fuel content of E85 is excise duty free.

Figure 6 illustrates the content of fuel prices in the examined period. It can be clearly seen that lower fuel prices in the U.S.A are primarily due to the lower tax rates. The fact that the tax ratio in Hungarian fuel prices did not grow, in spite of the increasing tax rate, is due to the growth of petroleum prices and the HUF-USD exchange rate.

4. Conclusion

Usually, there is no close correlation between the consumption of petroleum products and the change in real GDP, although the interaction between the economy and petroleum market is well known. However, the crisis influenced the economic processes in 2009 to such an extent that the often only suspected, but hardly or not at all provable correlation, became obvious
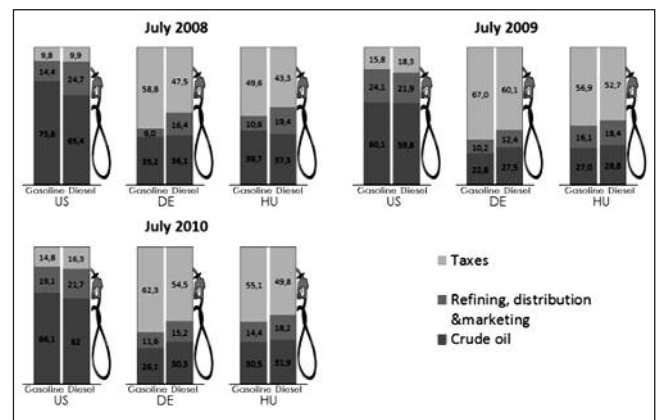

Figure 6: Composition of fuel prices
Source: EIA, 2011; own calculations

Fuel prices, as usual, obviously followed the evaluation of the world price of oil during the examined period and small differences are caused by exchange rate (EUR-USD; HUF-USD) fluctuations. The per capita consumption only loosely followed the evaluation of prices. This is due to two main reasons. On the one hand, fuels are traditionally inelastic products; price has little effect on demand in the short term; on the other hand, fluctuations caused by the crisis suppressed all other effects.

Demand for biofuels, despite the crisis, has shown steady growth in the USA, rather than in the EU, but there were very significant monthly fluctuations. These were mainly due to such an increase in raw material prices which made the substantial part of renewable fuels non-competitive - even with significant state subsidies.

Hungary is an exception in this tendency: where the increase of excise duty rate and VAT-rate occurred within a short time and led to a record increase in fuel prices, this caused an explosive growth in demand for E85 fuel market.

In the analyzed period, the price elasticity of fuel demand greatly deviated from the bibliographic data. The reason for this variation is the chaos caused by the crisis, which disarranged petroleum prices and exchange rates. Furthermore, it has bankrupted several enterprises and caused a significant increase in unemployment, thus reducing the purchasing power in the household sector. The combined effect of many special factors has disarranged the traditional price-consumption relationship at the fuel market.

The biofuel market was not directly affected by the renewable fuel regulation systems of the examined states, since their changes occurred at the end of the analyzed period. However, in the near future, they will become significant direct determinant factors.

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PERFORMANCE INDICATORS IN CSR AND SUSTAINABILITY REPORTS IN HUNGARY

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Abstract: Corporate Social Responsibility (CSR) or Corporate Sustainability reporting is a relatively new phenomenon in Hungary. As the external pressure from the civil society, public authorities and the media has so far been fairly low, this important corporate activity emerged only at the beginning of the last decade. In spite of this, several pioneering companies have started to publish information on its environmental and social performance in recent years. CSR and sustainability reports are seen increasingly as strategic documents that offer a balanced, objective, and comprehensive assessment of a firm's non-financial performance. In 2008 and 2009, more than a third of the 100 largest companies reported on their non-financial results (most of them were GRI based reports). In 2010, sixty-one organisations published a report about their non- financial performance, and 22 of these for only the first time.
The aim of this paper is to present recent attempts to use indicators in CSR and sustainability reports. On the basis of a detailed review of 70 CSR/sustainability reports published during the last 9 years in Hungary, an analysis was made on the performance indicators appearing in the reports. The motivations of indicator selection processes was analysed and the intended roles of indicator set in communication and strategy design was presented. The significance of and limits to the proposed indicators was discussed.

Keywords: CSR, sustainability report, indicator, Hungarian companies

1. Introduction

The number of dedicated sustainability reports produced by companies has mushroomed over the past decade. In 1996, only about 300 firms globally did so; but as of early 2010, some 3,100 did, according to research firm "CSR Insight" (*KPMG* 2011). Currently, a number of companies routinely report on key aspects of their social and environmental performance just as they report their financial performance: "nearly 80 percent of the largest 250 companies worldwide issued reports, up from about 50 percent in 2005" (*KPMG* 2008, p. 4). Motivations of companies to report their social and environmental performances have shifted away from reactive and risk management factors towards aspirational and innovative ones. Presently, CSR or sustainability reports for several firms serve as a tool to change external perceptions of their stakeholder and to instigate dialogues both inside and outside the company. An appropriate performance indicator system is a key element for organisations to measure, manage and communicate their impacts on the environment and other aspects of sustainability. The purpose of this paper is to present recent attempts to use indicators in CSR/ sustainability reports. Beyond a literature survey, my work is mainly based on a detailed review of 70 recent CSR or sustainability reports, annual reports and websites.

2. A brief overview of the current state of CSR in Hungary

Corporate Social Responsibility is a relatively new phenomenon in Hungary. As the external pressure from the civil society, public authorities and the media has so far been fairly low (*UNDP* 2007b*; CSR Europe* 2010), this important corporate activity emerged only at the beginning of the last decade. However, CSR awareness and implementation are advancing rapidly.

In principle, the Hungarian Government has objectives "to promote the implementation of the economic, social and environmental dimensions of sustainable development and to create policies, economic and financial rules promoting voluntary CSR" (*European Commission* 2007, p. 55), but real "systematic government incentives and initiatives for social and environmental performance are generally missing" (*UNDP* 2007a, p. 9). Although the Hungarian Government published the first CSR Decree in March 2006, which reinforces the social responsibility of employers and provides measures to stimulate such responsibility, the activity of the government is rather low in this field. For example, I have not found any direct indications or references on CSR either in the Hungarian National Sustainable Development Strategy (*cf. Hungarian Gov.* 2007), or in the New Hungarian Development Plan

2007–2013 (*cf. Hungarian Gov.* 2006). Similarly, even though, there are several laws dealing with relevant topics, none of them directly mention CSR.

The civil society and especially consumers are still not particularly interested in the CSR activities of companies. There is little trust in company leaders which naturally hampers the spread and dissemination of CSR. Nevertheless, consumer consciousness appears to be on the rise, and recently (before the economic crisis) price was no longer the only factor governing consumer choice. (*UNDP* 2007b)

The awareness, ability and organisational power of NGOs to put pressure on business and government are relatively limited (*UNDP* 2007a). To mention some positive examples, KÖVET-INEM, a corporate membership based environmental NGO promotes CSR issues very actively, especially corporate reporting and other public disclosure practices. For example, the second Hungarian CSR MarketPlace, an innovative forum for sharing solutions to business challenges in an informal, exchange-driven and creative environment, organized by KÖVET was held on June 2nd, 2011 in Budapest. At the MarketPlace, business practitioners presented their company's solutions to CSR challenges and shared experience with their peers. DEMOS Hungary, a member of the Public Policy Network is also active in bringing together a coalition of experts to promote and educate CSR related practices. In 2006, CSR Matrix Consulting, whose professional quality and media coverage generated positive developments in Hungary (a subsidiary of Atlantis Press Ltd.), launched the CSR Hungary annual conference series. The conference, held on November 2010 at the fifth times, has become one of the most significant CSR forums of the year where business decision-makers, company and communication managers, researchers and university students can share their experiences.

Still, there is a growing group of companies which voluntarily, without any significant pressure form key stakeholder groups (consumers, suppliers or the local community) or government incentives, make efforts towards a responsible and sustainable operation. The CSR movement in Hungary is initiated by companies and not by consumers as in developed consumer societies. It is more often foreign, multinational companies with long-term commitments to local and global economic success that are key corporate drivers of the social agenda. (*UNDP* 2007a*; UNDP* 2008*; KPMG* 2008*; CSR Europe* 2010)

At the end of 2008, GKI Economic Research Co., recognizing the rising importance of corporate social responsibility, made a research about the stage and development of Hungarian CSR market involving more than 1500 domestic enterprises. By the web site of the GKI (www.gki.hu), the main elements of the results of the research can be summarised as follows: i) the concept of CSR is known mostly by the biggest companies, but its practical tools (first of all the different activities) are potential purposes of all firms; ii) they measured balanced CSR activity just at one fifth of the answering companies, as most organizational practices concentrate mainly on environmental or economic issues (and leave social aspects on the HR department); iii) the companies spend money primarily on inner CSR aims, because they think these actions have bigger and more direct effect on the firm's performance; iv) the most important motivations of Hungarian enterprises are "the service of inner corporate interests" and realizing financial and competitive advantages; v) despite the above mentioned the most Hungarian companies value their own CSR activity positively; vi) the companies think that their communication regarding CSR is quite moderate.

2. 1. CSR/sustainability reporting in Hungary

The first sustainability report was made in 2002 by Budapest Er m Rt. (*Deák* et al. 2006), and since then more than 70 corporations have prepared (at least once) sustainability or CSR reports. In October 2010, KÖVET

Table 1. Non-monetary reporting in Hungary

Report type	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EBK	1	1	1	1	1	2	1							
Environmental			2	5	6	4	4	7	5	3	5	2	2	2
EMAS				1	1	1		1	4	8	14	16	12	12
Sustainability						2	3	5	7	7	12	11	21	27
Social							1	1			1		1	
CSR											2	3	6	6
Short CSR												25	22	11
Integrated													3	4
Total	1	1	3	7	8	9	9	14	16	18	34	50	54	61

Source: Database of Alternate CSR Consulting, 2011

recorded 90 companies having published a sustainability related report. (Table 1 shows the evolution of the number of different type of reports.).

According to a recent survey published by KPMG Hungary in March 2010 (*KPMG* 2010), a third of the 100 largest companies in Hungary reported on their non-financial results in 2009. The study assesses in what ways and to what extent non-financial sustainability and reporting practice has changed during the financial and economic crisis. It also reveals positive tendencies and highlights negative trends within sustainability and transparency. The study highlights that of the 33 companies reporting on their non-financial results last year (compared to 34 in 2008), 17 companies compiled stand-alone CSR/sustainability reports, 12 integrated this into their annual report, and a further 4 companies adopted both approaches. The study finds that drivers of non-financial reporting are reputation or brand and ethical considerations; business considerations and numerical results appear in a few reports only.

Among the reports examined, 8 reports of companies evidenced external control, which fact represents a decline on the 2008 data, when 15 companies had audited their reports; in other words there is no real external control behind most CSR communication. (*KPMG* 2010)

In a former study of the KPMG, the data vary slightly: almost 60 percent of the surveyed companies are involved in sustainability reporting either at a group or local level. Of those that report locally, 25 companies prepare a separate report, and 9 issue an annual report with a corporate responsibility section. Disclosed objectives, key performance indicators, impacts, and results achieved prove that reporting goes beyond a mere public relation exercise in most cases. Forty-one percent of companies apply GRI's G3 as a reporting standard and guideline, with the most widely-used application level being B/B+. (*KPMG* 2008, p. 81) Based on my survey, I consider, without quantitative estimations, that this percentage is higher.

The number of the CSR reports increased in 2008 because of a project called 'Good CSR'. Good CSR 2009 is a global reporting and communication program developed by Braun & Partners Network. Based on GRI guidelines and Accountability Rating principles, the program provides a credible and standardized communication platform offering opportunity: i) show the company's CSR activities in short, digestible format to its stakeholders; ii) popularize the CSR causes of participating companies; iii) share best practices with other participating companies and with others. Participating companies publish GRI level "C" short reports on a double sheet that will appear in one book together, and separate „branded" 2+2 pages reports for own stakeholder distribution with the information about the given company only. The participants are entitled to use the Good CSR logo in their communication activities honouring the good practice done by the company. In 2008, 25 and in 2009 21 enterprises participated in the program. The number of the short report decreased in 2010, but even though 61 organisations have published a report about their non

financial performance and there were 22 companies which reported at the first time.

Relatively few firms integrate this information in their annual report. For some this represents only a few additional pages while for others there is a healthy balance between the financial and non-financial information addressing both shareholders and stakeholder's expectations.

In all these published reports, the triple bottom line approach is quite general among the reporting corporations but the social responsibility chapter is characteristically underemphasized. (*Deák* et al. 2006)

Although the existing frameworks and instruments which could provide guidance on reporting and indicator design, e.g. OECD Guidelines (including guidelines on disclosure), ISO 26000, ISO 14031 (for environmental performance evaluation) etc. are known in Hungary, the findings of the KPMG survey indicate that 80% of the firms which prepared a stand-alone report actually adopted or claimed to adopt the principles of the GRI standards. (*KPMG* 2010) While the world's leading companies tend to adapt the highest A+ and B+ transparency values, in Hungary more than 40% of those firms adapt C and C+ levels, according to the GRI prepared reports. Those firms, however, which prepare their reports according to GRI-directives (e.g. Magyar Telekom, CIB Group, MVM Group, State Motorway Management Co.) generally publish more concise and detailed reports.

3. Some particular issues of indicator selection process

Importance of the stakeholder dialogue in the process of indicator design

Several authors emphasize that the task of identifying an appropriate indicator set should be done in consultation with key stakeholders (e.g. *Searcy* et al. 2008*; Adams and Frost* 2008*, O'Connor and Spangenberg* 2008*; KPMG* 2008). For O'Connor and Spangenberg stakeholder consultation is the key point of the indicator selection process, and they regard the appropriate indicator set as "discourse-derived CSR information". Their approach "considers indicator development as a deeply social decision-making process for which a diversity of viewpoints must be brought together in order to furnish a comprehensive representation of the direct and indirect impacts of and on a company" (*O'Connor and Spangenberg* 2008, p. 1401).

Although several standards (e.g. GRI, AA1000) suggest stakeholders should be involved in the selection and review of indicators, and the "number of companies citing stakeholder consultation as a key determinant for selecting indicators nearly doubled in the G250 category since 2005, up to nearly 40 percent" (*KPMG* 2008, p. 38), in most of the surveyed reports neither the relevant stakeholders nor their explicit interest profile are clearly defined. Nevertheless, in some reports, one can find some excellent illustration of this requirement.

For example, Magyar Telekom "identified through reviewing its management systems and benchmark audits the scope of stakeholders and keeps continuous contact with them to ensure that their interests are taken into consideration in the course of its operations" (*Magyar Telekom* 2009, p. 74), and in course of certifying the year-2007 sustainability report (in 2008) "a stakeholder forum was convened, where stakeholders could provide their comments about the report and the Company's sustainability performance. The feedback was processed and most of them were incorporated into the report or the sustainability activities." The report calls stakeholder's attention to the "10th Sustainability Roundtable, which will focus on key current topics" (*p. 74*) and refers on a web page for giving information on important issues discussed with stakeholder during the previous Sustainability Roundtables.

Several companies identify the key stakeholders and demonstrate the process of their involvement in some parts of the CSR activity, but not in the report preparation practice. That is the case of the sustainability report of the Hungarian Power Companies Ltd. that summarizes the most important stakeholder groups of the corporation and the forms and results of the engagement with them in a detailed table (*MVM* 2008, p. 59) but does not mention their involvement in the report development process (and in this way, neither in the indicator set design). Other companies started to identify their stakeholders methodically recently so created the indicator set without consultation with them. For example, Nestlé mapped its stakeholders systematically in 2008 at the first time. "The process resulted in a plan for getting a systematic dialogue started with the stakeholders. The 2009 sustainability report describes the implementation and results of this." (*Nestlé* 2009, p. 16)

The appropriate number of indicators

The clear majority of the published studies on sustainable development indicators and performance measurement emphasize the need to develop a small set of indicators. Today's accounting standards also seek to balance materiality and transparency. In terms of materiality, a relatively small number of indicators is preferable, 'less is more'. According to the European Federation of Financial Analysts Societies (EFFAS), one of the "essential criteria" for useable key performance indicator (KPI) set is that it "should be manageable in dimension ("Key"), e.g. small set of 30 KPIs max." (*EFFAS* 2009, p. 6*)*

At the same time "within a CSR indicator system or reporting process, the question may be posed of a 'balance' in the number of indicators associated with *each* performance issue, with *each* stakeholder type, for *each* site" (*O'Connor and Spangenberg* 2008, p. 1410), so the complexity of the phenomena would require a huge number of indicators.

O'Connor and Spangenberg, seeking a "representative diversity" of indicators and proposing "a framework called the CSR Deliberation Matrix for the structuring of CSR issue

identification, stakeholder dialogues, indicator selection and reporting, with an overarching goal to achieve an appropriate balance between sensitivity to individual situations and the benefits of "generic" indicators applicable to a large spectrum of reporting contexts" (p. 1399), arrive to the conclusion that "the maximum number of distinct information categories mobilised (if there is no redundancy) would, in principle, be … 180" (p. 1411). The authors claim that a "workable reporting system would depend on reduction of the number of indicators well below this figure" (p. 1411), and at the end of their theoretic procedure and some pragmatic considerations they arrive to a number of 45 indicators at site-level.

Last year, the European Federation of Financial Analysts Societies (EFFAS) worked on a set of indicators, of which about 20 would be applicable to any individual company. During this project, researchers gathered material on key performance indicators already in use or reported by corporations, and the initial long list of 600 indicators was reduced to a set 30 indicators through multiple iterative processes, moderating the discussion between mainstream investors and financial analysts and corporations. (*EFFAS* 2009)

According to the GRI standard, for a C Level application, the company must only report on 10 GRI indicators, at the B Level this moves up to 20, and at the A Level all 50 GRI "core" indicators must be represented, either with data or a valid explanation for why the indicator is not reported.

In the surveyed reports, the amount of the indicators is much higher. It is difficult to give exact numbers (on the one hand, it is a problem of definition, on the other hand, the indicators are often presented in complex graphics forms) but I consider that in most of the reports the number of all indicator exceed 150.

Absence of the ecological approach in the indicator design

The concept of sustainable development has its origin in global ecology. Mankind intervened in the global biogeochemical cycles of the Earth to such an extent that it threatens the natural balance developed during millions of years and the existence of all types of earthly life. One of the key sustainability challenges for the coming decades will be to improve the management of natural resources in order to reduce current levels of anthropogenic environmental pressure and respect the biological and physical limits and the carrying capacity of the planet. The first step towards meeting this challenge is an enhancement of the understanding of the material basis of our society. For this reason, we have to measure the rate of resource consumption, the amount of waste production generated by human activity and assess their impacts on the environment's capacity to provide the natural resources and assimilate the waste products. Any progress towards sustainable development strongly depends on the availability of methods to describe and analyse the metabolism of the socio-economic system. The main question related to this view of the sustainability is the following: "how to develop the physical basis of society

through restructuring the use of biotic and abiotic resources throughout the production and consumption system in a sustainable manner" (*Bringezu* 2006, p. 7).

Several new concepts of this ecological approach have appeared in the scientific literature and in certain sustainable development policy documents. There are some of them to which we can attach indicators – such as *carrying capacity*, *dematerialisation*, *decoupling*, *eco-efficiency*, *factor 4* or *10*, etc. –, and there are others – like *industrial ecology*, *societal metabolism*, *strong sustainability* – which can useful for better understanding the place of companies in the society and the ecological system.

A proposal of the UNDP follows (partly) this view: "It is an important task of the Hungarian Government in connection with the introduction of the ecological footprint to motive companies to calculate and reduce their *ecological footprint*. If we give concrete, helpful tools in the hands of businesses, it will be able to influence their operations more successfully than before." (*UNDP* 2008, p. 12) I consider that it would be very useful to measure the amount of *aggregate material flows inside corporations*, especially as the Hungarian Central Statistical Office report about the MFA indicators. A firm "might also present its absolute pollution loading *in relation to the capacity of the regional ecosystem* to absorb the pollutant".

This approach, this way of new thinking, these concepts and the derived indicators are absent almost completely from the Hungarian CSR activity and corporate reports. Nevertheless, eco-efficiency indicators appear in several surveyed report (e.g. data transmitted with 1kWh electric energy (Gbit), CO_2 emission per data traffic (*Magyar Telekom 2009, p. 46; 52*), specific CO_2 emissions (kilotonnes/GWh), specific SO_2 and NO_x emissions (tonnes/GWh) (*MVM Group* 2008 p. 24), etc.).

It is true that firms should be careful with eco-efficiency indicators because sometimes they can be misleading. Málovics, Csigéné Nagypál, and Kraus draw our attention on the so-called rebound effect that can be observed on both micro and macro levels. They stress that "several companies manage to reduce the quantity of material use per product unit, but the total use of raw material increases because output grows more rapidly than efficiency. Human beings basically use improved technological efficiency to increase comfort and improve their quality of life, not to reduce resource consumption." (*Málovics* et al. 2008, p. 911) Still, I consider that the use of eco-efficiency indicators would be a step forward towards the ecological approach.

System approach and indicator design

Searcy, Karapetrovic and McCartney draw our attention (without further explanation) on a nice distinction: "indicators must be conceptualized and designed as a system, not a set." (*Searcy* et al. 2009, p. 38) The authors emphasize that "an organization may be conceptualized as a single system, rather than as a set of independent management and operational functions" (p. 39) and observe that a "systems approach … not only fits well with the concept of sustainable development (which emphasizes a holistic approach to decision making), but it also provides a model to ensure that any indicators developed are integrated with existing business infrastructure" (p. 39). From my point of view, they offer two remarks: the one of the main questions of this approach is on "how the sustainable development indicators related to, and could be integrated with, existing internal initiatives." (p. 39) and "a systems approach explicitly emphasizes the need to stress linkages between indicators and issues (including how the behaviour of individual indicators can affect the properties of the whole system) and the need to establish goals for both the whole system and the individual indicators" (p. 40) And finally, I present an important warning from the authors: "A list of indicators alone may not adequately capture or address these critical features." (*Searcy* et al. 2009, p. 40)

I could hardly discover even slight indications of that type system approach in the surveyed reports. Interestingly, there is no report, for example, where the connection between indicators concerning material use and emissions would be mentioned.

4. Conclusions

- Corporate social responsibility is a relatively new phenomenon in Hungary; it emerged only in this decade.
- Sustainability reporting and indicator design is a learning process. The surveyed 51 Hungarian firms are at different stages of this development.
- The majority of reporting companies apply GRI's G3 as a reporting standard and guideline (with the most widely-used application level being B/B+), and follow the guidance of this designing in their indicator systems.
- Although the clear majority of the published studies on sustainable development indicators emphasize that a relatively small number of indicators is preferable in sustainability reports, in my sample I found that the number of different indicators is in generally much higher than the theoretically or intuitively given 30–45.
- The ecological approach, its concepts and the derived indicators are completely absents in the sustainability reports of Hungarian corporations though their presence might be fruitful.

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THE NEW STRATEGIC DIRECTIONS OF RURAL DEVELOPMENT IN HUNGARY

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Abstract: The notion of sustainability is the basis for our future possibilities. Local sustainability, in the centre of which can be found the livable settlement, is especially important in rural areas. Without developing rural areas, there is no developing society.

The growth of the Earth's population and the world economy has already surpassed the carrying capacity of this planet which may result in an "overshoot and collapse". This can still be prevented today.

The population of towns and cities is rapidly increasing. Urbanization is a very fast process, even in Hungary. In large cities with millions of inhabitants crime and lumpen lifestyle pose huge problems. However, the bases of a successful economy are morals and a puritan lifestyle, which so far have characterized rural villages. 70% of the poor and needy live in rural areas in the developing countries and agriculture provides livelihood for 40% of the world's population.

The International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) was established in 2002 by FAO and the World Bank to learn more about the role of agricultural science and technology. After the positive decision some comprehensive summaries were made on all the related topics with the participation of 400 scientists. The assessment provided many lessons to learn and at the 2008 closing sessions in Johannesburg, the reports were accepted and it was proved that rural areas have a significant role in providing adequate means of earning a livelihood.

The Ministry of Rural Development composed a domestic-level study with the title of the National Rural Strategy. The objectives stated in the study can be seen as the main directions of the Hungarian rural strategy.

The land policy aims to support the 50–70 hectare family farms and have the agricultural lands under national authority. The population must be provided with ample and safe food. The priority of local economy, local sale, and local markets is important. The positive exploitation of our natural resources may result in the strengthening of rural areas.

The deterioration of rural areas must be stopped. In order to halt these processes swiftly fundamental, patriotic economic and social policy changes, a strong people's party, a short-run crisis treating and a medium-long-run strategic development and action plan are needed which is based on the respect of work and moral norms, national cooperation, solidarity, and the defense of our mutual interests rather than on speculation (ÁNGYÁN, 2010).

The greatest problem of Hungary is low employment. Workplaces may be created in the least expensive and the fastest manner in irrigational agriculture. In order to achieve this, the role of the state must be reconsidered and EU rules on state intervention must be reviewed.

Keywords: sustainable rural economy, National Rural Strategy, food safety, employment, natural resources

Introduction

In 1981, the director of Worldwatch Institute, L. R. BROWN, published a book called Sustainable Society. According to the author, there must be harmony between population growth, economic requirements, the utilization of natural resources and the minimization of environment pollution.

The first world-wide program on the protection of human environment was developed at the 1972 UN conference in Stockholm.

In 1992, The United Nations Conference on Environment and Development (UNCED – informally The Earth Summit) was held in Rio de Janeiro, where Agenda 21, the international plan of action to sustainable development and a blueprint for sustainability was accepted.

The EU Amsterdam Treaty (1997) declares the following:
"DETERMINED to promote economic and social progress for their peoples, taking into account the principle of sustainable development"

The World Summit on Sustainable Development took place in Johannesburg, South Africa at the end of August, 2002. It was established that despite all efforts the general environmental state of the Earth has deteriorated to a great extent. The risk of a global climate change has increased and the differences in the quality of life between nations and societies have amplified considerably.

The Stockholm conference created a natural-environmental pillar, the Rio Conference highlighted the economic pillar, while the Johannesburg Conference the social pillar was emphasized (MAGDA – MARSELEK, 2004).

The Stockholm Declaration contains the duty of all governments to protect and improve the human environment for the present and the next generations.

In 1984 the UN convened the World Commission on Environment and Development (WCED) whose Chair was Gro Harlem Brundtland, the Norwegian Prime Minister. In 1987, the Brundtland Report outlined a development model

that contains both quantitative growth and qualitative development and it declares that economies can grow only by protecting the environment. In a sustainable world environment protection, economic objectives, and social justness must interlock in harmony.

LÁNYI (2010) refers to "sustainability" or development as the spread of activities that are based on local knowledge and work culture, that utilize – but do not exploit irreversibly – the local conditions, strengthen local communities, facilitate self-sufficiency and self-support, and preserve biodiversity.

These conceptions assign an important role for rural areas since a developing society is unimaginable without it. The conception of the development of a sustainable rural economy requires a multidisciplinary and plural approach which can be shaped only by considering an utterly complex sphere of activities.

In order to preserve quality of life and livability it is expedient to apply cost efficient and economic solutions and financial incentives that take care of the environment and as a positive externality contribute to the improvement of the health conditions (e.g. air quality) of local residents, furthermore create workplaces for local experts which activate the local economy (CSETE M., 2009). A livable settlement can be placed into the centre of local sustainability.

Hungary has entered the era of global economy. The UN predicts that the ratio of city dwellers will be over 60% by 2025(BIRG, 2005). Even by 2015 there will be a number of cities with a population around 20 million (Tokyo 27,9 M., Bombay 18,1 M., Sao Paolo 17,8 M., Shanghai 17,2 M., New York 16,6 M., Mexico City 16,4 M.). The growth of the number of city dwellers is also a current tendency in Hungary and this fact may threaten rural possibilities.

The world is now making its way towards unsustainability nevertheless the rural way of life is sustainable. This fact further supports the promotion of the development of rural areas.

According to MEADOWS et al. (2004), the barriers of permeability represents the barriers of growth – people need cars to maintain their lifestyle while houses and factories require a continuous energy supply and the price of energy and materials embody the barriers. Presently, the growth of the Earth's population and the world economy has already surpassed the carrying capacity of this planet which may result in a sudden "overshoot and collapse" – probably later than indicated in the study. Problems may occur in connection with the use of global resources and the emission of pollutants.

The past cannot be altered but positive changes may be induced for the future if the indefensibility of the situation is recognized.

Life in very big cities is difficult. It can be stated and observed that the unemployed masses in large cities very often lead deviant, lumpen lifestyles; there is considerable criminal activities and drug consumption.

KOPÁTSY (1996) considers success from a moral point of view. He believes that only the most economically advanced countries were able to advance considerably because economic policy was based on morals and puritan solidarity. The industrialized, well functioning countries are characterized by thriftiness, discipline, desire for cleanliness, and a modest lifestyle compared to financial possibilities. In the large cities of western European Puritanism, morals are always rooted in the moral heritage of villages and small towns.

"If we acknowledge that economic success is based on morals then we have to examine what economic conditions facilitate the development of suitable morals.

Strict morals may develop and survive only in relatively homogeneous societies where everybody knows everybody from all aspects."

In the past, villages were organized this way and even today it would be one of their most important roles.

The importance of rural areas is still growing in the EU because of the rural dominance of the new member countries. The reorganization and implementation of sustainable rural economies should have a central role amongst the goals of societies (MAGDA S. – MARSELEK, 2010).

According to CSETE – LÁNG (2005), "rural policy is the complex system of long-run interests, objectives, conditions, and operations based on principles. Rural policy is operatively implemented by rural development, which is the local chain of tasks.

From an economic point of view, the aim is to strengthen local activities and the local economy. The long-term advantages must be considered, if possible management must consider the protection of the environment. The reduction of non-renewable raw materials and energy resources is indispensable to protect the environment. The strengthening of institutions and civil societies serves sustainability. We must strive to widen and maintain the wealth of rural resources.

When analyzing sustainable development, we must distinguish between the different levels (global, regional, and local) and dimensions (natural environment, society, economy) of sustainability. In the current situation, the local programs have been the most successful ones therefore the global system can be developed by combining regional and local sustainable development (KEREK – MARSELEK, 2009).

The state of the rural and agro-economics, international outlook

The International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) was established in 2002 by FAO and the World Bank to establish whether there was a need for the international assessment of agricultural knowledge, science, and technology. The assessment resulted in a global and five regional reports, a global and five regional summaries for decision makers, and a horizontal comprehensive report with an executive summary.

The reports were made in cooperation with hundreds of experts from all over the world who participated in the preparatory work as well as in completing the experts' report. As always in such cases success primarily depended on the efforts, enthusiasm, and cooperation of experts of many disciplines. The cooperation of related professional fields enabled IAASTD to create this unique interdisciplinary, regional, and global process.

The final intergovernmental plenary session was opened by the executive director of UNEP, Achim Steiner on 7 April, 2008 at Johannesburg, South Africa. At the plenary session the reports, the summaries for decision makers, and the executive summary of the comprehensive report were accepted by a vast majority.

The report was made by about 400 experts; however other personalities, organizations, and governments were also involved in the process.

The international assessment of agricultural knowledge, science, and technology (AKST) was also urged by talks between the World Bank and the private enterprise sector, and NGOs on their perception on biotechnology or more precisely gene technology.

70% of the poor and needy live in rural areas in the developing countries and agriculture provides livelihood for 40% of the world's population. About 3 billion people live on less than 2 dollars a day and 854 million are malnourished (IAASTD, 2008). Governmental investments in AKST are utterly important (which should be considered by Hungary), since in a favorable market situation, they can have a 50% economic rate of return.

Focusing on global development and sustainable objectives this paper must naturally emphasize the challenges of developing countries and poor rural communities where the livelihood of most inhabitants depends on agriculture and where poverty and environmental degradation is at present.

The most important ascertainments are briefly the following:
– Productivity has increased recently. As a result the supply of food per capita has grown from 2360 Kcal in the 1960s to the present value of 2803 Kcal.
– There was an improvement all over the world except Sub-Saharan Africa.
– Today about 1.6 billion people live in water covered areas, in poverty stricken regions and approximately 1,9 million hectares of land is prone to erosion.
– The bad practices in agriculture (deforestation, soil erosion, deterioration of agro-ecological functions) in connection with dire social and economic circumstances are increasing.
– Demand for food is likely to increase rapidly especially in the developing countries, on the other hand production will decrease.
– Approaching the applications of AKST from different angles will decrease starvation and poverty.
– AKST must provide a solution for the decreasing amount of water and its deteriorating quality, for soil

erosion and regional destruction, for the decreasing functions of agricultural ecosystems, as well as for the deterioration of marine and fresh water ecosystems.
– AKST must strive to achieve equal rights between the sexes.
– There must be a new approach towards the handling of agricultural and natural resources and the technological possibilities must be utilized.
– The climate changing effects of agriculture must be reduced.
– Small scale producers and small enterprises may be helped by the active participation of the state, research, and the spread of knowledge.
– There must be a fight against poverty, small farms must be supported and sustained.
– Sustainable agriculture must be realized.
– The poorest developing countries are the losers of the liberalization of trade. This requires special treatment in certain cases. Many instances of intensive agriculture is unsustainable, the ecological footprint is already far too large.
– To achieve the developmental and sustainable goals is of crucial importance.
– The multifunctionality of agriculture must be taken into consideration.
– The role of the governments in research is to coordinate the cooperation between the private and the public sectors.

Agriculture is considered to be the combination of many complex production systems by IAASTD. It is a connected, dynamic, social-ecological system which is based upon the sustainability, use, and renewal of human-controlled ecosystem-services.

Analysis of correlations

Despite all achievements millions are affected by starvation, malnutrition, and the lack of food safety. Animal husbandry is likely to increase in the developing world where sustainable solutions are needed. The fish-stock – due to overfishing – is decreasing and it is unlikely to change in the future. The decrease of this protein source will promote live stock breeding.

The future of bio-fuel production is uncertain, it negative effects may surpass the positive ones (it requires a large quantity of water to produce). Worries about the appearance of gene manipulated raw materials in food and animal feed further increased demand for food safety rules and regulations and encouraged countries to create and introduce regulations to improve the situation.

Little is known about trans-gene plants, animals, and micro-organisms therefore more thorough research is needed. One of the dangers of rural possibilities is that imported food can be cheaply purchased in cities which may endanger employment in rural areas. Preference of intensive

energy consuming agriculture results in the fact that the environmental or social price of production remains unpaid which is unsustainable.

Some of the disadvantageous consequences of intensive agriculture are the following: depletion of nutritive materials in the soils, excessive use of water, unsustainable soil and water management, exploiting work conditions. Efficient agricultural production can only be achieved by experts. Governments may act in this respect. The main steps are as follows:

- renewal of the curricula, the appeal and the social recognition of agricultural sciences must be increased,
- scientific, agricultural, and management knowledge should be made more accessible,
- Cooperation between ministries and universities should be enhanced,
- improvement of infrastructure,
- capital should be provided for agricultural education,
- support the participation of universities in surveying the local and traditional knowledge and include these experts in the composition of the new curricula.

The state, NGOs, smallholders' association, professional organizations, etc. may be the basic providers of the services, naturally involving farmers, too. The state could facilitate the organization of clusters for the above listed actors.

New national rural strategy

By the beginning of 2011 the Ministry of Rural Development created the National Rural Strategy. The main objectives stated in the report can be taken as the main directions for the future.

The comprehensive goals of the strategy are the following:
- to preserve and increase rural workplaces
- to preserve the rural population and restore demographic balance
- to guarantee food production and ensure food supply, to eliminate poverty in the country
- to increase the vitality of agriculture and food production, to improve our market position, to restore the appropriate balance between crop production and animal husbandry.
- to protect our drinking water supplies, to preserve water sources, soil, natural flora and fauna and the countryside, and to increase environment protection
- energy supply based on local resources and systems, security of energy, decreasing of energy dependency
- to improve the quality of rural life and to diversify the rural economy
- to restore the close connections between the city and its environs

The plan points out seven strategic areas:
- Sustainable regional and natural resources management
- Quality of the rural environment
- Land policy
- Sustainable agricultural structure – and production policy
- Food safety, agri- and food market
- Local economy development
- Rural settlements, local communities

In the following parts the national strategy programs will be introduced which deal with environmental protection, land use, ecological farming, local processing of raw materials, education, research, village development, etc.

The regional complex rural development programs are also significant as they focus on local development. The following programs are included:
- Program for the development of areas with detached homesteads
- Tisza-valley complex development program
- Homokhátság program
- Ormánság (Old-Dráva) program
- Cserehát program
- Regional economic development complex programs
- Carpathian Basin rural development cooperation program

The program determines rural strategy for ten years with forward looking ideas; in case of successful implementation it can improve the state of rural areas.

In the following parts some of the important strategic areas will be highlighted which contain new, initiative ideas that may lead to essential changes.

ÁNGYÁN (2011) writes the following: Throughout its history, Hungarian society was always able to revive in difficult times by feeding on its rural roots and depending on rural communities. However, nowadays it is rural Hungary itself that has fallen into the deepest crisis and cries out for help to be able to revive. The ecological, economic, financial, and demographic symptoms, the food scandals and catastrophes make the countries of the world realize how important it is to protect the value of rural areas. National safety these days increasingly depends on the preservation of natural resources and systems, the retaining of national sovereignty, responsible management of natural resources, the development of agriculture and rural areas, food safety, energy and water supply, as well as the foundation of environment safety

However, Hungary and the changes that took place in the previous 20–25 years were not driven by these aspects. The revival of rural areas was hindered from the very beginning by the primitive accumulation of capital, which happened too late and also by the process of globalization.

Agriculture is a determining force for rural areas. The agricultural production of the world shows a continuous increase while it is decreasing in Hungary (Table 1).

Land and estate policy

As UDOVECZ (2010) explained, "maintenance of our rights over the natural resources (agricultural land, forests,

Table 1. Agricultural production indexes of the world and Hungary

per cent

Year	1989–1991 = 100			Previous year = 100	
	World	Hungary	Hungary – the world, difference in space, percentage point	World	Hungary
2002	127,2	86,8	–40,4	100,7	95,8
2003	130,6	82,9	–47,7	102,7	95,5
2004	136,1	102,0	–34,1	104,2	123,0
2005	136,8	93,3	–43,5	100,5	91,5
2006	137,4	91,2	–46,2	100,4	97,7
2007	139,9	80,6	–59,3	101,8	88,4
2008	144,7	100,8	–43,9	103,4	125,0
2009	145,9	91,2	–54,7	100,8	90,5

Source: KAPRONCZAI, 2010 on the basis of FAO
http://apps.fao.org/page/collections?subset=agriculture

Some of the most important goals of the National Rural Strategy are the following.

water) can be described as a paramount priority. The same attitude should concern the maintenance of food production capacities and local facilities, and also the most effective possible utilization of local supplies and employment possibilities." Every further conception related to land should be started from this priority.

Similarly, the National Strategy lays down that natural resource management has to be under national authority, it considers autonomy over natural resources as one of the key elements in the maintenance of national sovereignty. Maintaining autonomy over natural goods, solving problems of food and water supply, and also environmental security are all very important.

The National Rural Strategy has the following aims:

"Regarding land and estate policy we will do everything to keep agricultural land under national authority and in the property of farming families. With judicial and economic regulation systems we give preference to farming types that help strengthen families. We place family and private farms and their associations into the centre of land policy." There can be references here to the creations of co-operatives that may multiply employment if successfully managed.

CSAÁNYI (2011) writes the following: "The country has lost the countryside, because after the political trans-formation it liquidated co-operations, although these co-operations were created by force, by the end of the nineties they had become modern EU-competent farms, and solved social problems and worked as a community too, the gipsy problem would not be so serious were they still in function. But they have stopped functioning. And the political left did not have a single word, not even when they were in power with a two-third majority. What does community, processing industry, autarky, highly developed agriculture. In Denmark, there is capitalism and there are co-operatives at the same time and the two are reconcilable, all it needs is adequate

judicial background and some good words on it. There are things that are never too late to be done! Do wake up and strongly support every forms of co-operation. Things are not to be redone, since it is too late for that, but to create it again."

The unemployment of the Roma population is an ever-growing problem in the countryside, too. According to the author: "work instead of grants! But of course not the kind of communal work that underrates employees, we need rational work, such that the one who does it can also be content. Experts in work organization should be sent to Roma villages. That could be a splendid task for ready to act young people.

The most important would be that, together with work, Roma people get back their communities too. Mediation was the great idea of one of these parties. Clever mediators could bring Roma and non-Roma communities together. But where are these Roma communities? The kinds of organizations that help Roma people, but also can also deal with unmanageable families."

Leasehold – considering other factors – fundamentally determines the success of agricultural productivity. We have to try hard to adjust the system of leasehold to its own environmental potentials and constraints.

The effectiveness of the system depends on the composition of the land use and on the types of plants and the results of cultivation. Regional distribution of land use and its time-dependant changes are useful information for the inner structure of agricultural land use (MAGDA R., 1999).

Within this logic scheme the optimal land development means the determination of the most favorable relation among the leasehold subsystems in terms of competitiveness, which can be interpreted as an optimization task.

In the framework of the program of sustainable agricultural structure and cultivation policy important developments are being discussed, including:

– Program of leasehold structure change
– Damage mitigation, risk management program
– Garden-Hungary horticulture program
– Eco-farming program
– Live-stock farming development program
– Protein program
– National equestrian program
– Fish-breeding development program
– Gene preservation, gene bank program
– Programs of model farms, regional centers
– Forest program

The estate policy of the government does not support lands of any thousand hectares, nor the 1-3 hectare parcels of land. It aims at 50-70 hectares average land size, giving a chance to the youth with it. The institutional system of the National Land Fund supports small- and medium-scale

factories. Similarly to other EU member countries, the agricultural factory regulation helps to keep agricultural land in native property.

Changes in areas per farm is displayed in Table 2

Table 2. Land size per farm

(M.e.: hectare/farms)

Description	Agricultural organizations		Private farms	
	2000	2010	2000	2010
Arable land	506.9	352.3	3.1	6.2
Grass	161.2	120.4	2.9	4.8
Agricultural territory	533.5	336.7	2.5	4.5
Cultivable land	653.0	465.8	2.7	5.0

Source: Agriculture of Hungary, 2010.

Healthy food, non gmo (GMO free), employment

The National Rural Strategy considers a sufficient, healthy and safe food supply utterly important. It preserves the country's GMO-free status and it is also laid down in the new fundamental law. Conceptions harmonies with the summary of IAASTD published in 2008, discussed above, addresses the problems in full detail, however, due to compactness, we can only refer to it.

Regarding ecological farming, Hungary is planning to increase the involved areas from the actual 120,000 hectares to 350,000 hectares by 2020. The most important is to give preference to local farming, local cultivation and local sale. The rate of local produce in food trade is planned to be increased to 80% from the actual 65% by 2020. Only a diverse agriculture that is based on different sectors can create workplaces.

The past 20 years of agriculture led to regression and opportunities for work have decreased as well. With the closing-downs of the big agricultural farms, a system ceased to exist as well that had ensured considerable employment.

Economic and social problems in the countryside can be traced back, in the first place, to the reduction of the roles of agriculture in income production and employment.

Referring to the ideas of those involved in the political transformation RÓNA (2009) writes the following: "Participants agreed that the national economy of the country would be based on three pillars: the competitive sector, the state sector and the co-operative sector. Behind this notion stood not only a working economic structure, but outlines of a healthy and creative society could also be seen. The state sector can not and should not compete with the efficiency of the private sector; however the procurement and preservation of public welfare can not be entrusted to the competitive sector. A sector like agriculture, which requires social collaboration and significant capital at the same time, can not be successful without the co-operative structure. The

alternative, namely to concentrate property in private sector would have unacceptable consequences."

In our opinion, increase of employment would be the fastest and most economic in the agrarian sector. The state should get back its directional, organizational and developmental roles. We have to think of a system instead of small- or large-industry. The expected food shortage and increasing prices will give us a good chance to act in accordance with this.

The area where new workplaces could be created in the fastest and most economic way would be agriculture. According to RÓNA (2009): "The essence of this task is not to create new resources of capital, but rather to utilize and classify already existing means in an effective and purposeful manner. If, for example, Hungary wanted to irrigate as many hectares of land as would meet the EU average, then in that case we should develop the system of irrigating 680,000 hectares of land. The expense per hectare of this would be around HUF 1.5 million; counting with a 5 year development program it would mean HUF 200 billion. This amount of money - that by the way could obviously be realized with the rearrangement of the resources – would create one workplace per 3 hectares meaning 225,000 new workplaces in total. Thus, the gross expense of subsidy per one workplace would be HUF 4.5 million. No other industry can show such workplace creating abilities.

The key to success lies in the creation of the abovementioned industry. Nevertheless, that is a difficult and complex ask, without any doubt."

The other possibility of employment is energy generation. According to R. MAGDA (2011), 5-6 million hectares of relatively low-fertility land have become fallow in the Middle-Eastern European member states of the European Union due to considerable decline of live stock farming and because the agrarian population is growing old. Lands that grow wild, allergen parasitic weed, erosion and deflation do not attract people. Rural employment could be increased with a complex energetic, wood cultivation, utilization program. Concerning Roma employment it would be practical to lobby for EU sources.

Changes in employment and its critical situation are shown in Table 3.

Education should also get great emphasis beside employment. Reputation of studying and a scale of values that bounds progress and success to work and not speculative transactions should be restored. (MARSELEK 2010)

Situation of the countryside, possibilities of state organisation

The declared aim of the European Union is to decrease differences among the regions. The idea tends to ensure equal opportunities for earning a livelihood. A similar idea is the equilibration of life possibilities of rural and urban areas. In spite of the declared aims the state of the underdeveloped

percentage

Description	Number, thousand persons			Distribution %		
	1990*	2000	2009	1990*	2000	2009
Agriculture	697.2	251.9	173.5	15.4	6.6	4.6
Industry, construction industry	1711.0	1299.7	1174.4	37.9	33.9	31.3
Services	2107.9	2280.4	2403.4	46.7	59.5	64.1
Total	4516.1	3832.0	3751.3	100.0	100.0	100.0

*To present changes of a 20 year period we used the 1990 census data and in further years the data of workforce surveys. Because of the methodological differences of the two surveys the possibilities for comparison is limited.

Source: Hungarian Central Statistic Office 2010

Figure 1. Distribution of subsidies according to aims

regions and the countryside is becoming worse. Demonstrating the effects of the crisis SZALAI (2010) states that countries of the centre shifts the effects of crisis to the semi-peripheries, and this deepens the symptoms of structural crisis of neocapitalism in Eastern European countries. This idea is also relevant in urban-rural relations; recessions have stronger effects in rural areas. The situation leads to fast migration.

CSÁKI (2009) considers the coordinating activity of the state an important priority. According to him: "The development of agriculture is based on the private sector. However, help from the state and effective control are also indispensable. Thus production and the market demand a more effective cooperation between the state and the private sector. The role of the state should decreasingly manifest itself in direct intervention and financial support. The most important task of the state – presently when agriculture and food markets are going through transformations – is to guarantee safe and healthy food production and to gradually develop rules and institutional conditions of the market operations."

According to the article of the Treaty on the Functioning of European Union, it has to be noted in connection with aids granted by states, that the Government – when creating and applying aid constructions operated from solely national sources – has a scope for action within the frameworks of the

EU rules on existing aids. According to the article no 107 (1), aid granted by the state is irreconcilable with the internal market, thus it is forbidden.

For the 2014–2020 period we have to work hard to achieve compromise so that the ever so important state support investment for live stock farming, agrarian damage alleviation and agrarian marketing. could constitute a significant part of national agricultural sector subsidization system in the future, too.

The European Commission may give us permission for this. Investment and rural development aids are increasing constantly, however they are not enough to eliminate the backwardness of the countryside. Proportions are indicated on figure 1.

AKI (Research Institute of Agricultural Economics) calculation based on data from Ministry of Rural Development

Preservation of natural resources

The notion of **natural resources** expresses the link between nature and human economic activities, thus it involves the range of natural elements that may be used in energy generation, food production and as industrial raw materials. Furthermore, when talking about **natural resources** we refer to natural potentialities that humans utilize to meet their needs on their given state of development.

R. MAGDA (2010) expounds that two-thirds of our country's natural resources and more than a fifth of the national wealth is provided by soil of distinguished significance whose rational utilization is one of the main tasks of the economy.

The quality of the soil is a determinant factor from the viewpoint of rural economy too, rational land utilization is an economic question, and thus we have to take advantage of it. When estimating land economic factors that influence the yield has to be taken into consideration.

An essential condition of life is water. Our country has outstanding possibilities in this field, but utilizes it only partially.

Mankind is constantly shaping nature with its activities. This intervention is inseparable from the usage of nature. Environmental regulation is important in order to conserve the state of nature. The aim of natural regulation is to ensure that agricultural organizations carry on their activities in a way that the state of nature remains permanently in proper quality, meaning that certain norms concerning quality of nature have to be respected by everyone.

Polluting sources have to be followed with great attention and where necessary we are obliged to intervene. Such

pollutions are air- and water pollution, and pollution caused by waste. Waste management is legally regulated. Hazardous water management requires special attention. Conversation of biodiversity is fundamental on behalf of our future. In spite of the provisions of international organizations, the EU and certain member states, dangers threatening biodiversity still exist, in fact they are getting worse. Societies transform natural habitats in order to meet their needs therefore way many species get to extreme peril. Infrastructural developments that were not thought out carefully mean the biggest dangers, because for most species of the fauna the cutting up and isolation of their habitat can be fatal.

Biodiversity is also a natural resource; its sustenance is an important element of the preservation of „ecological equilibrium". Not even those who work in the agrarian sector can estimate the real value of natural resources, for traditional economic attitude neglects environmental damage and decrease of natural resources, and underestimates future value of natural resources.

Ecological economics as a new discipline translates the evaluation of biodiversity (that by the way was evaluated according to different views so far) to the language of economy. There are more methods available to the economic evaluation of biodiversity. Direct value is manifested at the utilization of certain natural resources, indirect value, however, shows the value they would have manifested had they not been destroyed. (STANDOVÁR – PRIMACK, 2001)

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