

CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE  
FACULTY OF ECONOMICS AND MANAGEMENT



# AGRARIAN PERSPECTIVES



**PROCEEDINGS**

of the 19<sup>th</sup> International Scientific Conference

September 14 – 15, 2010

Prague, Czech Republic

**ISBN 978-80-213-2123-6**

# PROGRAMME COMMITTEE

## Head of the programme committee:

Prof. Ing. Jan Hron, DrSc., dr.h.c.  
Czech University of Life Sciences Prague

## Members of the programme committee:

Prof. Ing. Peter Bielik, PhD, dr.h.c.  
Slovak University of Agriculture in Nitra

Dr. Stephen Clark  
Nova Scotia Agricultural College

Prof. Ing. Vladimír Gozora, PhD, dr.h.c.  
School of Economics and Management in Public Administration Bratislava

Prof. Dr. David Harvey  
University of Newcastle

Prof. Dr. Wim J. M. Heijman  
Wageningen University and Research Center

Prof. Dr. Heinrich Hockmann  
Martin Luther University Halle Wittenberg

Prof. Ing. Magdalena Hrabánková, CSc., prof.h.c.  
University of South Bohemia in České Budějovice

Prof. PhDr. Stanislav Hubík, CSc.  
Mendel University in Brno

Dr. Eamon Lenihan  
University College Cork

Doc. PhDr. Michal Lošťák, PhD  
Czech University of Life Sciences Prague

Prof. Thomas Payne, PhD  
University of Missouri, Columbia

Dr. Derek Shepherd  
University of Plymouth

Prof. Ing. Miroslav Svatoš, CSc.  
Czech University of Life Sciences Prague

Prof. Ing. Pavel Tomšík, CSc.  
Mendel University in Brno

Prof. Dr. László Villányi, CSc., dr.h.c.  
Szent Istvan University Gödöllő

Prof. Janusz Zmija, PhD, DSc.  
University of Agriculture in Krakow



<b>Foreword .....</b>	<b>1</b>
<b>ECONOMICS.....</b>	<b>3</b>
<b>The impact of subsidies on agricultural enterprises capital structure choice.....</b>	<b>5</b>
Renata Aulová	
<b>Agricultural Subjects Productivity Development Examination by adopting the Malmquist indexes – the Case of Slovakia.....</b>	<b>13</b>
Daniela Hupková, Peter Bielik, Matúš Vadovič	
<b>The Effect of Crossbreeding on Profit in Hungarian Sheep Farms Producing for Market .....</b>	<b>21</b>
Béla Cehla	
<b>Soft Information and European Corporate Governance: The Contributions of Textual Analyses.....</b>	<b>29</b>
James E. Cicon, Stephen P. Ferris, Armin J. Kammel, Gregory Noronha	
<b>Benefits and costs of species diversity and the formation of riparian from buffer zones in Prince Edward Island in Canada .....</b>	<b>35</b>
Qin Xu, J. Stephen Clark, Samuel Asiedu, Luboš Smutka, Robert Lewis	
<b>The function of agricultural extension agents‘ network in the East of Hungary .....</b>	<b>43</b>
Krisztina Dajnoki, Károly Pető, Éva Bácsné Bába	
<b>Perspectives for Applicability of Low Quality Water in Irrigated Agriculture .....</b>	<b>49</b>
Valentin Kazandzhiev, Peter Dimitrov	
<b>On the Future of Direct Payments: CAP Bond Revisited.....</b>	<b>57</b>
David Harvey	
<b>Socio-economic Characteristics impact on Peruvian Cocoa Farmers‘ Welfare: Acopagro Cooperative - A Case Study .....</b>	<b>67</b>
Angie Higuchi, Masahiro Moritaka, Susumu Fukuda	
<b>The evaluation of disparities in economic performance in the regions of the Czech Republic .....</b>	<b>77</b>
Jaroslav Jánký	
<b>Stochastic Frontier Model with Fixed Management of Czech Organic Agriculture.....</b>	<b>87</b>
Zdeňka Malá, Michal Malý	
<b>How applicable is the GTAP database in agriculturally oriented CGE modelling for the case of the Czech Republic? An empirical analysis .....</b>	<b>95</b>
Zuzana Křístková	
<b>The Financial Crisis: Implications for Nigeria’s Seven-Point Agenda.....</b>	<b>105</b>
Lenihan Éamon, Stephen Onakuse	
<b>The debt analysis of agricultural companies in the Slovak Republic .....</b>	<b>117</b>
Silvia Miklovičová, Jana Miklovičová	
<b>The Experience of Poland in Implementing Performance Budgeting in Central Government Regional Administration.....</b>	<b>125</b>
Jarosław Olejniczak, Dorota Bednarska-Olejniczak	
<b>Oligopoly competition on food market – theory and practice.....</b>	<b>133</b>
Severová Lucie, Šrédľ Karel	
<b>Commodity structure competitiveness of the agrarian trade of the “old” and “new” EU member states .....</b>	<b>145</b>
Luboš Smutka, Ondrej Miffek, Michal Steininger, Ondrej Škubna	
<b>Knowledge and financial skills of rural youth in Poland.....</b>	<b>155</b>
Monika Szafránska	

<b>Econometric Analysis of the Relationship between Wholesale Price and Consumer Price in the Pork Agri-food Chain in the Czech Republic.....</b>	<b>163</b>
Lenka Šobrová	
<b>Global trends in risk management support of agriculture.....</b>	<b>173</b>
Jindřich Špička	
<b>The energy balance of agricultural production and its political impacts.....</b>	<b>181</b>
Václav Vilhelm	
<b>MANAGEMENT AND ENTREPRENEURSHIP.....</b>	<b>189</b>
<b>Investigating Performance Management Systems in Organizations of Public and Competitive Sphere in Hungary.....</b>	<b>191</b>
Eva Gergely	
<b>Stakeholder analysis applied to safety issues in food production: what are the issues in terms of trust and risks and their implications? A sample analysis. ....</b>	<b>201</b>
Joan Harvey	
<b>Tuning of Production Management.....</b>	<b>211</b>
Jan Hron, Tomáš Macák	
<b>The Role of Fairness and Interdependence in International Business-to-Business Marketing Relationships.....</b>	<b>219</b>
Lisa Scheer, Donald Lund, Irina Kozlenkova	
<b>Dairy farm development plans in the EU.....</b>	<b>225</b>
Jiří Mach, Pavla Hošková, Richard Selby, Helena Řezbová	
<b>Ownership concentration and capital structure in the food industry sector of polish companies listed on the Warsaw Stock Exchange.....</b>	<b>233</b>
Jakub Marszałek, Bogna Kazmierska-Józwiak	
<b>Concession as the perspective form of public-private partnership development in the realization of large capital intensit projects in Russia.....</b>	<b>241</b>
Elena Selevanova	
<b>Cross-cultural Communication in Town-twinning.....</b>	<b>249</b>
Klára Šimonová, Luděk Kolman	
<b>Using Experiential Learning in Marketing Communication Course.....</b>	<b>257</b>
Václav Švec, Tereza Kaderábková	
<b>RURAL DEVELOPMENT.....</b>	<b>265</b>
<b>Testing causality between unemployment and population changes in rural areas in the Czech Republic.....</b>	<b>267</b>
Michaela Antoušková, Zdeňka Malá, Gabriela Červená	
<b>Same vision – different fulfillment (comparative study of a Czech and a German village).....</b>	<b>275</b>
Helena Hudečková, Lenka Pancová, Adéla Ševčíková	
<b>Cross-border Cooperation and Regional Development – Case Studies of Two Villages in the South Bohemia Region.....</b>	<b>283</b>
Jakub Husák	
<b>The Method for the Selection of Regions with Concentrated State Aid.....</b>	<b>291</b>
Igor Krejčí, Andrea Hornická	
<b>The Meaning of Legitimacy in the Local Political Process.....</b>	<b>299</b>
Michal Kubálek	

<b>EU subsidised projects in the frame of the National Development Plan and the New Hungary Development Plan in the Hajdúszoboszló and Karcag local labour system.....</b>	<b>307</b>
Oláh Judith, Miklós Pakurár	
<b>Analysis On The Objective Indicators Of Life Quality In Hajdú-Bihar Country.....</b>	<b>317</b>
Anett Sörös, Adrián Nagy, Károly Pető	
<b>INFORMATION MANAGEMENT AND QUANTITATIVE METHODS .....</b>	<b>325</b>
<b>ICT Support for Agritourism .....</b>	<b>327</b>
Zdeněk Havlíček, Václav Lohr, Petr Benda	
<b>Methodological instrument for complex regional development evaluation and regional categorization .....</b>	<b>335</b>
Tomáš Hlavsa	
<b>Knowledge maps in decision making using GIS support.....</b>	<b>343</b>
Dana Klimešová, Helena Brožová	
<b>Forecast of inflation rate by Box-Jenkins methodology .....</b>	<b>349</b>
Julie Poláčková	
<b>Unusual Statistical Views of the Household Expense Structure in the Czech Republic .....</b>	<b>357</b>
Radka Procházková	
<b>Instruments of methodology for assessment of the levels of living of the population.....</b>	<b>365</b>
Libuše Svatošová	
<b>Applying Principles of Service Science.....</b>	<b>373</b>
Tomáš Rain, Ivana Švarcová	
<b>Geographical analysis of the current agricultural threats .....</b>	<b>379</b>
Václav Vostrovský, Dana Klimešová	





## Foreword

It is a great honour for me to officially open the *Agrarian Perspectives 2010* Conference, which is now already in its 19<sup>th</sup> year. The tradition of the conference is linked with the *Czech University of Life Sciences* and, in particular, with the Faculty of Economics and Management, which is the largest economic faculty in the Czech Republic.

During the last two decades the *Agrarian Perspectives* Conference has become an important international event that attracts scholars from very diverse fields – economics, management, sociology, political science, and international studies. What they share in common is mutual interest in understanding issues that are related to rural regions and people who live there. The content of this book of proceedings clearly reflects this interest.

The presented collection of papers is a result of careful evaluation (double-blind peer review) to ensure that they match the scope of the conference and meet the criteria of topicality and adequate academic standards. On this basis, works of 45 participants from 10 different countries, who presented their proceedings within the official conference programme, have been selected. The book of proceedings is divided into four thematic parts that correspond with the conference sections – (1) Economics, (2) Management and Entrepreneurship, (3) Rural Development, and (4) Information Management and Quantitative Methods. Each section provided an opportunity for welcoming scientists from different parts of world and in this way it facilitated a truly international discussion of the conference topics.

At this point I would also like to acknowledge the work of people, who generously helped with the preparation and organization of the *Agrarian Perspectives*. They are the members of the programme committee, members of the organization committee and academic staff of the Faculty of Economics and Management.

Professor Jan Hron  
*Head of the Programme Committee*



# **Economics**



# The impact of subsidies on agricultural enterprises capital structure choice

Renata Aulová<sup>1</sup>

<sup>1</sup>Department of Economics, Faculty of Economics and Management,  
Czech University of Life Sciences Prague,  
Kamýcká 129, 165 21 Prague 6 Suchbát, Czech Republic  
aulova@pef.czu.cz

**Annotation:** The paper deals with assessing the impact of subsidies (direct payments) on the efficiency of capital structure choice for selected group of farms. Their capital structure of is represented by usage of both equity and debt capital, particularly by their relationship and structure. Choice of forms of capital is determined mainly by their availability and price. Expenses associated with the acquisition of forms of capital are determined predominantly by the maturity of capital, the risk degree and their payment. For the farmers, after the Czech Republic accession to the EU, our country has opened the possibility of drawing subsidies, that have a very significant impact not only on the business economics but also on the whole branch of the national economy. This article aims to verify the hypothesis, whether direct payments have an impact on the efficient choice of capital structure and which forms of capital are mostly influenced by this. To verify this hypothesis so-called weighted average cost of capital (WACC) has been used - it allows to assess the efficiency of the choice of capital resources. To calculate the WACC, we use two different approaches. First approach is based on the generally known theory, using the cost of equity and debt capital. Especially determining the cost of equity is very problematic task for the farms. In this case these costs were determined as so-called opportunity cost. Cost of debt capital is then expressed by the ratio: interest expense / bank loans. Second approach is based on the so-called rating model, which was methodically adjusted by the Ministry of Industry and Trade of the CR to achieve better fit for the Czech enterprises. These costs were calculated with and without the inclusion subsidies. Based on the calculations, it was possible to determine which types of capital are the most affected by the subsidy entitlement, and also to deduce the effective choice of capital structure. The panel data set we use is drawn from the database of the Creditinfo Firms' Monitor, collected by Creditinfo Czech Republic, s.r.o. Specifically, we use information from the final accounts of chosen farms.

**Key words:** capital structure, direct payments, weighted average cost of capital, efficiency, Czech agriculture.

**JEL classification:** D 24, Q 12

## 1 Introduction

Capital is regarded in the classical and neo-classical theory as one of three main product factors besides land and labour. As the capital (financial) structure of an enterprise, we regard the structure of financial resources from which the property of the enterprise issues [9]. Abundance of capital is a prerequisite for investment, business growth, and thus for the competitiveness of the company as a whole. Capital, however, must be spent efficiently, in other words at least cost. Capital cost represents a very significant value which should be regularly monitored and evaluated in the enterprise. Determining the cost of capital not only helps to evaluate capital sources in the enterprise, but also to evaluate their usage. Estimation of the cost of capital has been explored by a number of scientists engaged in defining and developing approaches and methodologies for calculating cost of capital [1, 2, 3, 7]. The most common method of calculating the cost of capital is the method of WACC, which represents the weighted average cost of capital and takes into account several conditions that affect the profitability of investment. This approach also respects the required return on both equity

ownership and equity structure and also the expected debt capital. For the agriculture sector, however, specific cost of capital was created, and it has not yet been resolved.

## 2 Data and Methodology

This article aims to verify the hypothesis, whether the direct payments have an impact on the efficient capital structure choice and what forms of capital are mainly influenced by this. Ten agricultural enterprises (legal persons) with the largest area of land (in 2008), and for which was possible to obtain necessary data for the period 2004-2008, have been chosen as the subjects of this study. To achieve the objective, respectively to verify the hypothesis, so-called weighted average cost of capital (WACC) has been used. It allows to track the effectiveness of the choice of capital resources. To define the impact of direct payment of WACC, they were calculated with the inclusion and excluding direct payments. To calculate the WACC, we use two approaches. The first approach is based on the generally known method of calculating, when the WACC is estimated using the cost of equity and debt capital. Second approach is based on the so-called rating model, which was methodically adjusted by the Ministry of Industry and Trade of the CR for better fit for the Czech enterprises. These costs were calculated with and without the inclusion subsidies. Based on the calculations, it was possible to determine which types of capital are the most affected by the subsidy entitlement, and also to deduce the effective choice of capital structure.

The panel data set used is drawn from the database of the Creditinfo Firms' Monitor, collected by Creditinfo Czech Republic, s.r.o. in selected enterprises and data from the publicly available database maintained by the State Agricultural Intervention Fund (SAIF), containing information about provided direct payments. SAIF, that collects information about provided single area payment scheme in agricultural operators, has been used to determine ten largest enterprises. Based on the share of SAPS with a unit rate in a given year, the size of enterprises was defined. According to the calculated land area of per hectare, the farms were then sorted out, and ten largest enterprises were chosen. Chosen farms were further tested and their cost of capital was assumed.

### 2.1 Average Cost of Capital

The method of average cost of capital allows assessing the efficiency of the utilization of both financial resources and general corporate capital of the company. WACC method is the most common method used in practice to calculate the cost of capital. The advantage of this method is the calculation of the average cost of capital as it takes into account several conditions that affect the profitability of investment and also respect the required return on equity ownership structure and the expected equity and debt capital [6]. To calculate the WACC, we use the breakdown of capital (equity / other sources). For other sources, specifically for the purpose of this calculation, we consider: equity (E = Equity) and long-term payables (D = Debt). These two items represent the fundamental source of capital for long-term financing. The formula used in this article to calculate the WACC is defined as follows [5]:

$$i(\text{WACC}) = r_e \times \frac{E}{(E + D)} + r_d \times (1 - t) \times \frac{D}{(E + D)} \quad (1)$$

Where:

- i (WACC) = Average Cost of Capital,
- $r_e$  = Cost of Equity,
- $r_d$  = Cost of Debt,
- E + D = All invested Capital (Equity and Debt),
- E = Equity

D = Debt,  
t = Tax.

Second approach used in this article for the calculation of WACC (and utilized in the Czech Republic) is based on the methodology of the Ministry of Industry and Trade (MIT). WACC is then defined as the undertaking would be equity. Also, the independence of WACC to the capital structure is assumed. According to this methodology, WACC is defined as follows [8]:

$$WACC = r_f + r_{LA} + r_{business} + r_{FinanStab} \quad (2)$$

Where:

$r_f$  = risk free rate - these values were calculated based on calculations by the MIT

$r_{LA}$  = function (parameters describing the size of the company)<sup>1</sup>

$r_{business}$  = function (parameters describing the creation of productive forces)<sup>2</sup>

$r_{FinStab}$  = function (parameters describing the relationship between assets and liabilities)<sup>3</sup>

## 2.2 Cost of Equity

Capital cost is one of the most characteristic variable for WACC and is mainly determined by business risk. For the purpose of this paper, we use a sophisticated method of determining the average cost so-called CAPM. According to the CAPM, cost of equity is defined as follows [4]:

$$r_e = r_f + \beta \cdot (r_m - r_f) \quad (3)$$

Where:

$r_f$  = risk free rate – respectively, appropriate rate of return government bonds, treasury bills.

$\beta$  = coefficient representing the degree of market risk through the balance, sensitivity to changes in stock market portfolio. This factor has been for the agricultural sector based on data available on the website Aswath Damoradan ([www.damoradan.com](http://www.damoradan.com)), section „Updated data“, Farms/Agriculture in Europe.

$r_m - r_f$  = risk market premium – also this value was estimated on the basis of the above procedure for beta.

## 2.3 Cost of Debt

For the purpose of this paper, we use two methods to calculate Cost of debt ( $r_d$ ). The first method defines the cost of debt as a cost corresponding to the average interest rate, determined on the basis of size and price of loans to now [5]. On the base of obtained data it

<sup>1</sup> If onerous sources > 3 mld. CZK  $r_{LA} = 0.00\%$ , if onerous sources < 100 mil. CZK  $r_{LA} = 5.00\%$ , if onerous sources > 100 mil. CZK but < 3 mld. CZK, is used this formula:  $r_{LA} = \frac{(3 \text{ mld. CZK} - \text{onerous sources})^2}{168,2}$

<sup>2</sup> EBIT/Assets risk is dependent on the indicators and conditions for valuable consideration of substitution debt capital equity capital (to work with debt capital). The condition reads:  $\frac{EBIT}{A} \geq \frac{(EC + BI + O)}{A} * \frac{U}{BL + O}$ ,  $X1 = \frac{(VK + BU + O)}{A} * \frac{U}{BU + O}$ ,  
if  $\frac{EBIT}{A} > X1 \Rightarrow r_{business} = 0,00\%$  if  $\frac{EBIT}{A} < 0 \Rightarrow r_{business} = 10,00\%$

<sup>3</sup> If the total liquidity > XL  $r_{FinStab} = 0.00\%$ , if the total liquidity < 1  $r_{FinStab} = 10.00\%$ , if the total liquidity > 1, but < XL than  $r_{FinStab}$  is calculated:  
 $r_{FinStab} = \frac{(XL - \text{total liquidity})^2}{10 * (XL - 1)^2}$

was not possible to determine the volume of short-and long-term loans and these are calculated together as one item, bank loans:

$$i(r_d) = \frac{\text{Interest Expense}}{\text{Bank Loans}} \quad (4)$$

The second method is based on the definition of cost of debt as the cost of the corresponding average interest rate (without distinction of long term or short term loans) of non-financial enterprises, with the use of information from the Czech National Bank. Both methods of calculating the cost of debt are considered as cost that the company is obliged to pay to the creditors, and thus is able reduce the business tax base. Therefore, the cost is adjusted in the calculation of WACC as follows:

$$N_{CK} = i(r_d) * (1 - d) \quad (5)$$

Where:  $N_{CK}$  = Cost of Debt %  
 $i(r_d)$  = Loans Interest %  
 $d$  = tax coefficient (Tax Rate of Profit%/100)

## 2.4 Subsidies

Since the Czech Republic accession to the EU, the farms have the chance to draw the EU's subsidies. This has a very significant impact not only for business economics, but also for the whole sector of the economy. In terms of business economics, the farms' subsidies are reflected in operating income, thus affect the operating profit, and hence the equity. As a result, there is a distortion in the financial results of the company. Therefore, in this paper, we calculate with a without subsidies in the WACC, namely the single area payment scheme subsidies (SAPS) as they have the biggest impact on the financial results (operating profit). To calculate the WACC excluding subsidies, data about SAPS reached by individual enterprises were used (yearly published by SZIF). The following values were then reduced by the related items in the financial statements (operating income, operating profit and equity). Since subsidies for farms represent another important source of financing, and in most enterprises basically replace equity, it would be appropriate to calculate also the cost of the subsidy in WACC [1]. Determination of this cost is problematic because of two things – the applicant spends minimal cost to obtain SAPS, but on the other hand, and the servant does not require any kind of equivalent value.

In addition, it is not possible to conclude the minimum required rate of return (internal rate of return achieved), as it is possible in the case of subsidies linked to specific investment activities, which investments have in order to be able to meet the provisioning support, and in this way will define the cost of the subsidy in calculating WACC.

## 3 Results and Discussion

Ten chosen companies were monitored in the period of 2004 – 2008. We used financial statements submitted to the examination of a group of farms on the basis of the estimated average cost of capital with and without the inclusion of direct payments. To find the best way for calculating WACC for agricultural enterprises, several approaches have been used. Detailed specifications of WACC variables (calculated with the cost of debt expressed as the average interest rate in the company) are shown in the tables below:



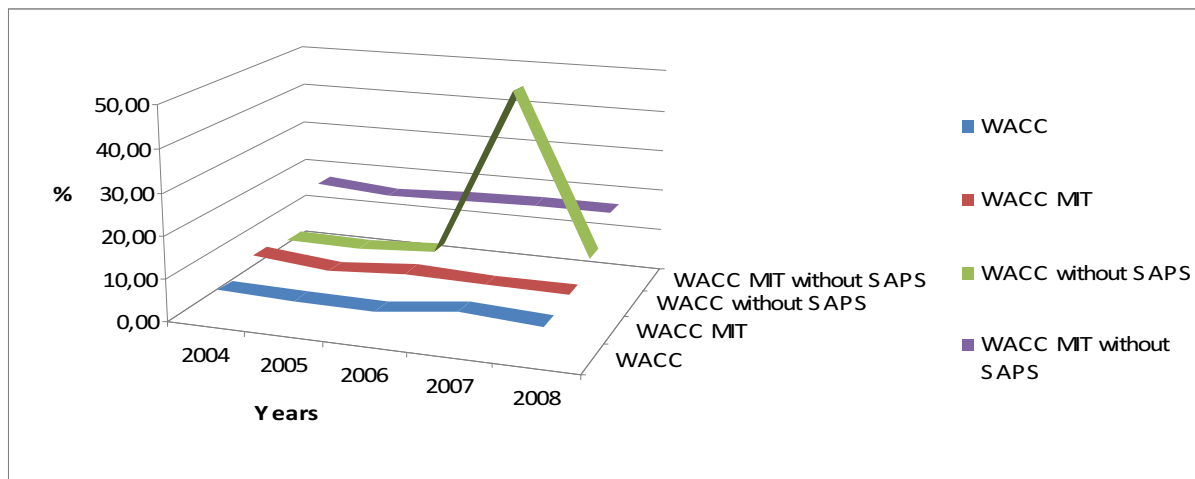
**Table 1.** Development indicators of WACC (in %, 2004-2008) in a group of chosen enterprises (including the average interest rate debt).

Indicator (in %)	Year				
	2004	2005	2006	2007	2008
WACC	6,72	6,14	6,25	8,38	7,30
WACC MIT	9,24	7,63	9,10	8,47	8,47
WACC without SAPS	7,91	7,59	8,75	49,06	11,22
WACC MIT without SAPS	17,63	16,10	16,63	17,06	17,11

**Source:** own calculation

The average value of WACC calculated by the formula (1) and using formula (4), reaches the reference interval 6.14 to 8.38 %, which means that company using 1 CZK as a capital produces cost of 0.0614 - 0.0838 CZK. In terms of time development, it can be stated that the lowest WACC was achieved in 2005 and highest one in 2007. Development of these values was mainly influenced by development in the cost of debt and related development in corporate taxation. This caused a reduction of tax rates and the proportional representation of both equity and debt (there was a reduction in the proportion of equity to total liabilities during the monitored period). Average value of WACC calculated by (2) ranged from 7.63 to 9.24%. The results achieved by the methodology of MIT do not reflect sufficiently on its own structure and debt capital and, thus the resulting values are mainly affected by the various risks to which this formula calculates.

With regard to the calculation of WACC adjusted for subsidies in the agricultural sector (which means a very important source of financing affecting operating income and therefore the company's equity), it has been clearly shown that the cost of capital increased, i.e. the efficiency of capital structure was lowered (using both methodologies). The average value of WACC calculated by (1) and (4) ranged from 7.59 to 49.06 %. The large variations in these values are mainly due to the situation in the farm ZD Mořina, of which cost of capital reached about 60 % of total loans in 2007 – this greatly distorted the indicator, since the cost of debt in this case was calculated as the average interest rate achieved in business. Results from WACC were also influenced by confusing the distinction between interests from short term and long term bank loans. The distortion of obtained result of WACC can be caused by high volatility of volume of short term loan in time. Results from WACC (2) ranged from 16.10 to 17.63%. This increase was caused mainly by one component of the WACC, namely business risk, which significantly increased due to negative EBIT. The average value of WACC achieved in the monitored period is captured in the following graph:



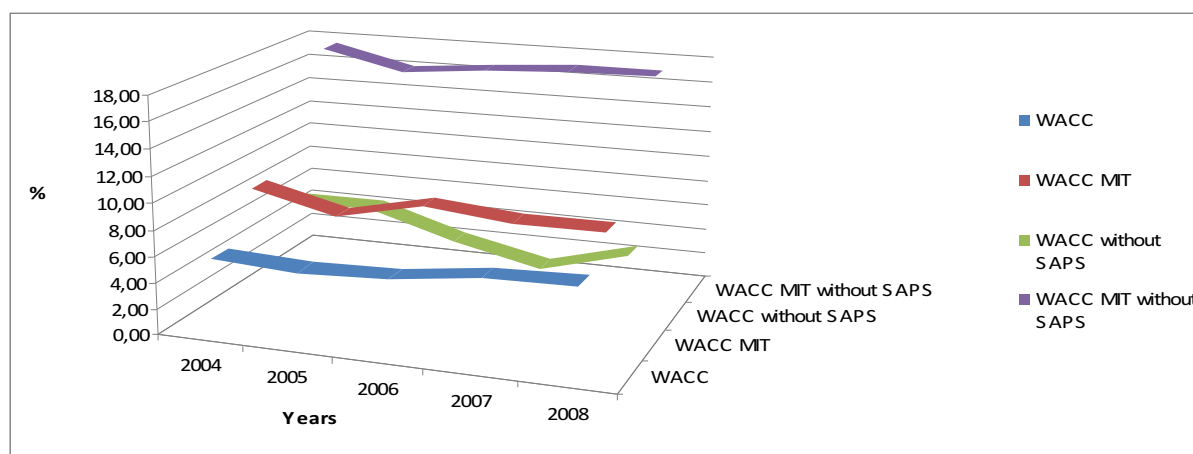
**Figure 1.** Development indicators of WACC (in %, 2004-2008) in a group of chosen enterprises (including the average interest rate debt).

Therefore, for the reason of not influencing the results of WACC by average interest rate in the enterprise, WACC was calculated on average interest rates on loans for non-financial corporations basis (5). This better reflects the situation on the financial market and there is no interest rate data distortion caused by enterprises' inner data. The results of these calculations are given below:

**Table 2.** Development indicators of WACC (in %, 2004-2008) in a group of chosen enterprises (including the average interest rate on loans to non-financial corporations).

Indicator (in %)	Year				
	2004	2005	2006	2007	2008
WACC	5,60	5,30	5,55	6,40	6,57
WACC MIT	9,24	7,63	9,10	8,47	8,47
WACC without SAPS	6,36	6,44	4,47	3,01	4,81
WACC MIT without SAPS	17,63	16,10	16,63	17,06	17,11

Source: own calculation



**Figure 2.** Development indicators of WACC (in %, 2004-2008) in a group of chosen enterprises (including the average interest rate on loans to non-financial corporations).

Based on the calculated values, it can be concluded that the cost of debt, defined as the average interest rate on loans to non-financial corporations, according to the results of the WACC (1), is more balanced, There is considerable inter-annual variation(as it was the case in previous calculation). Generally, we can see a growing trend. As for the calculation of WACC (2), above mentioned changes are not influenced by interest rate used, as they reflect only selected risks. From this perspective, this approach is recommended in the case of our chosen group of enterprises, as the calculation of average interest rate in each company from public information is not possible. It was also impossible to calculate interest expense with distinction if this comes from short term or long term bank loans. This fact can cause distortion of obtained result of WACC. Direct payments influence only the level of equity (not the other forms of capital) and this is only the case of direct payments as the company's input equal to other own source of financing.

## 4 Conclusions

In terms of the calculations and comparisons the following conclusions can be made:

- Direct payments as subsidy option for agricultural enterprises affect the amount of equity

and therefore they are reflected in the company's financial resources by increasing the percentage of equity to total liabilities. This method influenced not only the efficiency of capital structure choice, in terms of weighted average cost of capital, which is demonstrably lower than the adjusted accounting data (i.e. subsidies as another financial source are not included).

- The average cost of capital does not calculate with the financial sources obtained from direct payments as an additional source of financing. Determination of these costs is very problematic since the granting of subsidies linked to the SAPS are with minimal costs for the applicant and by the service provider is required minimal consideration. In addition, it does not seem, as in the case of subsidies linked to specific investment activities, that the minimum required rate of return (internal rate of return achieved), which has investments in order to be able to meet the provisioning support, and in this way will define the cost of the subsidy in calculating WACC.
- Methodology of calculating the WACC according to MIT does not reflect the capital structure in enterprise and therefore the WACC is not affected. Risks that are the part of the WACC calculation are rather defined for the industry areas and its use in the other areas is problematic. Also, the setting of whole methodology is problematic – e.g. in case of negative EBIT (very common phenomenon in agriculture connected to deduction of direct payments), the risk is defined the same way as in case of positive EBIT.
- Defining the average cost of capital is a very important indicator for the individual companies. It should be regularly calculated and assessed. Also, each company should choose individual forms of capital on the basis of the average cost of capital with the aim to lower the final WACC and have the capital structure in the company the most effective.

## Acknowledgements

Research presented in this paper is the result of a research grant MSM 6046070906 “Economics of Czech agriculture resources and their efficient usage within the framework of multifunctional agri-food systems”.

## References

1. Aleknevičienė V., Jaktūnaitė D.: Estimation of Cost of Own Capital: Methods and their Application in the Companies of Agricultural Sector. Proceedings of the International Scientific Conference „Economic Science for rural Development“, Finance and Credit diversification, No. 11, 2007. Jelgava 2007. ISBN 9984-784-06-1.
2. Cigola M., Peccati L.: On the comparison between the APV and the NPV computed via the WACC. European Journal of Operational Research 161, 2005. Elsevier, 2003. P. 377-385. ISSN 0377-2217. DOI: 10.1016/j.ejor.2003.08.049.
3. Damoradan A.: Applied Corporate Finance: A User's Manual (Paperback). Second Edition. New Jersey: Johns Wiley & Sons, Inc., 2006. ISBN 0-471-66093-0.
4. Jindřichovská I., Blaha Z.: Podnikové finance. Praha: Management Press, 2001. ISBN 80-7261-025-2.
5. Kislingerová, E.: Manažerské finance. 2. přepracované a doplněné vydání Praha: C. H. Beck, 2007. ISBN 978-80-7179-903-0.
6. Král, B. a kol.: Manažerské účetnictví. Praha: Management Press, 2002. ISBN 80-7261-062-7.
7. Miller R. A.: The weighted average cost of capital is not quite right. The Quarterly Review of Economics and Finance 49, 2009. Board of Trustees of the University of Illinois, 2006. P. 128-138. ISSN 1062-9769. DOI: 10.1016/j.gref.2006.11.001.

8. Ministerstvo průmyslu a obchodu ČR. Finanční analýza průmyslu a stavebnictví 2007. Dostupné [online] <<http://www.mpo.cz/dokument43538.html>> [cit-27-08-2009].
9. Rosochatecká E., Tomšík K., Židková D.: Selected problems of capital assets of Czech agriculture. Agricultural Economics- Czech, 54 (3) 2008. Institute of Agricultural Economics and Information, 2008. P. 108-116.

# Agricultural Subjects Productivity Development Examination by adopting the Malmquist indexes – the Case of Slovakia

Daniela Hupková<sup>1</sup>, Peter Bielik<sup>1</sup>, Matúš Vadovič<sup>2</sup>

<sup>1,2</sup> Faculty of Economics and Management, Slovak University of Agriculture,  
Nitra, Slovak Republic

<sup>1</sup>{daniela.hupkova, peter.bielik@fem.uniag.sk},  
<sup>2</sup>matus.vadovic@gmail.com

**Annotation:** Dynamic environment, where the agricultural companies are operating in the Slovak Republic after accession in the European Union, is required continuity in increasing efficiency of production process to preservation and growth of domestic producers' competitiveness on single agrarian market in the EU. Analysis of productivity and efficiency development could be used to assess of trend and factors influencing this process. Productivity development and production process efficiency examination during time could provide information about trend but also about individual components which influence total development. The objective of paper is total productivity development estimation of basic industry companies in Slovakia during period 1999-2007 and identification of developmental trends. The results of analysis indicate that in the development of average Total Factor Productivity (TFP) we can state that in spite of unfavorable conditions in individual periods the total productivity during analyzed period increased.

**Key words:** Total Factor Productivity, Malmquist Indexes, technical efficiency change, technological change, agriculture

**JEL classification:** C1 - Econometric and Statistical Methods: General, C14 - Semiparametric and Nonparametric Methods

## 1 Introduction

Generally is possible to state that objective of the rational owner respectively management is the profit maximization with minimal inputs applying, that means costs. This objective is possible to define as optimizing task which solution could be achieved with applying linear programming methods that means non parametric approach or by econometric methodology – parametric approach.

Theoretical background of technical efficiency analysis set Koopmans, T. C. (1951) who defined technical efficiency as permissible variation input/output vector in which is technically not possible to increase any output (or to reduce any input) without simultaneous reduction of other output or increasing other input. Later Farrell, M. J. (1957) derived input oriented indexes of technical efficiency expressed by radial reduction of all inputs at given level of outputs. These indexes were later inspiration for Charnes, A., Cooper, W. W. and Rhodes, E. (1978), Banker, R. D., Charnes, A. and Cooper, W. W. (1984) a Fähre, R., Grosskopf, S. and Lovell, C. A. K. (1985, [6]) who established the DEA (the Data Envelopment Analysis)

There exist many opinions on relation between productivity development (efficiency) and legal forms in transition economies. Petrick, M. a Weingarten, P. [7] maintain a position that countries in which remain sustentative companies with large area of cultivated land from central planed economy period but which simultaneously adapted organizational structure to new system and optimized number of employees reach higher efficiency measure.

The process of stabilisation and production and productivity growth started in the year 2004 after accession of the new member states into the EU by reduction number employees in agriculture, creation of new institutions and market relations stabilisation [9].

Ciaian, P. – Pokrivčák, J. – Drabik, D. [4] comparing efficiency of family and corporate farms stated that the transaction costs of using markets should also be taken into consideration. In many transition countries, output markets suit large corporate farms and prevent the development of family farms.

The average level of technical efficiency is around 90% for agricultural companies in the Czech Republic. Considering that technical efficiency is an important determinant of the competitiveness of Czech agricultural companies, ways must be found to reduce the waste of resources due to inefficient use of inputs. [5]

Results of Sojková, Z. – Kropková, Z. – Benda, V. [8] indicated that the average technical efficiency of Slovak farms is different over the investigated time period 2003 - 2005. From the results of this study, the increase in technical efficiency of Slovak farms in 2004 within is evident. It could be caused by the changes in the subsidy system and by better climatic conditions in 2004.

## **2 Data and Methodology**

The objective of paper is estimation of total productivity development of basic industry subjects in the Slovak Republic. Analysed period is 1999-2007. The dataset was obtained from the Central Database of the Ministry of Agriculture of the Slovak Republic (Information Letters of the MoA SR for the period 1999 – 2007). The base file comprised subjects which object of activity was agricultural basic industry and file was divided into two sub-files due to different accountancy. In the year 2007 were into sub-file Legal Entities (LE) integrated 1 365 companies, in proportion: 539 agricultural cooperatives (AC), 820 business companies (BC) and 6 state enterprises. Legal Entities farmed 1 422 360 hectares of agricultural land (average per one company is 1 042 ha of agricultural land, for AC it is 1 363 ha, for BC it is 835 ha, for state enterprises is it 490 ha).

Into sub-file Independently operating farmers were included 1 144 farmers which farmed 146 493 ha agricultural land. Average area of cultivated land is 128 ha per one Independently operating farmer.

Into analysed file were included all legal entities and Independently operating farmers which farmed more than 40 ha of agricultural land, declared more than 20 head of cattle or combination of cattle breeding and farming on agricultural land as well as companies farming without land or with small area of land, but in sector of intensive animal breeding.

Independently operating farmers incorporated in analysed data file represented 7.45 % from subjects which received payments in 2007 (15 532 subjects). Share of legal entities on total quantity of subjects receiving payments in the year 2007 was 8.89 % but they are farming more than three quarters of authorized area for all agricultural subjects in Slovakia.

From the fundamental data file was in the next step by random choice draw up panel data for the period 1999 – 2007 which comprised of 338 legal entities and 83 independently operated farmers so that incorporate proportional representation of subjects farming in all regions in Slovakia, the frequency of subjects in individual regions was considered also. Analysed data file was redeemed from subjects counting extreme values of variables applied in analysis which will affect total results.

## Estimation of total productivity on the basis the Malmquist indexes

Malmquist indexes ( $Mi$ ) are based on measuring the radial distances of input or output combinations during period  $s$  and  $t$  considering reference technology.  $Mi$  can be, according to the analyses aim, estimated from two points of view (input  $Mi$  and output  $Mi$ ). In paper were applied input  $Mi$  from the reason that we examined increase of companies' effectiveness by input reduction what in comparison with output maximization we consider to better way of increasing competitiveness.

Input oriented  $Mi$  is aimed on input level needed to produce output  $q_s$  and  $q_t$  combination regarding to reference technology. In case if we will apply time period  $s$  as the basic  $Mi$  will reached subsequent form

$$m_i^s(q_s, q_t, x_s, x_t) = \frac{d_i^s(q_t, x_t)}{d_i^s(q_s, x_s)}, \quad (1)$$

Where  $d_i^s(q_t, x_t)$  represent firm's production effectiveness in period  $t$  by applying technology from period  $s$  and  $d_i^s(q_s, x_s)$  represent firm's effectiveness in period  $s$  by applying technology from period  $s$ .

In case if firm is effectively in both periods,  $d_i^s(q_s, x_s) = 1$ , than  $Mi$  reached form

$$m_i^s(q_s, q_t, x_s, x_t) = d_i^s(q_t, x_t). \quad (2)$$

With similar method is possible to define also  $Mi$  with reference period  $t$  but also is possible apply specification of input  $Mi$  which is geometric mean  $Mi$  in periods  $s$  and  $t$  [3].

$$m_i(q_s, q_t, x_s, x_t) = \left[ m_i^s(q_s, q_t, x_s, x_t) \times m_i^t(q_s, q_t, x_s, x_t) \right]^{\frac{1}{2}} \quad (3)$$

In event if we want to estimate  $Mi$  on the basis previous equation we need to estimate four radial measures considering to production frontier defined in the equation 1. Only in case if firms are effective in both periods is possible to estimate this relation by two measures. As the biggest problem of  $Mi$  estimation we can determine the knowledge of technology during analysed periods (necessity to exactly specify form of production function). According to this fact is necessary to obtain detail information about inputs and outputs at enterprise level and also about production function estimation methodology which are not requiring individual firm efficiency prerequisite.

The equation 2 is simplified version of  $Mi$  in which we assumed that firms are effective in both periods. But if we assume possibility that firm could be not effective is possible to define two components influencing productivity (TFP) changes of individual firms as change of effectiveness and technology. After revisions input  $Mi$  reached form

$$m_i(q_s, q_t, x_s, x_t) = \frac{d_i^t(x_t, q_t)}{d_i^s(x_s, q_s)} \left[ \frac{d_i^s(x_t, q_t)}{d_i^t(x_t, q_t)} \times \frac{d_i^s(x_s, q_s)}{d_i^t(x_s, q_s)} \right]^{\frac{1}{2}}, \quad (4)$$

where formula outside brackets represent change of technical efficiency (Farell technical efficiency) during period  $t$  and  $s$ . This measures is interesting from aspect that it shows us

how input using in concrete companies improved with time change and if positive change of technical efficiency (if the equation reached value greater than one) or negative change (value is lower than one) is reached.

Part of the equation in square brackets represents technological change measure. It is geometric mean of technology movement between analysed periods  $x_s$  and  $x_t$ .

### 3 Results

According to the fact, that in data file are except legal entities represented also independently operating farmers, were from reason of limited monitoring individual variables in accounting statements of this primary producers group selected for Mi calculation one output – total revenues (incomes) and four inputs - total assets, cultivated land according LPIS - Land Parcel Identification System and total costs (expenditures). By selecting inputs and outputs were except of data availability also considered approaches of other authors who examined technical efficiency in group of agricultural companies ([9], [2]).

The development of individual variables which were used by TFP development estimation and its individual components as inputs and outputs is reported in table 1.

**Table 1.** Descriptive statistics of output and inputs for whole analysed data file during period 1999 – 2007

	1999	2000	2001	2002	2003	2004	2005	2006	2007
<b>Revenues (incomes) total in thousands SKK.</b>									
Mean value	21 160	22 815	25 206	25 263	23 155	24 718	25 017	26 108	27 211
Maximum	145 050	121 528	131 027	128 108	110 304	111 273	118 902	127 061	132 670
Minimum	179	493	496	562	165	658	14	914	309
Variance coefficient	0.862	0.825	0.829	0.828	0.836	0.830	0.843	0.828	0.816
<b>Total assets in thousands SKK.</b>									
Mean value	35 714	34 873	36 279	36 653	34 561	35 522	36 308	35 939	37 223
Maximum	239 863	157 352	178 677	151 445	138 058	134 951	140 422	134 742	159 041
Minimum	140	157	143	343	498	529	6	494	494
Variance coefficient	0.957	0.918	0.903	0.878	0.886	0.863	0.857	0.847	0.830
<b>Farmed land according to the LPIS (farmed land in utilization) in ha</b>									
Mean value	866	875	892	892	891	840	842	829	826
Maximum	3 675	3 675	3 675	3 675	3 425	3 425	3 425	3 425	3 425
Minimum	13	13	25	35	38	39	38	40	27
Variance coefficient	0.631	0.609	0.603	0.600	0.592	0.585	0.574	0.566	0.566
<b>Costs (expenditures) total in thousands SKK</b>									
Mean value	21 546	23 238	24 851	25 147	24 627	24 216	25 048	25 818	26 378
Maximum	143 125	125 444	134 367	123 321	108 695	106 063	110 210	125 053	128 977
Minimum	295	492	535	432	150	655	13	708	393
Variance coefficient	0.855	0.824	0.829	0.825	0.825	0.833	0.834	0.833	0.817

Source: own calculations



During analysed period increase of input prices into agriculture continued mainly due to increase of fuel, feeds, seeds, fertilizers and plant protection prices. New technologies implementation (in crop production) had favourable impact on fuel usage decrease however total material and energy usage did not decrease due to increase of diesel prices (by 29.1% in the year 2006).

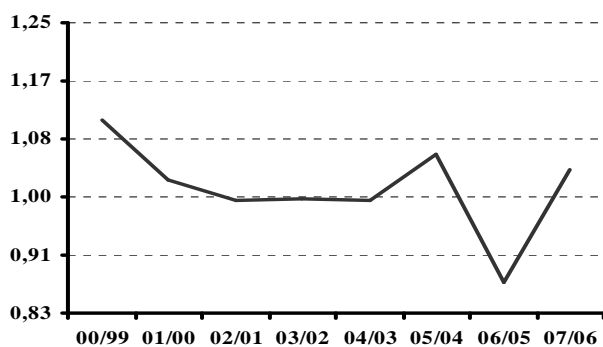
Significant changes which in final consequences influenced TFP development were recorded in case of revenues which as an output were influenced by natural conditions (especially due to weather influence during growing season) during individual years.

In this part is stated complex evaluation of development during analysed period 1999 – 2007 which assess development of total productivity and its elements, changes of production efficiency as well as in effective assets exploiting in time.

As it was mentioned before in material and methodology part total change of productivity measured by  $M_i$  (TFP) composed of two parts as change of efficiency (EFFCH) during time which reflects on changes of efficiency in comparison with previous period and technological change (TECHCH) which represents exploiting technology in comparing with previous period.

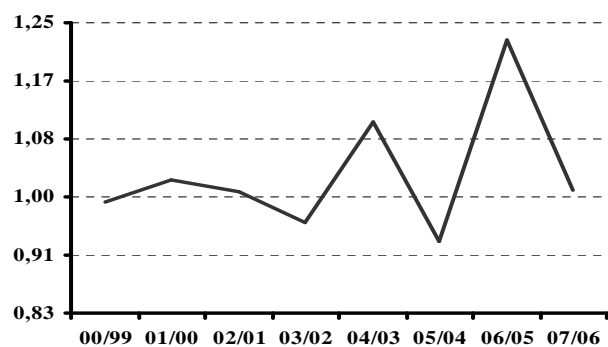
The TFP development and its components during analysed period for analysed data file as total is illustrated in graphs 1a-c.

**Figure 1a.** The EFFCH development in analysed data file



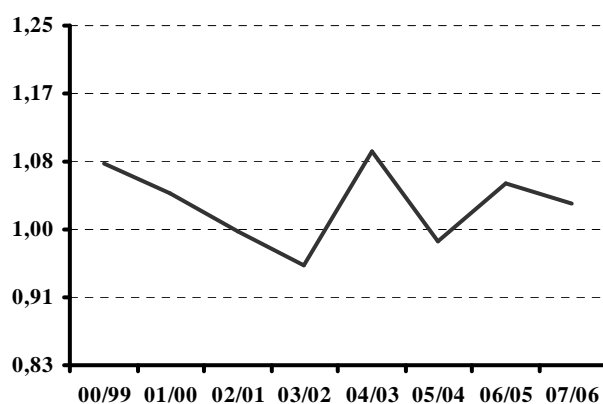
Source: own calculations

**Figure 1b.** The TECHCH development in analysed data file



Source: own calculations

**Figure 1c.** The TFPCH development in analysed data file



Source: own calculations

On the basis of analyses results is possible to state that in any studied variable was during period 199 -2007 noticed continual trend. The most stabile development was reached in case

of total productivity change which except years 2003 and 2005 reached in comparing with previous periods positive increase. Years 2003 and 2005 were characteristic by not favourable weather and climate conditions which in resort of agriculture negatively affected the significant decline of production. Similarly was not possible to unambiguously identify segment of efficiency which independently influenced total increase of productivity because during analysed period fluctuated both total productivity components. In final consequence we can state that in spite of not favourable conditions in separate period total productivity during analysed period increased.

Between the technical efficiency change measures and technical change is possible to identify inverse relation in their development. Stated is possible to explain by increasing new assets and its effective using during separate years. Increase of assets will appear in first period firstly as one time increase of costs and usually is this asset effectively used only in during next period. This fact could partially explain decrease of technical efficiency in year 2006 in comparison with year 2005 when new asset financed from the EU funds was bought. Concretely we can observe decrease of technical efficiency in 2006 in comparison with 2005 by significant increase of technological change which displayed in the year 2006. Increased investments temporarily negative influence on component technical efficiency change in long time horizon when firms stabilize production structure and eliminate not efficient asset and there is no more sharp movement in these components of total productivity.

## 4 Conclusions

Change of technical efficiency can be interpreted also as relative measure of managerial abilities to exploit inputs in given technological conditions.

The most stabile development was reached in case of total productivity change which except years 2003 and 2005 reached in comparing with previous periods positive increase. Years 2003 and 2005 were characteristic by not favourable weather and climate conditions which in resort of agriculture negatively affected the significant decline of production. Finally we can state that in spite of not favourable conditions in separate period total productivity during analysed period increased.

Change of technical efficiency could be interpreted as relative measure of managerial abilities of input utilization under given technological conditions. On the other side technological change presents changes in labour productivity based on changes in technologies and production processes. In a simplified way we can state that positive changes in technical efficiency are as the consequence of increasing knowledge level and management experiences. Unlike from technical efficiency change the technological change from great measure depends on investments into new technologies and research [1].

## References

1. Ahmad, M., Bravo-Ureta, B. E.: Dairy Farm Technical Efficiency, Measures Using Panel Data and Alternative Model Specifications. In: Journal of Productivity Analysis, 1996, No. 7, pp. 399-415.
2. Benda, V., Vadovič, M.: Model of Financial situation Estimation of Slovak Farms. In: International Scientific Days – conference. SUA, FEM, Nitra, Slovakia. 2008 ISBN 978-80-552-0061-3.
3. Caves, D. W. Christensen, L. R., Diewert, W. E.: The Economic Theory of Index Numbers and the Measurement of Input, Output, and Productivity. In: Econometrica, 1982, No.50, pp. 1393-1414.

4. Ciaian, P., Pokrivčák, J., Drabik, D.: Transaction costs, agricultural production specialization and farm structure in Central and Eastern Europe. In: *Post-Communist Economies*, 1465-3958, Vol. 21, Issue 2, 2009, pp. 191 – 201, ISSN: 1465-3958 (electronic).
5. Čechura, L.: Estimation of technical efficiency in Czech agriculture with respect to firm heterogeneity. In: *Agricultural Economics – Czech*, 2010, 56(4), pp. 183-191. ISSN 0139-570X.
6. Färe, R., Grosskopf, S., Norris, M., Zhang, Z.: Productivity Growth, Technical Progress, and Efficiency Change in Industrialized Countries. In: *The American Economic Review*, 1994, No. 84, pp. 66-83.
7. Petrick, M., Weingarten, P.: The Role of Agriculture in Central and Eastern European Rural Development: An Overview. In: *The Role of Agriculture in Central and Eastern European Rural Development: Engine of Change or Social Buffer?*, Halle: Institute of Agricultural Development in Central and Eastern Europe, 2004, pp. 1-19.
8. Sojková, Z., Kropková, Z., Benda, V.: Slovak agricultural farms in different regions – comparison of efficiency. In: *Agricultural Economics – Czech*, 2008, 54 (4), pp. 158-165. ISSN 0139-570X.
9. Swinnen, J. F. M., Vranken, L.: Reforms and Efficiency Change in Transition Agriculture. In: *Conference of the European Association of Agricultural Economists*, Copenhagen, 2005.



# The Effect of Crossbreeding on Profit in Hungarian Sheep Farms Producing for Market

Béla Cehla<sup>1</sup>

<sup>1</sup>University of Debrecen, Centre for Agricultural and Applied Economic Sciences  
Faculty of Applied Economics and Rural Development  
4032 Debrecen, Böszörményi Str. 138, Hungary  
cehlab@agr.unideb.hu

**Annotation:** The present problems of the Hungarian sheep farms may be classified in three fields from the point of view of sustainability. The first field is the social problems, the second one is economic and market problems, and the third group contains environmental problems. In my investigation, within the economic problems I dealt with the unfavourable breed structure, which considerably contributes to the low yields typical to Hungary nowadays. For solving the problem, improving the production and breed structure may be a specific objective. Its expected results are developing breeding programs and growing yields. The effect of crossbreeding, being one of the several possibilities of increasing yields as a separately activity, on the economic result were investigated.

A calculation model was constructed, which made the effect of the change of input data calculable for the operation of the modeled farm producing for the market. The modeling reflected the improving effect of the crossbreeding on the results. The effect of crossbreeding was modeled on the basis of input prices of the year 2009 in case of farms of 5, 10, 20 and 30 ESU.

When preparing scenarios, the natural input data of the model was changed on the basis of results of previous researches, such as yield, weight gain, feed conversion, milk producing ability of ewes; that is every feature influencing the production which is changed by the effect of crossbreeding. The positive effects of crossbreeding were evaluated. Other factors (other input parameters) were not changed during running the scenarios.

Sheep farms of every firm size in Hungary may reach positive results only by profit supplementing subsidies. In this way it was a relevant issue of my calculation that whether only crossbreeding may result in an extra yield, by which the Hungarian sheep production for the market may be viable, even without profit supplementing subsidies.

**Keywords:** mutton, crossbreeding, yield, model

**JEL classification:** Q12

## 1 Introduction

The Hungarian sheep industry copes with significant problems. According to Nábrádi [8] the central problem is the fact that the competitiveness of the Hungarian sheep enterprise has been weakening, it is of low efficiency in added value and innovation in this way it is not sustainable in the long run. The basic problem may be divided into three fields, such as social problems, economic and market problems, and the third group contains environmental problems.

In my investigation, within the economic problems I dealt with the unfavourable breed structure, which considerably contributes to the low yields typical to Hungary nowadays. The feature of the problem had been already defined by Jávora and Oláh [5]. Low yields resulted in

the presently typical low profitability of the enterprise, which is proved by Beládi's and Kertész's as well as Cehla's economic calculations.

For solving the problem, improving the production and breed structure may be a specific objective. Its expected results are developing breeding programs and growing yields. The effect of crossbreeding on the economic result was investigated being one of the several possibilities of increasing yields as a separately activity. According to Jávör and Oláh [5], the success of cross-breeding is influenced by several factors:

- Genetically stability and homogeneity of the starting breeds
- The genetic distance between the breeds
- The ability to combine
- Great additive genetic value, ability

Choosing the type of cross-breeding depends basically on the number of breeds available in the breeding stocks in the country. On the basis of data of the Hungarian Sheep and Goat Breeding Association the number of lacaune, German mutton merino, Ile de France, Suffolk and Bábolna tetra is significant in breeding stocks. All these mean that lacaune may be considered to develop the maternal line for the indirect livestock cross-breeding, any mutton typed breed is available for cross-breeding of F1 offspring.

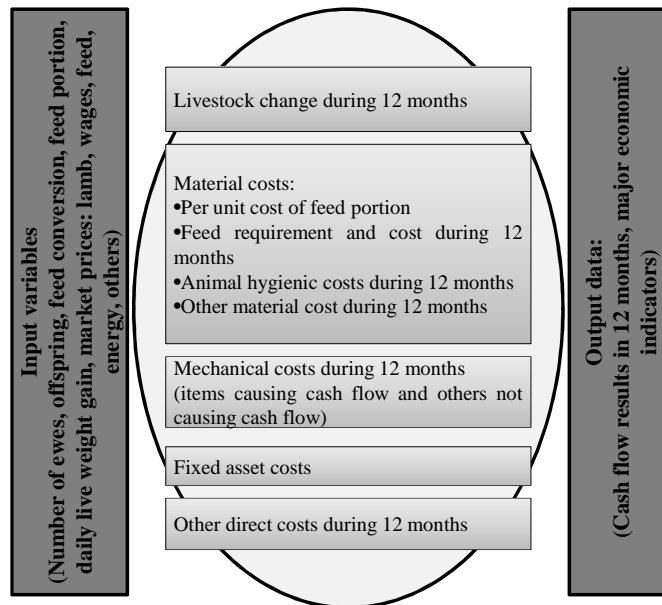
The direct livestock cross-breeding is the next possibility, in which merino ewes are cross-bred by breeds for mutton purpose, improving the production parameters of the offspring. According to the number of animals, the merino ewes may be cross-bred by German mutton merino, Bábolna tetra, Ile de France and Suffolk breeds. Crossbreeding by German mutton merino is not favourable because of the small genetic distance between the two breeds, thus cross-breeding by Ile de France, Suffolk and Bábolna tetra is preferable, which may be realized even in the practice.

Regarding previous researches for improving the Hungarian merino, the British milking and Ile de France breeds are appropriate due to their excellent body forms [7]. Jávör [6] suggests the British milking and Ile de France breeds for improving the merino according to the S/EUROP qualification. Jakubec [8] finds using terminal sire line to produce lambs of high quality necessary. He suggests Suffolk and Ile de France breeds.

I examine the positive effects in case of cross-breeding merino ewes by Ile de France and Suffolk breeds using the recommendations and experimental data of Jakubec[4], Pajor et al. [9], and Póti et al. [10], besides this I investigate the effect of the change of feed conversion. To sum up the general aim of my investigation is to reflect the effect of cross-breeding and feed conversion on profit.

## **2 Data and Methodology**

To carry out the comparison on the basis of economic firm sizes, a model was constructed representing the operation of sheep farms producing for the market. I used market data for the year 2009 in my investigation (Figure 1).



Source: own construction

**Figure 1.** Model Representing the Operation of Sheep Farms Producing for the Market

Technological characteristics typical to sheep farms producing for the market were built in the model, which made quantifying the changes of indicators of feed conversion and live weight gain typical to the breed possible. The basic data for the investigated firm sizes are introduced in *Table 1*.

When selecting the economic firm sizes I considered the fact that more than 99% of the sheep owners have a flock below 1000 animals. Per farm average farm size is 145 ewes [1].

**Table 1.** Basic Data of the Investigated Firm Sizes

Denomination/Firm size	5 ESU	10 ESU	20 ESU	30 ESU
Ewe lamb (animal)	21	42	84	126
Ewe (animal)	127	253	505	756
Ram (animal)	2	5	10	15
Grassland (ha)	19,05	37,95	75,75	113,4

Source: own elaboration

In case of merino the basic model was utilized. In direct livestock cross-breeding the used technology is differs from that in the practice, thus a separate model version had to be constructed for the cross-bred stock. The modification was necessary in the livestock changing plan and when calculating the daily live weight gain.

In case of Hungarian merino sheep on the basis of own experimental results the daily weight gain is 251 grams and 281 grams for lambs and weaned lambs, respectively. Regarding the results of Póti et al. [10] the daily live weight gain of Ile de France F1 weaned lambs is 360,5 grams, while that of Suffolk F1 weaned lambs is 358,5 grams.

### 3 The Effect of Cross-Breeding on Profit

One of the objectives of the investigation was to reflect the effect of cross-breeding on economic indicators in case of farms of different firm sizes. In my examinations I studied the

effect of producing Ile de France F1 and Suffolk F1 lambs on the economic indicators. The Hungarian merino formed the basis. When running the model a per kilogram average feed conversion of 3,3 kilograms got into the model as input data. The result of the examination is contained in Table 2.

**Table 2.** The Major Economic Indicators of Hungarian Merino Farm Producing for the Market in the Investigated Firm Sizes in the year 2009

Merino	5 ESU	10 ESU	20 ESU	30 ESU
Cash Flow (EUR/ewe)	25,46	18,28	22,58	31,27
Revenue (EUR/ewe)	55,47	56,06	55,96	56,62
Production value (EUR/ewe)	111,62	112,20	112,13	111,74
Production cost (EUR/ewe)	83,13	102,62	96,71	85,81
Net profit (NP) (EUR/ewe)	28,49	9,58	15,42	25,93
NP without subsidy (EUR/ewe)	-27,66	-46,57	-40,74	-29,18
NP ewe subsidy (EUR/ewe)	-16,81	-35,71	-29,89	-19,40
NP own land.& ewe subsidy (EUR/ewe)	-13,49	-32,39	-26,56	-16,07

Source: own elaboration

Evaluating the data of the table it is clear that the cash flow is the most favourable in case of farms of 30 ESU. At the same time certain indicators have different tendencies in case of certain firm sizes (cash flow is the lowest in 10 ESU, NP is the highest in 5 ESU). The reason of all these is the gradually changing costs, which modify the result of the farms through changing the number of ewes of the modeled farm.

The objective of my investigation was to economic evaluate the improving effect of cross-breeding, which was carried out by data in references and the model constructed by myself based on practical crucial data. Table 3 contains the effect of cross-breeding of Ile de France breed on profit.

**Table 3.** The Effect of Ile de France Cross-Breeding on the Major Economic Indicators in the Investigated Firm Sizes in the Year 2009

Ile de France F1	5 ESU	10 ESU	20 ESU	30 ESU
Cash Flow (EUR/ewe)	5,13	1,39	-0,48	-1,08
Revenue (EUR/ewe)	11,87	11,78	11,86	11,93
Production value (EUR/ewe)	2,23	2,15	2,21	2,27
Production cost (EUR/ewe)	-1,15	1,85	3,53	4,09
Net profit (NP) (EUR/ewe)	3,38	0,30	-1,31	-1,82
NP without subsidy (EUR/ewe)	13,02	9,93	8,33	7,85
NP ewe subsidy (EUR/ewe)	13,02	9,93	8,33	7,85
NP own land.& ewe subsidy (EUR/ewe)	13,02	9,93	8,33	7,85

Source: own elaboration

The table contains not the results of the model run, but the extra profit and cost reduction compared to the merino flock. Evaluating the cash-flow, cross-breeding improved the balance only in case of farms between 5 and 10 ESU, while the balance decreased in farms of 20 to 30 ESU. The table reflects the fact that the cross-breeding increased the revenue significantly.



The explanation is simple, due to cross-breeding the live weight gain of lambs improves, the weight is higher under a single period of time, which results in higher yield compared to merino and in this way the revenue changes as well. Cost reduction happened only in farms of 5 ESU, while the costs increased in the other firm sizes. The cross-breeding affected the profit in the same way in every scenario, it decreased the loss by 7,8 to 13,2 EUR/ewe in the investigated firm sizes.

When examining Suffolk F1 final product, the results were similar to Ile de France (Table 4). The reason of the results is that the parameters of F1 lambs coming from the cross-breeding of the two breeds differ only to a small degree from each other.

**Table 4.** The Effect of Suffolk Cross-Breeding on the Major Economic Indicators in the Investigated Firm Sizes in the Year 2009

Suffolk F1	5 ESU	10 ESU	20 ESU	30 ESU
Cash Flow (EUR/ewe)	5,16	1,42	-0,45	-1,05
Revenue (EUR/ewe)	11,85	11,76	11,84	11,91
Production value (EUR/ewe)	2,21	2,13	2,19	2,25
Production cost (EUR/ewe)	-1,19	1,80	3,48	4,04
Net profit (NP) (EUR/ewe)	3,40	0,32	-1,29	-1,79
NP without subsidy (EUR/ewe)	13,04	9,95	8,36	7,87
NP ewe subsidy (EUR/ewe)	13,04	9,95	8,36	7,87
NP own land.& ewe subsidy (EUR/ewe)	13,04	9,95	8,36	7,87

Source: own elaboration

To sum up we can conclude that the purposeful cross-breeding may modify the profit of the given farms in case of flock for market purposes in the above mentioned ratio (per ewe revenue 11 to 11,9 EUR). Shepherds have to do nothing in practice to achieve this, just to use the registered rams of the given breed during the rutting period. One of the detectable effects of cross-breeding is that it increases the yield, the average weight of lambs. At the same time, it decreases the length of fattening period, which means that compared to merino the cross-bred lambs reach the selling average weight in a shorter period of time. Though the results do not reflect but the reduction of the length of fattening period decreases the costs of feeding. The cost reduction is not reflected in the data because due to cross-breeding the technology is modified and all these alter the inner cost structure of the enterprise. Factors causing the mentioned cost changes are the followings:

- The length of fattening period decreases – the number of feed portions reduce – the feeding cost decreases
- As the F1 lambs of cross-breeding producing final product are for sale, the model lacks ewe lamb groups, which in one hand increases the ratio of revenue and decreases the cost of feeding at the same time, on the other hand it increases the expenses as well, because the flock freshening comes from external source.

To sum up cross-breeding has positive effects on the operation of every farm producing for the market.

#### 4 The Effect of Food Conversion on the Profit

The next critical point of producing quality and economical hogget is the feed conversion. The model reflected the effects of feed conversion on costs and profit at the same time. The model was run twice; first, with a feed conversion of 3,3 kg/kg, second, with a feed conversion of 4 kg/kg. Comparing the two scenarios made revealing the fact possible that in

what ratio the decline of feed conversion concerns the realized profit and what kind of cost changes may be occur.

The effect of decline in feed conversion of Hungarian merino is summarized in Table 5.

**Table 5.** The Effect of Decline in Feed Conversion on the Major Economic Indicators in the Investigated Firm Sizes in the year 2009 in case of Merino flock

Merino	5 ESU	10 ESU	20 ESU	30 ESU
Cash Flow (EUR/ewe)	-1,60	-1,59	-1,60	-2,05
Revenue (EUR/ewe)	0,00	0,00	0,00	0,00
Production value (EUR/ewe)	0,00	0,00	0,00	0,00
Production cost (EUR/ewe)	1,30	1,30	1,34	1,35
Net profit (NP) (EUR/ewe)	-1,30	-1,30	-1,34	-1,35
NP without subsidy (EUR/ewe)	-1,30	-1,30	-1,34	-1,35
NP ewe subsidy (EUR/ewe)	-1,30	-1,30	-1,34	-1,35
NP own land.& ewe subsidy (EUR/ewe)	-1,30	-1,30	-1,34	-1,35

Source: own elaboration

In case of merino a decline of 0,7 kg/kg decreases the cash flow by 1,6 to 2 EUR/ewe. The increase of costs is 1,3 to 1,35 EUR/ewe and the decline of feed conversion affects the profit to the same ratio.

Similar values can be seen in Tables 6 and 7, where the effect of decline in feed conversion of Ile de France F1 and Suffolk F1 flock was investigated.

**Table 6.** The Effect of Decline in Feed Conversion on the Major Economic Indicators in the Investigated Firm Sizes in the year 2009 in case of Ile de France F1 flock

Ile de France F1	5 ESU	10 ESU	20 ESU	30 ESU
Cash Flow (EUR/ewe)	-1,99	-2,01	-2,04	-2,06
Revenue (EUR/ewe)	0,00	0,00	0,00	0,00
Production value (EUR/ewe)	0,00	0,00	0,00	0,00
Production cost (EUR/ewe)	1,30	1,64	1,71	1,73
Net profit (NP) (EUR/ewe)	-1,30	-1,64	-1,71	-1,73
NP without subsidy (EUR/ewe)	-1,30	-1,64	-1,71	-1,73
NP ewe subsidy (EUR/ewe)	-1,30	-1,64	-1,71	-1,73
NP own land.& ewe subsidy (EUR/ewe)	-1,30	-1,64	-1,71	-1,73

Source: own elaboration

In case of cross-bred flocks and within them in farms higher than 10 ESU the decline of feed conversion increases the costs to a greater extent than in case of merino flocks. All these mean that when using cross-breeding the fattening conditions and technologies have to be ensured appropriate for the requirement of the crossbred breed.

**Table 7.** The Effect of Decline in Feed Conversion on the Major Economic Indicators in the Investigated Firm Sizes in the year 2009 in case of Suffolk F1 flock

Suffolk F1	5 ESU	10 ESU	20 ESU	30 ESU
Cash Flow (EUR/ewe)	-1,98	-2,00	-2,03	-2,05
Revenue (EUR/ewe)	0,00	0,00	0,00	0,00
Production value (EUR/ewe)	0,00	0,00	0,00	0,00
Production cost (EUR/ewe)	1,61	1,63	1,70	1,72
Net profit (NP) (EUR/ewe)	-1,61	-1,63	-1,70	-1,72
NP without subsidy (EUR/ewe)	-1,61	-1,63	-1,70	-1,72
NP ewe subsidy (EUR/ewe)	-1,61	-1,63	-1,70	-1,72
NP own land.& ewe subsidy (EUR/ewe)	-1,61	-1,63	-1,70	-1,72

Source: own elaboration

## 5 Conclusions

On the basis of the results of the investigation when merino ewes are cross-bred by mutton type rams every economic indicator increases. Though the costs rises (Table 8), the production value changes to a greater extent, thus the result of the change is positive.

**Table 8.** The Effect of Cross-Breeding on the Major Economic Indicators in the Investigated Firm Sizes in the year 2009

	5 ESU	10 ESU	20 ESU	30 ESU
Cash Flow (EUR/ewe)	+	+	-	-
Revenue (EUR/ewe)	+	+	+	+
Production value (EUR/ewe)	+	+	+	+
Production cost (EUR/ewe)	+	-	-	-
Net profit (NP) (EUR/ewe)	+	+	-	-
NP without subsidy (EUR/ewe)	+	+	+	+
NP ewe subsidy (EUR/ewe)	+	+	+	+
NP own land.& ewe subsidy (EUR/ewe)	+	+	+	+

Source: own elaboration

Although cross-breeding affects the profit positively, it is not sufficient for making the Hungarian sheep farms producing for the market competitive without subsidies. The ratio of the change is outstanding as the extra profit of the cross-breeding decreases almost to its half of the losses of shepherds (7 to 13 EUR/ewe depending on firm sizes).

According to quantifying the changes of feed conversion, the decline of feed conversion does not realize as much expense increase as in cross-bred flocks. All these points to the fact that only cross-breeding is not enough, the proper conditions necessary for the requirements of the final product lambs should be ensured as the extra yield/extra profit being reached by cross-breeding may only be achieved in this way.

## References

1. Magyar juh- és Kecsketenyésztők Szövetsége, 14 Időszaki tájékoztató, Budapest, pp. 81-95.

2. Beládi K., Kertész R.: A főbb mezőgazdasági ágazatok költség- és jövedelemhelyzete a tesztüzemek adatai alapján 2008-ban. Agrárgazdasági Információk, Budapest. Kiadó: Agrárgazdasági Kutatóintézet, 2009, pp. 155. ISBN 978 963 491 540 9.
3. Cehla B.: An economically viable plant size in meat producing shepherd stock farms, Agrár- és Vidékfejlesztési Szemle CD issue, Hódmezővásárhely, 5 évf 2010, pp. 49. ISSN 1788-5345.
4. Jakubec V.: Livest. Prod. Sci., 4. 1977, pp. 379-392.
5. Jávora A., Oláh J.: Juhtenyésztési kalauz: fajtákról , tenyésztésről, Östermelő, 2006/5, pp. 69-73.
6. Jávora A.: Innovációs lehetőségek a juhtenyésztésben. Magyar juhászat és kecsketenyésztés, 11. 2002, pp. 11-14.
7. Molnár Gy.: A magyar juhok vágott test és húsminősége, valamint az S/EUROP minősítés. Állattenyésztés és Takarmányozás, 48. 1999, pp. 702-703. HU ISSN 02301814.
8. Nábrádi A.: Az átfogó stratégia kialakításának elemei, elméleti és gyakorlati megvalósíthatóság, In: A juhágazat stratégiai kutatási terve, Kukovics S.-Jávora A. (szerk), Kiadó: K-OVI-CAP Bt, Érd, 2009 ISBN 978-963-8030-65-8.
9. Pajor F., Lácza E., Erdős O., Póti P.: Effects of crossbreeding Hungarian Merino sheep with Suffolk and Ile de France on carcass traits, In: Archiv Tierzucht 52 (2009) 2, Research Institute for the Biology of Farm Animals (FBN) Dummerdorf, Germany, pp. 169-176.
10. Póti P., Pajor F., Lácza E.: Magyar merinó, ile de france F1 és suffolk F1 bárányok hízlalási és vágási teljesítményének vizsgálata, ActaAgraria Debreceniensis, Debrecen, 2005/18, pp. 16-23. HU-ISSN 1587-1282.

# Soft Information and European Corporate Governance: The Contributions of Textual Analyses

James E. Cicon<sup>1</sup>, Stephen P. Ferris<sup>1</sup>, Armin J. Kammel<sup>2</sup> and Gregory Noronha<sup>3</sup>

<sup>1</sup>University of Missouri, Trulaske College of Business, USA  
jecdhf@mail.missouri.edu, ferriss@missouri.edu

<sup>2</sup>British Institute of International and Comparative Law and the Austrian Association of Investment  
Fund Management Companies  
Armin.kammel@voeig.at

<sup>3</sup>University of Washington-Tacoma, 1900 Commerce St.,  
gnoronha@u.washington.edu

**Annotation:** Using Latent Semantic Analysis techniques to analyze the corporate governance codes of twenty-three EU nations, we obtain a number of new findings regarding their thematic content, variability, and convergence. We determine that these codes can be decomposed into five common themes, with substantial cross-sectional variability in their relative importance. We also find that the themes contained in these codes cluster in ways that are not fully consistent with the legal regime classifications of La Porta et al. [9], leading us to construct two new country clusters. We further discover that the identity of the code issuer (e.g., government versus stock exchange) is important in explaining a code's primary theme as well as changes in theme prominence over time. Finally, we fail to find evidence of an unchecked thematic convergence towards an Anglo-Saxon model of corporate governance, with some code themes converging to U.K. practices while others diverge

**Key words:** Governance; convergence; legal regimes.

**JEL classification:** G 30, G 34

## 1 Introduction

As national economies become interconnected through global trade and communication, local standards of corporate governance have become increasingly important to investors. Beginning with the Cadbury Report of 1992, countries are adopting national codes that attempt to guide, if not implicitly regulate, the level of corporate governance enjoyed by investors in their firms. The existence of these codes now makes it possible for investors to shop national markets in an effort to invest in those economies that will best provide protection against expropriation and fraud by management or majority shareholders. Using a sample of twenty-three different European national codes spanning a variety of historical legal traditions, this study provides one of the first thematic analyses of the content, variability, and convergence in these national codes of corporate governance.

We analyze these codes through an analysis of the themes that they contain rather than a comparative examination of their individual provisions. That is, we focus on the underlying governance and regulatory themes shaping each national code rather than an analysis of the provisions contained in a code. This way of investigating national governance codes is motivated by several considerations. First, since themes are broader constructs than any single code provision, this approach allows for a higher level comparison of international governance practices. Second, we believe that changes in the relative importance of code themes are more suggestive of the future development of a nation's corporate governance than the design of any specific code provision. Finally, our analysis of code themes through the

methodology of Latent Semantic Analysis (LSA) makes tractable the comparative examination of forty-seven different corporate governance codes distributed over 23 European countries. The breadth of our sample makes an individual provision by provision empirical analysis of the codes infeasible

## **2 Data and Methodology**

### **2.1 Data Set**

Several reasons justify our choice of European national codes as the subject of this analysis. The existence of the European Union (EU) allows us to examine the impact of political and economic integration on the development of corporate governance and the associated evolution of normative company law. Further, the European economies are sufficiently capitalized to be important to the global economy, making our findings useful to an understanding of international business practices and policies. Finally, our sample of European countries provides the cross-sectional variability in legal regimes that will allow us to test how historical legal traditions influence the design of current governance practices.

### **2.2 Research Questions**

This study empirically examines three research questions as they relate to national codes of corporate governance. First, we examine the extent to which there is significant thematic variation across the codes of our twenty-three sample countries.

That is, to what extent are there meaningful national differences in the governance themes emphasized in these codes? The existence of differences in these codes can encourage competition in the market for business incorporations as investors seek the most favorable environments for their capital. Related to the issue of code variability is our analysis of similarities in theme emphasis by countries from a shared legal regime and the extent to which these themes are able to define new country clusters that differ from the categories currently used in the literature.

Our second research question focuses on differences in the thematic content of governance codes based on the issuer's identity. The effect of issuer identity (e.g., government versus stock exchange) on code content remains unexamined in the literature. Since issuers differ in organizational priorities, internal politics, and the demands of their membership, they are likely to emphasize different themes in the design of their codes. We also explore the extent to which issuer identity can explain the evolution of code thematic content.

Our third research question examines the extent to which national corporate governance codes are converging towards the U.K. model. Unlike previous studies of convergence, our analysis tests for a thematic convergence of the codes. This approach has not been previously used in the literature. Bebchuk and Roe [2], for instance, develop a theoretical path dependence approach to convergence that focuses on the effects of rules and structures in an economy and their influence on corporate ownership and governance. Khanna, Kogan and Palepu [8] lack time-series data and are able only to examine convergence as correlations between globalization and similarity in corporate governance at a given point in time. They acknowledge the limitations of their approach in identifying the true extent of governance convergence. Martynova and Renneboog [10] examine convergence based upon an international comparison of three different corporate governance indices which capture the ability of a country's laws to protect against: (1) shareholder expropriation by firm's management, (2) minority shareholders expropriation by controlling shareholders, and (3) creditor expropriation by shareholders.

Cernat [3] argues that the spread of global capitalism and its emphasis on economic efficiencies implies a competition between corporate governance systems to determine which one better serves the needs of international investors. To the extent that a particular system of governance best serves the needs of investors, one might anticipate a convergence of governance systems. Previous researchers such as La Porta et al. [9] argue that the common law system provides the best set of investor protections, suggesting that one should ultimately observe a convergence of international governance practices to United Kingdom (UK) standards

### 3 Results

The findings in this study provide new insights into each of the three research questions. Regarding our inquiry into code thematic variability, we find that national codes of corporate governance can be decomposed into five common themes with substantial cross-sectional variability in their relative importance. We also determine that theme prominence clusters across countries in ways that are not fully consistent with the widely-used legal regime classifications of La Porta et al. [9]. This leads us to construct two new governance regimes, Global Governance Practices and Baltic Civil, based on code thematic content.

While examining the second research question, we determine that the identity of the code issuer is important in establishing a code's primary theme and how it changes over time. We find that the exchange, government, and composite-issued codes emphasize the accounting/disclosure theme while industry designed codes put the greatest weight on the internal governance/board organization theme. The first corporate governance codes were written in the U.S in the 1970s, during a wave of mergers and hostile takeovers. In 1978, the U.S. Business Roundtable published a report entitled, *The Role and Composition of the Board of Directors of the Large Publicly Owned Corporation*. As noted by Aguilera and Cuervo-Cazurra [1], this report shifted the role of directors from being largely ornamental to one with substantial responsibilities, and represents the first set of guidelines designed to improve the quality of corporate governance within U.S. firms.

By the late 1980s, corporate governance codes began to emerge worldwide. In 1989, the Hong Kong Stock Exchange issued a code of best practices, followed by Ireland in 1991. The development of national governance codes accelerated with the publication of the Cadbury Report in the U.K. in 1992. Our results supplement the findings of Aguilera and Cuervo-Cazurra [1] about the effect of issuer identity on code development. They conclude that codes issued by governments and exchanges are the most influential due to their greater enforceability.

Using our thematic analysis approach, we fail to find evidence of an unchecked convergence towards an Anglo-Saxon model of corporate governance. We discover that the emphasis placed on some code themes is converging to U.K. standards while that for other themes is diverging from their corresponding U.K. level. Our results are more nuanced than those of researchers such as Coffee [4], Hansmann and Kraakman [6] and Goergen and Renneboog [5], who project an ultimate convergence to Anglo-American governance practices. Rather, our findings are most consistent with the literature on limited convergence. Although limited convergence is discussed more thoroughly in our extended paper, this literature argues that convergence in corporate governance is most likely to occur only in specific areas of the law or among a small subset of countries. Limited convergence contends that convergence will be neither comprehensive in scope nor widespread in practice.

The corporate governance codes developed throughout the European Union are not legally binding and therefore constitute an important component of European soft law. These codes are commonly based on the "comply or explain" principle. That is, companies are free to

deviate from the practices recommended in these codes as long as they explain the reasons for doing so. But as Hermes, Postma and Zivkov [7] caution, the fact that these codes are incorporated into the listing requirements of many exchanges gives them a more formal nature than “comply or explain” would imply. Also, Aguilera and Cuervo-Cazurra [1] note that codes developed by stock exchanges and governments have the strongest enforceability and hence are most likely to effect actual governance practices.<sup>1</sup> Thus, in practice, corporate governance codes are gaining increased visibility and importance as the demand for corporate transparency and accountability grows in a globalized economy

## 4 Conclusions

Through the use of LSA, we are able to examine the thematic content of the governance codes for twenty-three EU nations. Our analysis produces a number of useful findings regarding the content, variability and convergence of the themes contained in these codes.

We find that these national codes of corporate governance can be decomposed into five major themes which emphasize internal governance/board organization, state legal and regulatory effects, accounting and disclosure, industry effects, and shareholder protection. We find that there is substantial variability in the relative importance of these themes across countries, legal regimes, and issuers.

We also determine that these codes cluster in ways that are not totally consistent with the historical legal regime classifications established in the literature by La Porta et al [9]. Consequently, we construct two new groupings, Global Governance Practices and Baltic Civil Law that better capture code theme commonalities. We conclude that national governance practices are evolving beyond the confines of historical legal classifications, incorporating a more inclusive set of perspectives and orientations that are reflected in our thematic analysis. We find that the identity of the issuer is important for an understanding of code design. The identity of the code issuer is important in establishing a code’s primary theme. We also discover that theme importance changes over time and that these changes differ across issuer types. Exchange issued codes emphasize the importance of board organization and the firm’s internal governance structure while those codes issued by government agencies or composite groups place greater weight on legal/regulatory considerations. We observe that the greatest amount of change occurs within the set of industry issued codes. These codes are decreasing the importance of the accounting/disclosure and shareholder protection themes.

Although the existing corporate finance literature abounds with references to the general superiority of common law countries with respect to shareholder rights, we fail to find evidence of an unchecked convergence towards an Anglo-Saxon model of corporate governance. Rather, we determine that some elements of continental governance codes are converging to U.K. practices while others diverge. We conclude that any convergence between national codes is more likely to occur on the basis of “best practices” than convergence to a common law model.

Beyond the specific findings reported in this study, our analysis introduces a new way of thinking about code content, variability, and convergence. Rather than focusing on individual provisions, we use LSA to identify five common themes reflected in our sample of national governance codes. These themes serve as the basis of our subsequent examinations. Because these themes are broader constructs than any single code provision, this approach allows for a higher level comparison of international governance practices. Second, we contend that changes in the relative importance of code themes are more suggestive of the future

---

<sup>1</sup> National codes are also developed by professional associations, director associations, and management associations which have less ability to enforce them. These codes are essentially voluntary in nature and are unable to correct governance deficiencies.



development of national corporate governance than any specific code provision. This approach contributes to a fuller understanding of the comparative nature of these national governance codes while suggesting a useful way for researchers to examine other complex corporate or business documents.

## References

1. Aguilera, R., Cuervo-Cazurra, A.: Codes of Good Governance Worldwide: What is the Trigger?. *Studies in Organizational Management* 25 (3), 2004, pp. 415-443.
2. Bebchuk, L. A., Roe, M.: A Theory of Path Dependence in Corporate Ownership and Governance. *Stanford Law Review* 52, 1999, pp. 127-170.
3. Cernat, L.: The Emerging European Corporate Governance Model: Anglo-Saxon, Continental, or Still the Century of Diversity?. *Journal of European Public Policy* 11 (1), 2004, pp. 147-166.
4. Coffee, J.: The future as history: The prospects for global convergence in corporate governance and its implications. *Northwestern University Law Review* 93, 1999, pp. 641-707.
5. Goergen, M., Renneboog, L.: Contractual Corporate Governance. *Journal of Corporate Finance*, 14 (3), 2008, pp. 166-182.
6. Hansmann, H., Kraakman, R.: The End of History for Corporate Law. *Georgetown Law Journal* 89, 2001, pp. 439-468.
7. Hermes, N., Postma, T., Zivkov, O.: Corporate Governance Codes in the European Union. *International Journal of Managerial Finance* 2 (4), 2006, pp. 280-301.
8. Khanna, T., Kogan, J., Palepu, K.: Globalization and Similarities in Corporate Governance: A Cross-Country Analysis. *Review of Economics and Statistics* 88 (1), 2006, pp. 69-90.
9. La Porta, R., Lopez de Silanes, F., Schleifer A., Vishny R.: Legal Determinants of External Finance. *Journal of Finance* 52, 1997, pp. 1131-1150.
10. Martynoya, M., Renneboog, L.: A Corporate Governance Index: Convergence and Diversity of National Corporate Governance Regulations. Working Paper (ECGI – Finance, 2007).



# Benefits and costs of species diversity and the formation of riparian from buffer zones in Prince Edward Island in Canada

Qin Xu<sup>1</sup>, J. Stephen Clark<sup>2</sup>, Samuel Asiedu<sup>3</sup>, Luboš Smutka<sup>4</sup>, Robert Lewis<sup>2</sup>

<sup>1</sup>Department of Economics, Dalhousie University, Halifax, Nova Scotia, Canada

<sup>2</sup>Department of Business and Social Sciences, Nova Scotia Agricultural College,  
Truro Nova Scotia Canada  
sclark@nsac.ca

<sup>3</sup>Department of Plant and Animal Science, Nova Scotia Agricultural College,  
Truro Nova Scotia Canada

<sup>4</sup>Department of Economics, Faculty of Economics and Management,  
Czech University of Life Sciences Prague,  
Kamýcká 129, 165 21 Prague 6 Suchdol, Czech republic  
smutka@pef.czu.cz

**Annotation:** The study analyzes the benefits and costs of species diversity and the establishment of riparian zones from buffer zones in Prince Edward Island (PEI) in Canada. Buffer zones are areas of uncultivated land between cultivated land and watercourses meant prevent water pollution associated within the application of pesticides and fertilizers associated with agricultural production. A riparian zone is a zone within urban area that is “natural” for that environment. Since a buffer zone in PEI cannot be cultivated, it could potentially serve the dual function as both an area that mitigates pollution (a buffer zone) and an area that is “natural” for that environment (a riparian zone): A buffer zone could potentially be a riparian zone. This paper is concerned with the ecosystem creation problems existing in PEI in Canada. Specifically, the purpose of the study to is analyze the costs and benefits associated with turning buffer zones into riparian zones in PEI. The benefits of buffer zones are two types: forage buffer zones and woodlot buffer zones. Forage buffer zones do little to promote species diversity and therefore would preclude the development of a riparian from a forage buffer zone. Woodlot buffer zones have far more potential for species diversity. Three types of costs for forage buffer zones and woodlot buffer zones are studied in this research: establishment costs, opportunity costs and control costs. This study traces out the marginal cost of diversity on forage and woodlot buffer zones by examining marginal control, opportunity and establishment costs. Once these marginal costs have been deduced, various scenarios regarding marginal revenue functions (government incentive programs) are discussed to determine optimal species diversity policies on buffer zones and as a guide to public policy. On the base of the results of the analyses, it is possible to say the following: (1) A woodlot buffer zone has much more potential to promote species diversity than a forage buffer zone; (2) It would be extremely costly to existing commercial farms in PEI to establish “complete” or “perfect” riparian zones; (3) Most of the species diversity of a PEI riparian zone (approximately 90%) could be achieved from a woodlot buffer zone with a modest incentive system from the PEI government. This paper is the part of research project which was carried out by authors within the framework of their research activities.

**Key words:** Riparian zones, buffer zones, Canada, agriculture, marginal costs, ecosystem, establishment, costs, species diversity

**JEL classification:** F10

## 1 Introduction

Ecosystems sustain human life. They supply food and drinking water, maintain a stock of continuously evolving genetic resources, preserve and regenerate soils, fix nitrogen and carbon, recycle nutrients, control floods, filter pollutants, pollinate crops and much more. Despite their importance to human well-being, many of these services are under threat throughout the world. Agricultural ecosystems are by far the largest managed ecosystems in

the world. Of the total land area of about 13 billion hectares, crops and pasture occupy almost 5 billion hectares. Forests and woodlands add another 4 billion hectares. Inland, coastal and marine fisheries ecosystems also generate crucial services for humans [2].

Today, the provision of ecosystem services generally, and agriculture-based services in particular, is being challenged as never before by the combined effects of expanding populations, rapid economic growth and greater global integration. Agriculture is being asked to provide an ever-growing supply of ecosystem-based goods and services. Agriculture's role in the provision of ecosystem services depends critically on the incentives available to farmers. Healthy ecosystems provide a variety of critical goods and services that contribute, directly or indirectly, to human well-being. Ecosystem services are created by the interactions of living organisms, including humans, with their environment. These services provide the conditions and processes that sustain human life. A specific landscape might provide a range of ecosystem services. A forest at the top of a watershed not only provides timber but also facilitates or enhances soil retention and water quality (filtering contaminants from the water as it flows through roots and soil), flood control (regulating the movement of water through the watershed), pollination (provided by the pollinators inhabiting the edge of the forest), carbon sequestration (in the form of additional biomass), biodiversity conservation (including the forest habitat and the wide range of species it harbors) and landscape aesthetics [3].

One of the activities supporting the above mentioned concepts is establishing riparian zones. There is an increasing trend in trying to re-establish more natural environments within urban settings. This has led to efforts to establish "riparian zones" within the urban rural interface. A riparian zone is defined as an area within an urban setting that is a natural environment for that area. Often a riparian zone is part of a watershed which is adjacent to the watercourse, such as rivers, streams, lakes, ponds, and wetlands [7]. The species diversity in riparian zone leads to many environmental protection functions, which reduces the impacts on aquatic and terrestrial ecosystem from land use activities, such as prevention of runoff and erosion, habitat of wildlife, and temperature reduction [7]. Establishing riparian zones is more and more popular around the world, for example in Canada, China, New Zealand, and U.S. ([6]; [4]; [8]; [5]; [7]; [9]).

In Prince Edward Island (PEI) a recent land use policy commission recommended that buffer zones be established to protect watercourses (a river, stream or lake) (e.g. [6], [10]). A buffer zone is a strip uncultivated area between a watercourse and crop-cultivated land [6]. Since the area in a buffer zone is uncultivated, a buffer zone is designed to slow down or prevent erosion and runoff of fertilizer, herbicide and pesticide pollutants into watercourses [10]. Since buffer zones are areas of uncultivated land, they could potentially be riparian zones. Riparian zones are areas of uncultivated land meant to promote biodiversity. To be uncultivated and therefore qualify as a buffer, a forage crop could be planted and harvested a few times during a growing season. While this would qualify as a buffer, it would do little to promote species diversity since forages are mono-species and would not establish a riparian zone. Therefore, the simple establishment of a buffer zone may do little to promote species diversity through the establishment of riparian zones. Furthermore, the establishment of more species than a mono-species buffer zone will improve an areas ability to mitigate runoff; a riparian zone is a better buffer than a mono-species buffer zone.

The purpose of this study is to examine the private costs and benefits to farm producers of establishing riparian zones from buffer zones in PEI. First, we discuss the potential benefits of buffer zones to agricultural producers. This is followed by a discussion of the costs of species diversity on PEI buffer zones. The study concludes with a discussion concerning the public policies that will promote species diversity on buffer zones in PEI.

## **2 Data and Methodology**

In PEI, the responsibility to establish a buffer zone lies with the agricultural producer. Assuming that the producer is compliant with the requirement to set aside a certain zone land adjacent to a watercourse, producers will establish the zone that maximizes net returns by equating the marginal revenue of species diversity with its marginal cost. The aim of this study is to determine the marginal revenue and marginal cost of species diversity for PEI buffer zones.

There are three types of costs that will be studied in this research:

- 1) Establishment costs. Different species have different establishment costs. Some species are fairly cheap to establish while others are more costly. Some species may even generate a return while others may have little or no commercial value.
- 2) Opportunity Costs. Some species have commercial value on buffer zones. These include certain forage crops and tree species. Species that have little or no commercial value represent an opportunity cost due to crowding out of commercial species.
- 3) Control costs. If certain species are established within the buffer zone, then they will also be adjacent to existing cultivated land. This means they could invade the cultivated land and may require expensive eradication costs once they do invade. In this regard, different species have different potential control costs. Some species may be fairly benign and have little or no control costs. However, some species may be extremely competitive with crops on cultivated land and may have extremely high control costs.

This study will trace out the marginal costs and benefits PEI species diversity on buffer zones by examining private revenue and marginal control, opportunity and establishment costs. Once these marginal costs have been deduced, various scenarios regarding social marginal revenue functions (government incentive programs) will be discussed to determine optimal species diversity policies on buffer zones and as a guide to public policy.

## **3 Results**

### **3.1 The returns to buffer zone crops**

While normally it would be the case that a buffer zone would be left fallow and therefore be of no commercial value to the producer, this is not the case for buffer zones in PEI. There are two potential uses in areas required to be buffer zones between cultivated lands and watercourses that would still qualify as a buffer zone: a forage crop and a woodlot.

A forage crop is a grass that would be grown on the buffer zone. After formation, the land would be uncultivated in the sense that no extra ploughing would be undertaken, however, cutting taking place once or twice during each growing season. The forage could be sold as a feed or fed to on-farm livestock through grazing. On farm grazing of livestock would require a fence to be erected to keep livestock out of the watercourse. The value of the forage would therefore be the value of the feed gained by periodic harvest of the forage crop or the value of grazing to the livestock. Establishment costs are not costly since it involves a one-time seeding, and there is little in the way of maintenance costs. Occasionally, there may be need to reseed the land in a forage buffer zone to maintain the forage crop. Harvesting costs involve cutting and baling costs. It is possible to graze livestock on a forage buffer zone to avoid cutting and baling costs, but this would require the erection of fencing to keep livestock out of streams at the edge of the buffer and the watercourse.

While the establishment of a forage crop in a buffer zone would not be costly and would yield a modest return, it would do little to promote species diversity within the buffer zone beyond

the species of grasses included in the initial seeded forage crop. The frequent cutting for harvest would imply that no other species would be established within the buffer zone. Therefore, forage buffer zones would do little to promote species diversity or the formation of riparian zones.

The other possibility for commercial value on a PEI buffer zone is the formation of a woodlot. A woodlot is an area of forest that is periodically harvested for its wood. Wood is a very important energy resource in Atlantic Canada [1].

Establishment costs of woodlots are more expensive than for forage crops, because it takes longer to establish fast growing tree species over the first few years. Typically, these fast growing tree species are pine and poplar species, and, if care is taken when species are planted, yields at harvest are enhanced. For those producers who do not have livestock, woodlots may well be competitive with forage buffer zones, given that the price of energy is currently so high.

The major environmental advantage of a woodlot buffer zone over forage buffer zone is its enhanced potential for biodiversity. Since the woodlot buffer zone is harvested far more infrequently than is the forage buffer zone (approximately every 20 years, versus one or two times a year), the potential for species diversity is much larger for a woodlot buffer zone than for a forage buffer zone. The establishment of fast growing tree species is also accompanied by other annual and biannual species, promoting species diversity over the mono-species forage buffer zone.

However, woodlot buffer zones would not promote complete species diversity and therefore would not qualify as riparian zones. In fact, it is very unlikely that producers would voluntarily form riparian zones in woodlot buffer zones in PEI. The reason is related to the marginal cost of species diversity in PEI woodlot buffer zones.

Simply put, all species are not created equally in the eyes of PEI agricultural producers. There are three types of costs that are considered by agricultural producers when they consider the establishment of species in woodlot buffer zones: Establishment costs, opportunity costs and control costs.

#### Establishment costs.

Planting and maintenance costs are important costs in establishing woodlots. Some species are relatively cheap to establish and others relatively expensive. This means that marginal establishment costs for species would be rising, with the species with the cheapest establishment costs representing the lower part of the margin cost curve and those with the highest representing the highest part of the cost curve.

#### Opportunity costs.

When woodlots are formed, tree species are chosen for their relatively fast growth rates. Beyond a few fast growing tree species, slower tree species will not be chosen, and therefore there is an opportunity cost of choosing a slow growth tree species over a fast growing tree species in the loss of potential wood harvest. There is an even larger loss associated with growing species that have little or no commercial value, no matter what their growth rates. The value of non-commercial species needs to be measured in terms of non-market value, and is related to existence value, option value and the value of the species to promote biodiversity.

#### Control costs.

Buffer zones are located adjacent to existing cultivated land. Species located in buffer zones could invade existing cultivated land and become a nuisance to existing crops. Species adjacent to existing cultivated land may not in themselves be competitive with existing crops

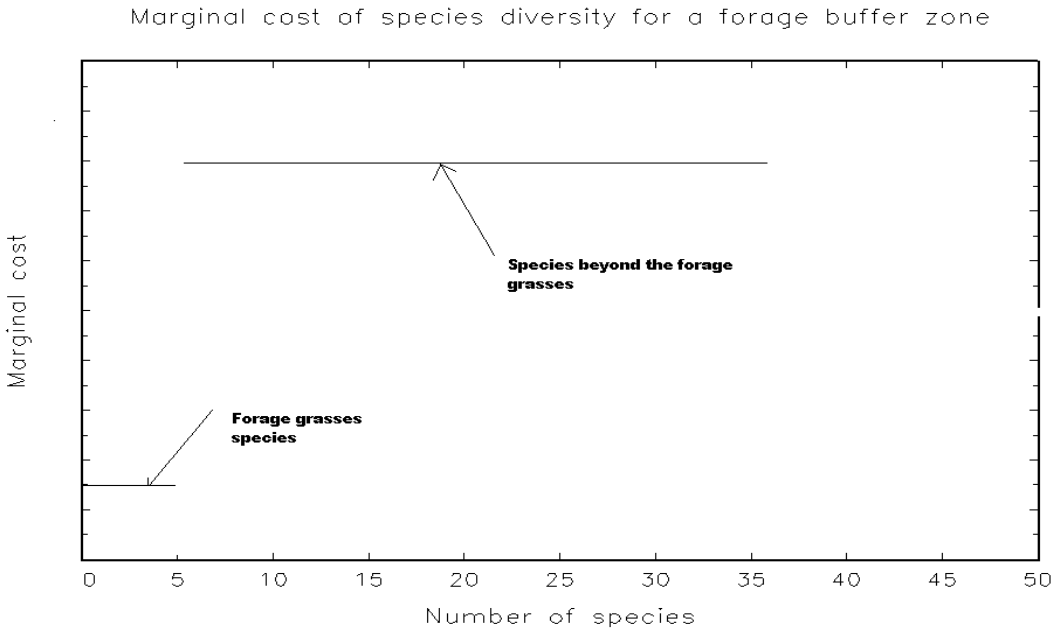
but may represent a threat to existing crops because they are hosts of pests to existing crops that would need to be controlled. Some species may be extremely costly to control, even to the extent that no allowable controls are available to producers. This means that producers are unlikely to voluntarily establish certain competitive species on buffer zones especially control costs are extremely high.

**3.2 The marginal cost of species diversity on PEI buffer zones**

Since the forage and woodlot buffer zones are so much different, it seems best to develop two marginal cost functions, one for each type of buffer zone, and then compare the two.

**The forage buffer zone marginal cost function**

The characterization of the forage buffer zone species marginal cost (SMC) function is a relatively easy exercise. This SMC is plotted in figure 1. Strictly speaking, forage is not mono-species and is typically a mixture of a few grasses, and so figure 1 shows that the first few species have a low marginal cost (the plot assumes that a forage grass planted includes five species). Since forage implies frequent cutting, planting any other species on a forage buffer zone would include establishment costs and opportunity costs, even if there were no control costs. Furthermore, it would be costly to harvest the forage without destroying the other species (especially tree species) and so harvesting costs would rise for species other than the forage species. Therefore the plot includes a fairly high marginal cost of species in addition to the forage species. For this reason, producers who form a buffer zone with forage crops are unlikely to establish species beyond those included within the forage without large incentives from government.



**Figure 1.** Species Marginal cost function for forage buffer zone  
Source: own processing

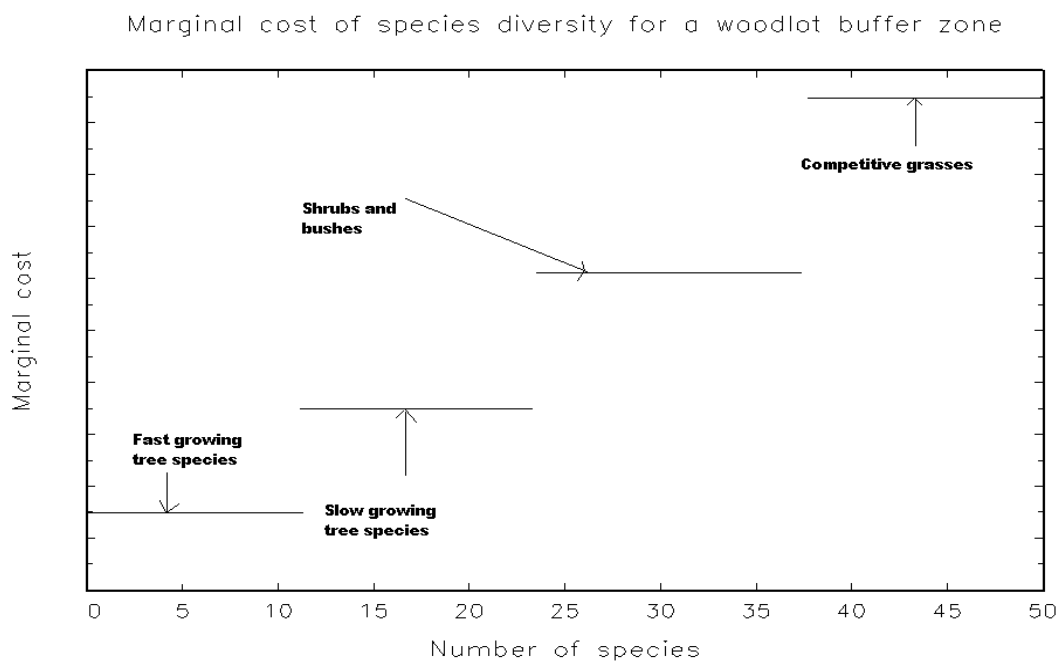
**The marginal cost function of a woodlot buffer zone**

The development of the marginal cost function of a woodlot buffer zone is somewhat more involved than for a forage buffer zone because, unlike a forage buffer zone, forming a woodlot would not exclude additional species from growing along with the major commercial

species of woodlot. The clear cutting nature of harvesting a woodlot would mean harvesting costs would not rise with additional species in a woodlot as they would with a forage crop.

There are 53 native plant species that are recommended by the department of Environment in PEI that would constitute a riparian zone [4]. These plant species include 23 species of trees and 14 species of shrubs.

Figure 2 plots the marginal costs species diversity of a woodlot buffer zone in PEI. Of the 23 tree species recommended for a riparian zone, eleven would be considered to be high growth, and therefore those chosen by producers to form a woodlot. These are labeled “fast growing tree species” in figure 2. The only costs associated with these species would be the establishment costs since tree species are not considered to be a threat to crops on cultivated land in PEI. The marginal costs of these species are the lowest costs of the marginal cost curve and are plotted as the lowest “step” of the marginal cost step function in figure 2.



**Figure 2.** Species marginal cost function for a PEI woodlot buffer zone  
Source: own processing

The next highest step of the marginal cost function is labeled “slow growing tree species” in figure 2. The marginal costs of growing these species would be the establishment costs and opportunity costs associated with growing these species over the fast growing tree species. Like the fast growing tree species, slow growing tree species are not a threat to cultivated land crops in PEI and so would have low or even non-existent control costs.

The next step of the species marginal cost function is labeled “shrubs and bushes” in figure 2. The costs of these species include establishment, opportunity and control costs. Establishment costs would be similar to those of trees whereas the opportunity costs would be higher, since shrubs and bushes provide no marketable yield to a woodlot owner. Shrubs and bushes are a moderate threat to cultivated land crops and require some control costs if they invade cultivated land.

The highest step of the SMP is labeled “competitive grasses” in Figure 2. These grasses are a set of species that are highly competitive to existing cultivated land crops in PEI. They have no commercial value and are very difficult to eradicate if they invade cultivated land. In some extreme cases, there are no economically viable controls for these species. Therefore the



control costs of these crops may be extremely high and producers will not want to establish these species on land adjacent to their cultivated land within a woodlot buffer zone.

## 4 Conclusions

There are several policy implications resulting from an examination of the SMC functions of figures 1 and 2:

- 1) It is clear from figure 2 that it would be extremely costly to existing commercial farms in PEI to form “complete” or “perfect” riparian zones. Specifically, there are a few competitive grasses that could be devastating to cultivated land crop if they are established in buffer zones adjacent to cultivated land.
- 2) From a species diversity point of view, a woodlot buffer zone has much more potential than a forage buffer zone. Forming a forage buffer zone would preclude any further species diversity beyond a few forage grass species, mostly because of the nature of the harvest (cutting once or twice a year). In contrast, a woodlot buffer zone, since it is harvested approximately every twenty years, has much greater potential to establish species diversity. Given that the benefits of forage buffer zones to producers are only moderately greater than for a woodlot, the government may wish to provide a small subsidy to producers who form woodlots on buffer zones rather than forage crops. This would provide the greatest potential for species diversity.
- 3) For those who do form woodlots, the costs associated with establishing slow growth tree species may be small over the fast growing tree species. Therefore, another small subsidy, say providing the slow growth tree species free for planting to woodlot owners, will add to species diversity without a substantial increase in cost to the government.
- 4) For another additional subsidy, the PEI government could also provide incentives to producers to plant shrubs and bushes on woodlots. These subsidies would need to be higher than those of the slow growing trees, but would go a long way to establishing a land area that would be very close to a riparian zone, within approximately 10% of the species that would be considered “natural” from an environmental perspective.
- 5) It would be ill advised to encourage farmers to establish on buffer zones the 10% of species that would be a substantial threat to cultivated crops, since this would require a large increase in incentives to farmers and add very little to species diversity.
- 6) The government may want to consider paying an extra subsidy to producers to not harvest the woodlot, or the value of the woodlot harvest. This would mitigate the periodic clear cutting of the land and the concomitant need to forego re-establishment costs after wood has been harvested.

## Acknowledgements

This paper is a part of a research project which was carried out by the authors within the framework of the “Economics of resources of the Czech agriculture and their efficient use in the frame of multifunctional agri-food systems” grant No. 6046070906, funded by the Czech Ministry of Education, Youth and Sports of the Czech Republic.

## References

1. Environmental Advisory Council: Biomass Heat on Prince Edward Island: A Pathway Forward, 2009, available at: <http://www.gov.pe.ca/photos/original/BioMassHeat.pdf>, retrieved: 07/07/2010.

2. FAO: Millennium Ecosystem Assessment, 2005a, Ecosystems and human well-being: synthesis, Washington, DC, Island Press, ISBN 1-59726-040-1.
3. FAO: The State of Food and Agriculture - Paying farmers for environmental services, 2007, Rome, ISBN 978-92-5-105750-6.
4. Island Nature Trust: Beneficial Management Practices for Riparian Zones in Atlantic Canada, 2005, available at: [http://www.islandnaturetrust.ca/?page\\_id=32](http://www.islandnaturetrust.ca/?page_id=32), retrieved: 07/07/2010.
5. Jiang, M., X., Deng, H., B., Cai, Q., H.: Distribution pattern of rare plants along riparian zone in Shennongjia Area, 2002, *Journal of Forestry Research*, 13: 25-27, ISSN: 1007-662X.
6. Prochazka, P.: Economic Analysis of Land Use Policy in Prince Edward Island, 2008, unpublished MSc Thesis, Dalhousie University, Halifax, Nova Scotia.
7. Parkyn, S.: Review of Riparian Buffer Zone Effectiveness, 2004, Ministry of Agriculture and Forestry (New Zealand), available at: <http://www.maf.govt.nz/mafnet/rural-nz/sustainable-resource-use/resource-management/review-riparian-buffer-zone-effectiveness/techpaper-04-05-riparian-effectiveness.pdf>, retrieved: 06/06/2010.
8. Qiao, Q. S.: Riparian zone ecology conservation and development, 2007, *Urban environmental design*, 2007(1): 72-73, (Chinese), ISSN 1672-9080.
9. UNRBA Focus Areas: Watershed management strategy 2-Riparian buffers, 2008, Available at website: <http://unrba.wordpress.com/2008/04/14/riparian-buffers-for-development/>, retrieved: 12/9/2009.
10. Xu, Q.: The marginal cost of species diversity and establishment of riparian zones in PEI, 2010, Department of Business and Social Sciences, Nova Scotia Agricultural College.

# The function of agricultural extension agents' network in the East of Hungary

Krisztina Dajnoki<sup>1</sup>, Károly Pető<sup>2</sup>, Éva Bácsné Bába<sup>1</sup>

University of Debrecen, Centre for Agricultural and Applied Economic Sciences,  
Faculty of Applied Economics and Rural Development

<sup>1</sup>Institute of Management and Organization

<sup>2</sup>Institute of Rural Development and Functional Economics

H-4032 Debrecen, Böszörményi str. 138.

dajnoki@agr.unideb.hu

**Annotation:** Agricultural extension has a hundred-year background in Hungarian history. For years, this complex activity has been operated by agricultural higher education institutions, research institutes, state-owned farms and professional supervisor organisms. Changes in recent years in agriculture caused the transformation or abolishment of information and communication systems in Hungary. At the same time, small-scale enterprises formed (family farms, small-scale producers, native producers), whose need for information highly increased. Adequate communication systems have not been established and the conditions required for their operation do not exist, even though daily farm management requires a considerable amount of information. This raises the question of how to make the professional communication system more efficient and effective in transition. We aimed to identify, considering practical experiences, the most important tasks that interviewees had to perform day-to-day, the information producers' needs and their most effective forms of communication. This article represents the results of a survey of agricultural extension agents in three counties in eastern Hungary. Results emphasized the increased role of daily connection and technical support. Farmers have a high demand for information concerning administration and applications. The most effective manner of transferring information is during organized consultancy hours and local consultancy possibilities. Implications of the findings may contribute to the better reconstruction of the current extension system.

**Key words:** agriculture, farmers, consultancy, agricultural extension, information

**JEL classification:** R50

## 1 Introduction

Agricultural extension, area and regional development have become more and more often used notions since the past couple of years. In many cases we see the users of terminologies fill these expressions with various content. The past decade generated great changes in all fields of economic life in Hungary, the effect of which is still hard to estimate, and caused new challenges for managers [5]. We assume that changes still influence traditional internal and external corporate communication methods. Communication still has a vital role in the transmission of professional information, and it fundamentally determines the realization of visions in both governmental and professional institutions. Borsos [3] considers the farmers' assistant system for education and information supply important due to the rapid change of knowledge in farm management. The most significant task of a technical advisor is to provide clients with reliable knowledge and information, to convince them of the necessity of certain changes and the advantages of the changes [7].

When information management is less efficient and effective, it causes competition drawbacks, which may result in the weakness of a corporation's position and a strengthening of the competitor's position [10]. It is vital how a central administration can represent and introduce a vision for professionals and productive organizations. It is also essential that such connective associations and co-operations operate more and more efficiently, which plays an important role in the harmonization and cooperation of productive activity. Productive

associations and distributional organizations are structures with objectives that are promoted by the government. These organizations aim to validate organizations and co-operations of agricultural entrepreneurs and enterprises. Producers must recognize their private interests to get involved. Unfortunately, mistakes made in the 1950s and 1960s still impact the judgment of cooperation. Earlier, cooperation was built on urged communication, violent persuasion and in many cases enforcement. Current organizational problems are explained by former communication mistakes. Communication that is built on persuasion requires considerable patience; this is why it is an extremely time-consuming procedure. The realization of associations and co-operation among organizations requires a different kind of communication, the vital element of which is to persuade producers, since it is in their private interest. Associations and co-operations not only express common interests to new entrants, they also accept entrants' personal economic interests and intend to validate them. These arguments have to be justified by professional and economic facts in the process of communication. Moreover, those benefits which are achieved by associations have to be introduced.

Pető and Nagy [9] believe that a new organizational model of agricultural extension was launched in the early 1990s, the process of which is largely determined by changes. Umali-Deininger [12] examined the roles of the public and private sectors in agricultural extension. Extension services are classified by their economic characteristics to identify areas where opportunities for private (for-profit and non-profit) participation will arise.

According to Szabóné [11], agricultural consultancy is a service that supports producers in developing production flows with training methods. Hence, it helps to increase the standard of a producer's living, as well as the social standing of rural life. Mosher [8] still believes that agricultural extension does not solely contribute to the development of the agricultural sector, though its functions are essential to promoting effective farm management. Laurent et al. [6] claims that farmers need to face new challenges in agriculture (environment, rural development, etc.), for which appropriate knowledge has to be applied. Anderson and Feder [1] provide a framework of information need for farmers in their article. The scope of producers, who cannot gain help from the extension operating on a mostly business basis, as it wants to live and can live on agricultural producers, rather than for them, is large. Indeed, farmer-focused extension is needed [4].

After the change of regime, in a radically changed situation with private farms, establishing a promotional organization for entrepreneurs and administrative governance became necessary. Agricultural extension was once known as the application of scientific research and new knowledge to agricultural practices through farmer education. This is the reason why the system and its leverages demand consideration from a scientific point of view.

## **2 Data and Methodology**

Research was carried out as part of the "Functional examination of agricultural corporate management" research program, which was established in 1994 by the Department of Management Sciences at the University of Debrecen in Hungary. This article represents the results of a survey of agricultural extension agents in three counties (Hajdú-Bihar; Jász-Nagykun-Szolnok; Szabolcs-Szatmár-Bereg) in eastern Hungary. Here, we compiled the data of 118 questionnaire interviews. The questionnaire is closed and oriented, because we determined the possible answers for every question. Interviewees had to evaluate factors on a scale from 1 to 5. Interviewees make free pointing. The exercise examinations asked about the everyday activities of interviewees. The groups of factors were defined by professional literature, by the activities that were determined for agricultural extension agents on the homepage of the Ministry of Agriculture and Rural Development, and by our own experience.

In the information survey, we asked for the information demands of farmers and the role of different information sources.

Preparations and analyses were based on descriptive statistical methods: division and precedence examinations were undertaken by classifying criteria and analyzing variance, as well as main component analysis and cluster-analysis. Reliability of the data was tested with the Chrombach alpha index.

$$\alpha = \frac{k}{k-1} \left( 1 - \frac{\sum_{i=1}^k s_i^2}{s_T^2} \right)$$

where:  $k$  = the number of items

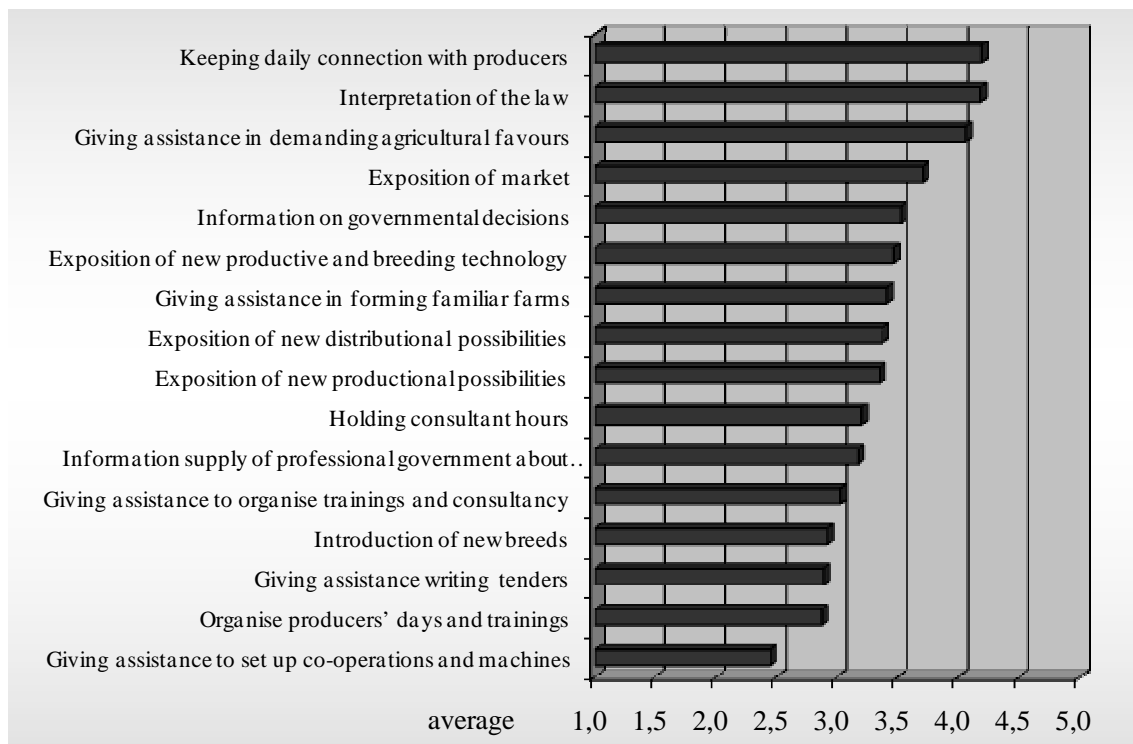
$s_i^2$  = item variance  $i$  of  $k$

$s_T^2$  = the total test core variance.

The index values for every questionnaire are over 0.90, which were higher than the defined 0.7 value [2]. We thus found data suitable for further analyses.

### 3 Results and Discussions

We attempted to answer how often examined activities were presented in the activities of agricultural extension agents, what was the relative importance of these activities, and what kind of differences could be experienced in their job (Figure 1). Factors for examination were composed by professional suggestions, private experience and the homepage of the Ministry of Agriculture and Rural Development. Despite interviewees being astonished by the quantity and content of the listed tasks, it justifies the assumption that the flow of professional information between the productive and institutional sector is inadequate. Obviously, this is the reason for the lower average value of some task factor.

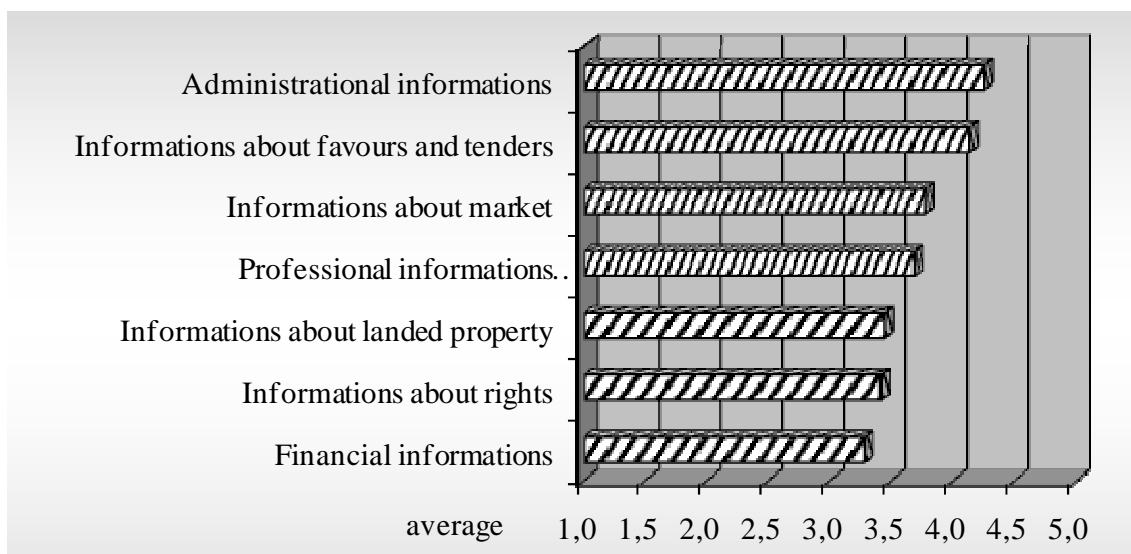


**Figure 1.** The most important activities of agricultural extension agents  
Source: Own examinations

Through the results of summarized averages, interviewees evaluated squarely with the highest points having a daily connection and support in the interpretation of the law. This is followed by, with an average concrete value above four, the role of providing assistance in demanding agricultural advocacy. Information supply on market-related conditions received a lower qualification, since the position of producers is primarily determined by the market. Thus, it is not accidental that they consider daily information access important.

Regarding the answers, we found that farmers demand the assistance of agricultural extension agents for writing tenders the least. Assistance with forming subsistence farms received a higher ranking for agricultural extension agents, and giving assistance in forming co-operations and machinery was largely ignored. Thus, asking for assistance in forming farms was preferred over assistance in forming co-operations.

In information examinations we attempted to discover what kind of information farmers were interested in, what information agricultural extension agents needed to provide correct answers, and what kind of sources they used (Figure 2).



**Figure 2.** Farmers' information demand  
Source: Own examinations

We also found that administrative information and information about tenders and calls for tenders were ranked as the most important by respondents. Market and profession (kind, technology) were ranked third and fourth by the respondents. Producers are well-informed about landed property, rights and financial information by the data, so this information has been ranked the lowest.

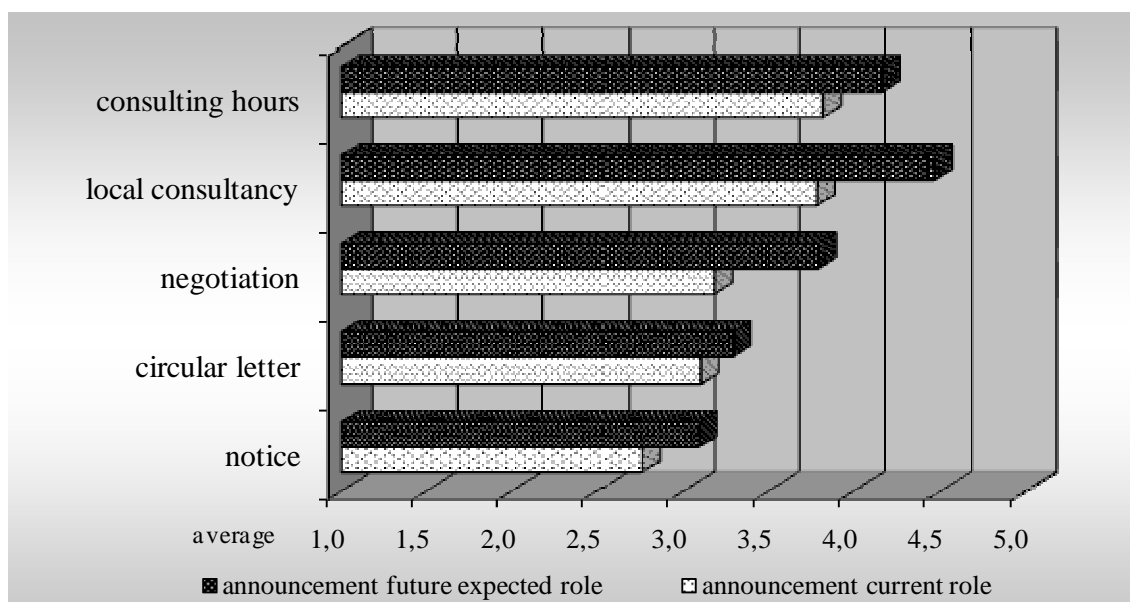
Those agricultural producers, who would like to get external help for their work, have the following opportunities now:

- The agricultural institutions of higher education in the region play special roles, performing significant tasks of research, education and extension;
- They can extend their knowledge in training courses within and outside the system of education as well; most of which are free or receive public support;
- They can take part in extension programs for groups, organized by public support of 100%, organized by the agricultural institutions of higher education in the region, on behalf of the Ministry of Land Cultivation and Management;

- They can sign contracts of extension with registered consultants, for this they can apply for public support of 25-75%, depending on their income;
- They can turn to agronomists in their settlements with their problems, who not only perform their basic tasks, but give some technical advice related to them as well;
- They can turn to business entrepreneurs acting in certain partial areas (accountants, legal advisors etc.), who offer services; they can sign contracts with them under market conditions;
- They can cooperate with processing plants, organizations of production and integration, who can provide them with technical support for the realization of the agreement between them;
- They can get technical information from the providing (input) sectors of agriculture, as parts of business offers;
- They can gain considerable knowledge in their civil relationships, or as members of civil and technical organizations (e. g. Chamber of Agriculture), through information service supplied by the given organization.

We can conclude that there exists a varied, not even completely listed structure of services, which provides a basis for development. To achieve this, the brief and critical analysis of the structure is indispensable, just as well the clarification of the theoretical priorities of further development.

The objective of the communication examination was to reveal what communicational forms are preferred by agricultural extension agents on a daily basis. In this case, we tried to measure their future position beside the current one, so we could determine which conditions the interviewees intend to change (Figure 3).



**Figure 3.** The role of communication forms in the present and in the future  
Source: Own examinations

Based on the results, the current role of consulting hours show the highest value, followed by the importance of local agricultural extension. The benefits of the communicational forms are personal connection and immediacy. Interpersonal communication enables farmers to pose

questions, and provide a chance to answer related problems. Other communicational forms were not preferred, and were given a value of approximately three. Announcements are rarely applied during the routine of the agents.

At the qualification of future roles, it seems obvious that all interviewees intend to increase all forms of communication. The order only changed in the first ranking, i.e., in the future they want to increase the role of local consultancy.

## 4 Conclusions

Organizational structure and modes of internal communication have a basic role in information flow, as the influential factor analysis shows. The stability of consultant structures and the structure and stabilization of communication is of primary importance in professional communication. Changes of the last few years in agriculture have caused the transformation and abolishment of these information and communication systems.

Research results indicate that the most important role of agriculture extension agents is having daily connections and supporting the interpretation of law. Farmers mostly demand information concerning administration and application. The most effective manner of transferring information is conducting consultancy hours and hosting local consultancy possibilities.

## References

1. Anderson, J. R., Feder, G.: Agricultural Extension. World Bank Research Observer, Volume 19, Number 1, March, 2004, pp. 41-60.
2. Barrett, P.: Assessing the Reliability of Rating Data - Revised. 2001. [www.pbarrett.net/rater.pdf](http://www.pbarrett.net/rater.pdf)
3. Borsos J.: Térségfejlesztés, regionális agrárkutatás. Tiszántúli Tudományos Napok, DATEKI Karcag, 1997, pp. 124-126.
4. Gályász J., Berde Cs.: Farmer-centered extension by lobbying. Magyar Mezőgazdaság, 1995. pp. 19-20.
5. Kerékjártó G.: Vezetői vélemények a közelmúlt változásairól XLIII. Georgikon Napok, Keszthely, 2001. pp. 443-448.
6. Laurent, C., Cerf, M., Labarthe, P.: Agricultural Extension Services and Market Regulation: Learning from a Comparison of Six EU Countries. The Journal of Agricultural Education and Extension, Volume 12, Number 1, March, 2006, pp. 5-16.
7. Mannion, J.: Handbook of Extension, 1992. pp. 1-32.
8. Mosher, A. T.: Getting Agriculture Moving. Essentials for Development and Modernization, Prague, New York, 1996.
9. Pető K., Nagy G.: A mezőgazdasági szaktanácsadás szerepe a vidékfejlesztésben, Tiszántúli Mezőgazdasági Tudományos Napok, Debrecen, 1999, pp. 3-9.
10. Szabados Gy.: Információmenedzsment. In: Vezetélméleti ismeretek. Szerk.: Berde Cs., Campus Kiadó, Debrecen, 2003, pp. 112-119.
11. Szabóné P. H.: A szaktanácsadás szerepe a vidékfejlesztésben, VII. Nemzetközi Agrárökonómiai Tudományos Napok kiadványa 4. kötet, Gyöngyös, 2000, pp.127-132.
12. Umali-Deininger, D.: Public and Private Agricultural Extension. World Bank Research Observer, Volume 12, Number 2, September, 1997, pp. 203-224.



# Perspectives for Applicability of Low Quality Water in Irrigated Agriculture

Valentin Kazandzhiev<sup>1</sup>, Peter Dimitrov<sup>2</sup>

<sup>1</sup>National Institute of Meteorology and Hydrology, Bulgarian Academy of Sciences,  
66, Tsarigradsko shausse, 1784 Sofia, Bulgaria  
valentin.kazandzhiev@meteo.bg

<sup>2</sup>Institute of Land Reclamation and Agricultural Mechanization,  
3, Shosse Bankya Street, 1331 Sofia, Bulgaria  
dimitrov\_pn@yahoo.com

**Annotation:** Quality control on the water for irrigation is needed to avoid emerging problems as decreasing the yield of agriculture and worsening its quality at using inadequate quality water. The development of a computer based information system, i.e. decision support system for assessing the suitability of the water for irrigation aims to protect cultivated crops not to be irrigated with water of unsuitable quality. The system uses laboratory analysis information, cultivated crops data, soil and agro-climatic characteristics, irrigation technology, legal rules and some additional parameters.

The paper presents the main directions for determination the applicability of irrigation water at various crops on the basis of the assessment of its quality, i.e. establishing a database of irrigation water quality indicators and recommendations' elaboration for irrigation water considering qualitative parameters of the available water. The estimation algorithm and the programme follows three fundamental steps: establishing an irrigation water quality indicators database and input data uploading and updating, assessment of irrigation water quality, issuing recommendations for irrigation water utilization.

**Key words:** Sustainable Agriculture, Irrigation, Water Quality Assessment, Decision Support System, Drought.

**JEL classification:** Q25, Q15, Q54

## 1 Introduction

The irrigation of agricultural crops with water of poor quality will not only decrease the yield of agriculture output but also substantially worsen its quality. A system for assessing the suitability of the available water for irrigation in dependence of the requirements of the different crops, taking into consideration the results of the chemical laboratory analysis is needed in order to avoid emerging problems at using inadequate quality water for irrigation.

The aims of the project are directed towards the protection of water resources, soil fertility, crop production and consumers' health.

The study contributes to the implementation of the EU Water Framework Directive in the field of agricultural water management and will get the decision makers to be able to make decisions on best practices in irrigated agriculture for various cultivated crops taking into consideration the water quality. The system is based on FAO methodology on water quality for agriculture [1], published scientific results [2, 3, 5, 6] and the research results of author's experience [4]. The system issues recommendations how to use the water for irrigation on the base of laboratory analysis and on the information of cultivated crops, soil and agro-climatic characteristics of the region.

The objectives of study are as follows:

- Water resource protection - assessment of the water quality indicators for efficient use of the water resources in accordance with the requirements of the water consumers;

- Soil resource protection - knowing the irrigation water and the soil characteristics the farmer could predict the water impact on the modification of the soil parameters;
- Crop protection - usage of water for irrigation according to the needs of crops towards water quality and taking into consideration the economic efficiency of the irrigation permits obtaining stable crop yields;
- Consumer protection - the sustainable agricultural development is a precondition for the crop output which eliminates health risks for the consumers.

The computer programme will be used not only for recommendations towards the direct users, i.e. farmers, irrigation societies and laboratories which perform the water chemical analysis but also for the goals of further research. The software functioning in Visual Environment, responds to the main tasks of the methodology.

## 2 Data and Methodology

The present methodology and the algorithm focus on the process of recommendation elaboration for irrigation water considering qualitative parameters of the available water.

The database for the quality of the irrigating water contains information on:

- Water users, water sources, type of water, soil characteristics, methods of irrigation, cultivated crops, water samples taken for laboratory analysis;
- The results of irrigation water chemical laboratory analysis.

The information of the cultivated crop, soil characteristics (water table depth, soil type, and precipitation), water quality and irrigation method (surface, sprinkler, drip, subsurface, more methods admissible) is necessary for the water applicability assessment.

The degree of restriction on the usage of irrigation water has been presented as a remark for all analyzed parameters in conformity with FAO methodology on water quality for agriculture [1]. The parameters are, as follows:

- Salinity (it affects crop water availability);
- Infiltration (it affects infiltration rate of water into the soil). The assessment of infiltration is based on the electrical conductivity of the water and on the sodium adsorption ratio in the case of fresh water for irrigation, and on the adjusted sodium adsorption ratio in the case of waste water;
- Specific ion toxicity (it affects sensitive crops), as follows: Sodium – in case of surface irrigation and sprinkler irrigation; Chloride – in case of surface irrigation and sprinkler irrigation; Boron; Trace elements – arsenic, cadmium, chromium, copper, iron, manganese, lead, zinc;
- Miscellaneous effects (it affects susceptible crops), as follows: Nitrogen ( $\text{NO}_3\text{-N}$ ); Bicarbonate (overhead sprinkling only); pH factor; Clogging problems (in the case of localized, drip irrigation): Langelier saturation index, suspended solids, bacteria population, etc.;
- Suggestions about the application of irrigation water, taking into consideration the previous estimations, biochemical oxygen demands, chemical oxygen demands, etc.

The indicators comprised in the methodological part of study, respectively reflected in its software have to be brought into line with the Ordinance on Irrigation Water after its adoption by the Bulgarian Ministry of Agriculture and Foods. The new requirements are shown in Table 1 and Table 2.

The recommendation how to use the irrigation water is a natural continuation of the assessment of the irrigation water quality. During the assessment of each indicator of the irrigation water quality the user of the system gets acquainted with the recommendations, which take into consideration soil characteristics, irrigation methods, etc. General restrictions concerning irrigation water quality which limit problems connected with cultivated crops are presented in [1].

**Table 1.** Requirements - water quality for irrigation of agricultural crops

Indicators	Dimension	Limit value	Indicators	Dimension	Limit value
<b>A. Salinity (Salt Content)</b>			<b>D. Sanitary - hygiene indicators</b>		
Electrical Conductivity, EC <sub>w</sub> (or Total Dissolved Solids, TDS)	μS/cm (mg/dm <sup>3</sup> )	2000	Total Coli-titre	cm <sup>3</sup>	<0,1
<b>B. Infiltration</b>			Esheria Coli-titre	cm <sup>3</sup>	<1,0
Sodium (Na <sup>+</sup> )	mg/dm <sup>3</sup>	300	Intestinal Pathogenic	cm <sup>3</sup>	unallowable
Calcium (Ca <sup>++</sup> )	mg/dm <sup>3</sup>	400	Microorganisms		wable
Magnesium (Mg <sup>++</sup> )	mg/dm <sup>3</sup>	300	<b>E. Miscellaneous effects</b>		
Potassium (K <sup>+</sup> )	mg/dm <sup>3</sup>	350	Ammonium-Nitrogen (NH <sub>4</sub> -N)	mg/dm <sup>3</sup>	5
<b>C. Toxicity</b>			Nitrate-Nitrogen (NO <sub>3</sub> -N <sup>-</sup> )	mg/dm <sup>3</sup>	20
Boron (B)	mg/dm <sup>3</sup>	1,0	Carbonate (CO <sub>3</sub> <sup>-</sup> )	mg/dm <sup>3</sup>	200
Chloride (Cl <sup>-</sup> )	mg/dm <sup>3</sup>	300	Bicarbonate (HCO <sub>3</sub> <sup>-</sup> )	mg/dm <sup>3</sup>	300
Manganese (Mn)	mg/dm <sup>3</sup>	0,2	<i>(overhead sprinkling only)</i>		
Iron (Fe)	mg/dm <sup>3</sup>	5,0	Sulphate (SO <sub>4</sub> <sup>-</sup> )	mg/dm <sup>3</sup>	300
Copper (Cu)	mg/dm <sup>3</sup>	0,2	Phosphate (PO <sub>4</sub> )	mg/dm <sup>3</sup>	3
Cobalt (Co)	mg/dm <sup>3</sup>	0,05	pH (hydrogen-ion activity)		6 - 9
Zinc (Zn)	mg/dm <sup>3</sup>	2,0	Phenols (volatile)	mg/dm <sup>3</sup>	0,05
Molybdenum (Mo)	mg/dm <sup>3</sup>	0,01	Cyanides (CN) - total	mg/dm <sup>3</sup>	0,5
Lead (Pb)	mg/dm <sup>3</sup>	0,05	Petroleum	mg/dm <sup>3</sup>	0,3
Mercury (Hg)	mg/dm <sup>3</sup>	0,001	Detergents	mg/dm <sup>3</sup>	1,0
Aluminium (Al)	mg/dm <sup>3</sup>	5,0	COD (Chemical Oxygen Demand)	mg/dm <sup>3</sup>	100
Beryllium (Be)	mg/dm <sup>3</sup>	0,01	BOD5 (Biological Oxygen Demand)	mg/dm <sup>3</sup>	25
Nickel (Ni),	mg/dm <sup>3</sup>	0,2	Extractable Substances with	mg/dm <sup>3</sup>	5,0
Vanadium (V)	mg/dm <sup>3</sup>	0,1	Carbon Tetrachloride		
Cadmium (Cd)	mg/dm <sup>3</sup>	0,01	Temperature	°C	28
Selenium (Se)	mg/dm <sup>3</sup>	0,01	Dissolved Oxygen	mg/dm <sup>3</sup>	>2,0
Arsenic (As)	mg/dm <sup>3</sup>	0,1	Total Hardness	mgeqv/dm <sup>3</sup>	14
Chromium - hexavalent (Cr <sup>+6</sup> )	mg/dm <sup>3</sup>	0,05	Non-dissolved Substances	mg/dm <sup>3</sup>	50
Chromium - triad (Cr <sup>+3</sup> )	mg/dm <sup>3</sup>	0,5	<b>F. Radioactivity</b>		
(Chromium)	(mg/dm <sup>3</sup> )		Radium 226 (Ra 226)	mBq/dm <sup>3</sup>	150
Fluoride (F)	mg/dm <sup>3</sup>	1,0	Total Beta Radioactivity	mBq/dm <sup>3</sup>	750
Lithium (Li)	mg/dm <sup>3</sup>	2,5			

The guidelines are rational and have been successfully used in general irrigated agriculture for the evaluation of common constituents in surface water, groundwater, drainage water, sewage effluent and wastewater. The specific impact of every one of the problematic factors on separate groups of crops and their limitation is presented at detailed algorithm of the system.

Usually, no soil or cropping problems are experienced or recognized when the water parameters are lower than those shown for 'no restriction on use'. Increasing care in selection of crop and management alternatives is required if full yield potential is aimed to be achieved. If water quality values approach or exceed those given for the severe restriction category it is recommended a series of pilot farming studies to be conducted in order to determine farming and cropping techniques which need to be implemented.

**Table 2.** Short list of minimum physical and chemical indicators - water quality needed for irrigation

No	Indicators	No	Indicators
1	Temperature	12	Bicarbonate ( $\text{HCO}_3$ ) ( <i>overhead sprinkling only</i> )
2	pH (hydrogen-ion activity)	12	Carbonate ( $\text{CO}_3$ )
3	Electrical Conductivity (water), $\text{EC}_w$	13	Iron (Fe)
4	Total Hardness	15	Manganese (Mn)
5	Non-dissolved Substances	16	Calcium ( $\text{Ca}^{++}$ )
6	Ammonium-Nitrogen ( $\text{NH}_4\text{-N}$ )	17	Magnesium ( $\text{Mg}^{++}$ )
7	Nitrate-Nitrogen ( $\text{NO}_3\text{-N}^-$ )	18	Sodium ( $\text{Na}^+$ )
8	Nitrite-Nitrogen ( $\text{NO}_2\text{-N}^-$ )	19	Potassium ( $\text{K}^+$ )
9	Chloride ( $\text{Cl}^-$ )	20	Lead (Pb)
10	Sulphate ( $\text{SO}_4^-$ )	21	Cadmium (Cd)
11	Phosphate ( $\text{PO}_4$ )	22	Mercury (Hg)

### 3 Results

Based on the described methodology computer programme is necessary for preparing recommendations and suggestions on the usage of irrigation water according to its quality.

#### Program structure

The program structure is, as follow:

- input and updating of initial data,
- results and recommendations.

Each of these structures envelops some program blocks. The input data are divided into 3 basic groups depending on the information source and its character, i.e.:

- data for the water user,
- general information about irrigated field,
- data from laboratory analysis.

Results and recommendations on water quality are divided depending on the information groups which are processed taking into consideration the data interrelation in each group. The groups are, as follows:

- potential irrigation problems,
- specific toxicity,
- miscellaneous effects,
- recommendations.

The basic steps of system operation at its launching are, as follows:

- Input data uploading, i.e. forms on the specific water user and general information about the irrigated field. The data from the last processing are available because significant part of the information about the water user at the last service provided is the same. The data is being updated with the uploading of the new ones;
- Uploading of the data got from laboratory analysis. If the water source coincides with the source from the last processing than the previous processing data are shown too because there is very likely that some of them will be the same;
- Processing the laboratory analysis information and results preserving. The achieved results will be processed together with the data of sensibility and tolerance of the crop and also with the information on irrigated field;
- Results divided into three groups: potential problems at irrigation, specific toxicity and side effects;

- Recommendation choice according to the achieved indicators. Recommendation information is kept as a permanent information of the algorithm;
- Results carried out from the recommendation analysis.

### **Information uploading**

Data uploading has accomplished at user level, as well as data blocks input and their consequent updating regardless the fact that they are visible or not for the user while he is working with the system.

Personal information input is done consequently. If there is a coincidence with the database data shown on the screen, the information will be accepted as granted. Part of the information which is not significant for the identification of the research subject can be omitted while some information like code of the target subject, crop cultivated, etc. shall be upload obligatorily, i.e. it is not allowed to go further towards assessment without this information. The same rule is valid even more for the operational information, i.e. for the laboratory analysis results of a specific water sample.

Permanent information is presented mostly in table forms. It shows the crop sensibility towards water quality indicators, soil characteristics and methods of irrigation.

### **Information processing and results**

Information processing means not only its reliability and correctness but also a follow-up complex analysis of the uploaded data for assessment achievement of the irrigation water indicators and the follow-up formulation of the user recommendation done on the basis of them.

Input data control envelops an assessment of its structure (digital, text and other type of information), as well as data validity check. If there is discrepancy among data concerning their structure/format or inconformity with their admissible range which has been taken in consideration from the other available information, the reason of specific data rejection should be said and the user gets measures for their correction. In the same time, the main indicators TDS, SAR, AdjSAR and LSI will be determined.

The next is data complex analysis. Firstly, an assessment of potential irrigation problems is done. As a result of this, if there are likely potential irrigation problems with the cultivated crop, for specific indicators will be given user information which contains a short description of the problem and how it could be solved. If data are analyzed for specific toxicity and side effects, the approach is the same. During the water quality assessment the system user can look through the information concerning the reflection of the specific indicator on the crop yield and its development, i.e. crop sensibility and the quality indicators of the output.

User recommendations are formulated on the basis of data analysis. They are based on the practical experience in great extend and they are combination of the knowledge included in the methodology.

### **Input data forms**

Input data forms (Fig. 1 and 2) are divided in two groups according to the above grouping of the database: form of personal information about water users and water sources, and form of the laboratory analysis data.

Each form contains some information and there is envisaged a transfer towards:

- the other input form,
- three forms for results from analysis-assessment,
- the form on recommendations.

It is envisaged a transfer to a previous inspection of this water source, new research data to be added, as well as data about research available in the database to be deleted.

The screenshot shows a software window titled "EVALUATION OF SUITABILITY OF IRRIGATION WATER". The "INPUT DATA" section is active, showing "OWNER'S INDIVIDUAL DATA" with fields for CODE, SURNAME, FIRST NAME, ADDRESS, MUNICIPALITY, PREFECTURE, NUMBER, MUNICIPALITY PART, POST CODE, TELEPHONE, FAX, and E-mail. Below this is "GENERAL INFORMATION" with fields for SAMPLING DATE, DATE, CULTIVATED CROPS, SOURCE, and REGION. To the right is a "Soil Characteristics" section with radio buttons for Water Table Depth (High (<1m), Middle (1-2m), Low (>2m)), Soil Type (Heavy (Clayey), Middle (Normal), Light (Sandy)), and Precipitation (High, Middle, Low). There are also checkboxes for Irrigation Method (Surface, Sprinkler, Drip, Subsurface) and Type of Water (Fresh, Waste). A "RESULTS" section is partially visible with buttons for "POTENTIAL IRRIGATION PROBLEMS", "SPECIFIC ION TOXICITY", "MISCELLANEOUS EFFECTS", and "SUGGESTIONS". A data table at the bottom has columns: Code, Surname, FirstName, Address, Number, Municipality, MunicipalityP, PostCode, Prefecture, Telephone, Fax, Email, SamplingDate, Date, and vWasteV.

Figure 1. Input form - water users & sources, water, & soil characteristics, cultivated crops, etc.

The screenshot shows the "LABORATORI DETERMINATIONS" section of the software. It includes input fields for pH, ECw (microS/cm), BOD (mg/l), COD (mg/l), Suspended Solids (mg/l), and Bacteria Populations (N/m<sup>l</sup>). There are sections for ANIONS (Cl, CO<sub>3</sub>, HCO<sub>3</sub>, SO<sub>4</sub> in me/l) and MAIN CATIONS (Ca, Mg, Na, K in me/l). A "TRACE ELEMENTS" section includes As, Cd, Cr, Cu, Fe, Mn, Pb, and Zn in mg/l. An "Estimated parameters" section shows TDS (mg/l), SAR, and LSI. A "RESULTS" section is partially visible with buttons for "POTENTIAL IRRIGATION PROBLEMS", "SPECIFIC ION TOXICITY", "MISCELLANEOUS EFFECTS", and "SUGGESTIONS". The data table at the bottom has columns: Code, Surname, FirstName, Address, Number, Municipality, MunicipalityP, PostCode, Prefecture, Telephone, Fax, Email, SamplingDate, Date, and vWasteV.

Figure 2. Input form - results of the water chemical analysis

### Forms for water quality assessment and for recommendations

These forms illustrate results from assessment of the potential irrigation problems, specific toxicity and side effects, as well as the form of issuing user recommendations. They contain tables which could be activated by the user, i.e. it can be shown in the form, in this way,

possible negative consequences for the crop in the table using irrigation water could be assessed.

The form, recommendations for the user contains not only the recommendation formulated in the result of the complex assessment but basic data and preliminary results. In this way, user education is helped for better interpretation of information and if the user is knowledgeable it means qualified usage of the recommendations.

## 4 Conclusions

The results of the research are, as follows:

- Formulation of a methodology on determining the usability of irrigation water for differing crops on the basis of the results of chemical analysis for its quality;
- An algorithm for recommendation on the usage of irrigation water taking into consideration its quality parameters;
- Software on recommendations issue and provisions to the users for better usage of the irrigation water.

The software helps to achieve the main objectives of the research process. However, for testing the relevant versions it is needed longer period of time and the selection of suitable data.

## Acknowledgements

The authors express their high appreciation to the Bulgarian National Science Fund for its financial support of the Projects: *Present and Future State of the Climate Change, Mitigation of their Effect* and *Development of Sustainable Agriculture and Agroclimatic Resources in Bulgaria for Field Crop Cultivation under Irrigated and Rain-Fed Conditions*.

## References

1. Ayers, R. S., Westcot D. W.: Water quality for agriculture. FAO Irrigation and Drainage Paper 29 Rev. 1. FAO of UN, 1985, Rome, M56. ISBN 92-5-102263-1.
2. Bauder, T. A., Waskom R.M., Davis J.G.: Irrigation Water Quality Criteria. Colorado State University, Department of Agriculture, U.S. 7/03. Revised 3/07.
3. Bergkvist, P., Jarvis, N. J., Berggren, D., Carlgren, K.: Long-term effects of sewage sludge applications on soil properties, cadmium availability and distribution in arable soil. *Agriculture, Ecosystems and Environment*, Elsevier 2003, 97: 167-179. ISSN: 0167-8809.
4. Dimitrov, P., Kalcheva Sp., Kathijotes N., Simeonova Ts.: Assessing Suitability of Water for Irrigation in Bulgaria. 3<sup>rd</sup> International Conference BALWOIS, 2008. Ohrid, Macedonia, 2008, pp. 5. ISBN 978-608-4510-00-0.
5. Johnson, G., Zhang H.: Classification of Irrigation Water Quality. Oklahoma State University, U.S. [http://www.soiltesting.okstate.edu/Extn\\_Pub/F-2401web.pdf](http://www.soiltesting.okstate.edu/Extn_Pub/F-2401web.pdf).
6. Jones, J. W., Hansen J. W., Royce F. S.: Potential benefits of climate forecasting to agriculture. *Messina CD 2000, Agriculture, Ecosystems & Environment*, Elsevier 2000, 82: 169-184. ISSN: 0167-8809.





# On the Future of Direct Payments: CAP Bond Revisited

David Harvey<sup>1</sup>

<sup>1</sup>Newcastle University, School of Agriculture, Food and Rural Development,  
Newcastle upon Tyne, NE1 7RU, United Kingdom  
david.harvey@ncl.ac.uk

**Annotation:** The European Union's Common Agricultural Policy continues to evolve. The public debate about its future post 2013 was launched in April 2010 and a formal Commission Communication on the future of the Common Agriculture Policy (CAP) is due in the Autumn/Winter 2010. Our paper contributes to this debate by re-visiting the CAP Bond. We argue that the CAP Bond should be considered as a core element of the development of the CAP and could contribute to the solution of several problems of the existing policy. We argue that the compensatory logic still embedded in the current CAP is now a hindrance to further development of the CAP, and is a major cause of debilitating uncertainty for the industry and its farmers. The Bond provides a coherent adaptive option for both the policy and the European agricultural sector and its farmers. Among the Bond's chief advantages is its capacity to reduce the uncertainty about both the needs for future policy intervention and about individual farmers' future family and business strategies.

**Key words:** European Agricultural Policy; direct payments; producer support; policy dependency; CAP Bond.

**JEL classification:** Q18; H24

## 1 Introduction

With 2020 hindsight, CAP analysis in the 'good old days' seems to have been very straightforward. Beginning with Josling [14] economic welfare analysis of the major instruments of the Old CAP (import levies, intervention and export refunds) was simple, at least in principle, and it was relatively easy to calculate/estimate the economic costs and benefits of the policy. Buckwell et al. [3], for instance, were able to develop a coherent model of the economics of the CAP and demonstrate the costs and benefits in traditional economic terms. However, times have changed, and many of the more obvious anomalies of the Old CAP have long since gone.

Now, we are faced with more serious and multi-dimensional challenges. The CAP has evolved (e.g. [10]), perhaps beyond the dreams of some early researchers, adapting and adjusting to much changed local and world environments. Its apparent scope has been constrained by the fact of the URAA and WTO governance of trade relations, whose introduction coincided with the beginnings of substantial CAP reform under Commissioner MacSharry in 1992. This reform trajectory has developed to embrace 15 new country members with substantially different policy needs from those of the founder and early members. The challenge, now, is to further reform the policy so that it is better fitted to the 21st Century, and makes a more positive contribution to further developing and sustaining the EU and its people.

A critical area of future CAP reform concerns direct payments. Although many issues are identified when considering the future of CAP, it is apparent that direct payments play a central role in the debate. While the original idea of the CAP Bond [21] has been well discussed, especially by Swinbank and Tranter [19], the idea has apparently and surprisingly disappeared from the current literature and debate [13]. We revisit the Bond option in this paper, and re-examine its potential advantages in the current context.

Section 2 outlines the critiques of direct payments and also highlights the major proposals being advanced for their future beyond 2013. Against this background, Section 3 outlines the CAP Bond option and the steps required for its introduction, and considers the application of the idea to the current situation. Section 4 concludes.

## **2 Direct payments in the European Union**

### **2.1. Critiques of direct payments**

Despite their obvious importance to European farmer accounts, the vast majority of the professional literature analysing the CAP [13] considers that direct payments are well past their sell-by date. Intellectually and academically, the case for continued direct payments, without very considerable re-design and much more careful targeting to specific objectives, is virtually non-existent (see, especially [20], [4]). According to Swinnen [20], for instance, this policy instrument is not effective in any defensible dimension: (1) Agricultural employment is still decreasing despite large and increasing direct support; (2) the majority of farm household incomes come from off-farm sources, reflecting improved integration of rural areas and markets with the general economy; (3) the distribution of support is very uneven amongst farm sizes, with those perhaps most deserving or needing support receiving the least; (4) most support is dissipated to input suppliers and landowners, since payments are based on historical rights and linked to land use, driving land prices up as a consequence; (5) cross compliance is either largely ineffective or impossibly expensive as a means of paying for agriculturally-related public goods (conservation, amenity, recreation and environmental (care) goods and services)

Based on this logic, Swinnen [20] well summarises the arguments that improvements in farm incomes due to support are temporary, which both history and economic logic demonstrate. Competition in the industry soon results in the revenue increase being capitalised in the value of farm assets, or being spent on increased costs of production. In either case, market competition ensures that total production costs will increase to match the supported increase in revenue. In effect, the benefits of support are frozen into higher costs for the sector and its businesses. Entrants to the supported industry have to purchase or rent their farm assets and pay the additional costs generated by the support, and are, consequently, no better off with the policy than they would have been without it.

Moreover, as evident from the 2007-08 food crisis, direct payments are unable to stabilise markets/incomes. There is no evidence that farm households in industrialised OECD countries have systematically lower incomes than other households, so policies to support incomes across the whole sector are unjustified [16]. A similar conclusion is drawn by a UK Government report [12] analysing the price spikes for agricultural commodities in 2007/08. The report concludes that these spikes were exacerbated by poorly performing markets and that there is an urgent need to further open up international agricultural markets by phasing out agricultural subsidies such as Pillar 1 of the CAP. However, according to some analysts, phasing out of the current direct payments should be accompanied by phasing in new, or re-designed, policy instruments [1].

These views are strengthened by the fact that direct payments are neither evenly distributed by farm sizes, nor by geographical location [8, 24, 23, 5]. The 80/20 rule applies – 80% of the support being received by 20% of farmers (recipients). Small farmers, especially, are handicapped in many ways. Though they are eligible for direct payments, due to the small farm size and administrative procedures, most of them receive marginal amounts or do not even participate in the system. As Zahrnt [24] and others have also emphasised, payment rates per hectare are also widely dissimilar, ranging from €500+ in Greece to €174 in Portugal.

Furthermore and as already noted, following the EU Copenhagen agreement, direct payments were introduced at lower initial rates in the New Member States (NMS), which have still not reached the level of EU15. Indeed, the NMS are already supplementing their EU funded direct payments with national supplements to make good the difference, so the common status of these payments is violated. In a more general context, it has also argued that the CAP is not targeted effectively to the NMS, for four main reasons [8]: (1) the lack of convergence between rural areas in NMS and EU15; (2) differences in farm structures in terms of both size and organizational type; (3) an inappropriate balance between the two CAP Pillars (direct support and Rural Development); (4) inadequate policy to implement rural development measures in the NMS. Therefore, the system of direct payments, amongst other issues, should be changed and redirected to meet the needs of the NMS.

## **2.2. The future of direct payments?**

What might justify the continuation of direct payments? A range of possibilities is considered in the reform literature. The most obvious are already identified in the axes of Pillar 2: competitiveness; the environment & land management; rural development & diversification. However, as is recognized in the design and implementation of Pillar 2, all of these justifications demand well-aimed targeting of payments towards specific objectives and conditions, and not to general, sector-wide payments to all farms. There is, perhaps, one argument for continued sector-wide support that at least some analysts find persuasive – the inherent volatility of agricultural markets and the need for some safety net or insurance/security provision. While there is some support for the provision of a safety net – to cope with ‘exceptional circumstances’ [4], there are also strong arguments [2, 20] that private sector/market provision of insurance is likely to be both more efficient and effective, though perhaps requiring some public facilitation through information and extension. State provision of insurance is very likely to crowd out market provision. It should also be noted that the EU’s import tariffs (as reflected in the CSE element of support, Figure 3 above) continue to provide a substantial ‘safety net’ as far as world market prices are concerned, albeit that this protection can be expected to be reduced in the future as and when agreement is reached under the WTO Doha round. Nevertheless, at a gross value of some 10% of total farm revenues, this continued market protection and associated stabilisation remains substantial (especially for some products, such as dairy).

However, the European Commission makes it pretty clear that it is not willing to acknowledge the temporary nature of the SFP system, at least publically [7, p.11]. *“Direct payments provide a basic level of income to all farmers throughout Europe, and market measures ensure a guaranteed price for some agricultural products. Changing one of these, without counterbalancing the other, thus affects the overall income level of producers. At the same time, the provision of a basic income payment to all farmers ensures the basic provision of public goods throughout Europe, by encouraging them to stay in farming.”*

It is apparent that the present system should be changed. The most commonly accepted idea in the professional literature [13] is to phase them out completely. However, various other ideas have been proposed. Swinnen [20] suggests that new objectives are needed for the CAP and direct payments should be drastically reduced and be converted to a safety net. A similar idea is proposed by [4], who argue that the system of direct payments should be converted into a general contractual scheme of three levels: basic husbandry payments, natural handicap payments and green points payments. In each category, farmers would provide special environmental services, according to their contract for a fixed term (“what you get depends on what you do”). Moreover, these authors propose to extend co-financing to direct payments in order to increase accountability and legitimacy, and also suggest 14 objectives that the new CAP should meet.

Similarly, Heissenhuber et al. (2008) suggest a three-step scheme of basic payments, voluntary agri-environmental measures and regional support. Ribbe [18] argues that all future subsidies, whether they are for investment or paid per unit of area, should be justified on values recognised by society, as an amplification of the cross compliance conditions, suggesting that future direct payments must be conditional on practical “services” rendered by farmers for the conservation of the natural environment, for animal welfare, as well as quality production and job creation. Zahrt [24] calls for complete elimination of Pillar 1, as well as exploring comprehensive reform of the distribution of CAP spending between member states. He argues that the two-pillar structure should be replaced by a discretionary and a public goods pillar, giving Member States flexibility in how they phase out the SFP, avoiding contentious EU debates about phase-out programmes. Zahrt [24] also notes that any far-reaching reforms will involve potentially substantial re-distribution of CAP payments across member states.

Two more recent reports, both prepared for the European Parliament, also conclude that the SPS is obsolete. “One can consider the present situation one of transition to a new policy, but without a clear orientation. Presently, the support measures of the Common Agricultural Policy score badly in terms of EU value added due to a lack of efficient targeting and ensuing excessive opportunity costs” [9, p3/4]. Bureau and Witzke [5] also consider that “the EU budget for direct CAP payments should be reallocated towards the provision of public goods, which is the only uncontested reason why society should provide money to farmers in the long run” (p. 11). This is the most comprehensive review of SFP and of alternative proposals yet produced. The authors are clear – the present SPS should be phased out over a transition period, and co-financing of the scheme over the phase-out period also recommended. Instead, European policy should be directed towards establishing a common framework for the payment for public goods, to ensure that “the boundary between what is part of the baseline (i.e. what is statutory for farmers) and what goes beyond and is eligible for EU payments remain consistent across Member States” (p. 12). Finally, Professor Tangermann [22] has recently written a trenchant critique of the single payment system. As he says “Unless justification (for the SPS) is fully credible, it will not be politically sustainable. And if it is not politically sustainable, it will not stick, and then the uncertainty among farmers will persist. But policy uncertainty is just about the worst thing one can inflict on a sector whose health so much depends on long-term planning.”

There is another potential idea for the future of direct payments: the CAP Bond. The idea has been well developed by Tangermann [21] and Swinbank and Tranter [19] but has interestingly largely disappeared from the mainstream of literature. Bureau and Witzke (*op. cit.*) are virtually the only analysts who even mention the option, and even so are curiously dismissive. “A rather ancient proposal, which still appeals to some governments, is that SPS should evolve towards a “bond scheme”. The bond scheme is a proposal for CAP reform tabled by the Danish government in the early nineties. .. This scheme, however, is merely a way to ease the transition towards a dismantling of the SPS and can hardly be considered as a “new model” for SPS. It also raises some practical issues, given the differences between the ways in which Member States have implemented the SPS.” (p. 77)

### **3 The CAP Bond**

The CAP Bond scheme was first formally proposed by Land Use and Food Policy Inter-Group (LUFPIG) of European Parliament in 1991 as a significant development of the concept of decoupled payments. The essence was to issue a bond through which the future stream of direct payments would be rolled up into a single, lump sum, once-and-for-all payment to existing farmers, and all rights to future compensation payments would be eliminated. The Commission plans for the 1992 CAP reforms included the bond scheme but it was not adopted [19]. The Commission also proposed a bond scheme in 1991 for the dairy sector and

in 1996 for the tobacco sector but neither proposal was accepted by the Council of Ministers. The most comprehensive analysis of the Bond scheme is provided by Swinbank and Tranter [19] who investigate the feasibility and practicality of introducing a bond scheme as an element of CAP Reform. We summarize the idea and its advantages briefly here, as a basis for reassessing the option for current conditions.

### **3.1. The Concept**

Tangermann's [21] original idea was based on the proposition that farmers would receive annual payments for a certain number of years to compensate for cuts in support prices (following, at least implicitly, the Buckwell report [6] idea of Transitional Adjustment Assistance). Bonds would be allocated to farmers on the basis of output in a reference period and future production decisions would not affect the value of the bonds, which anyway would be transferable and could be sold on the private capital market. Farmers could even retire and continue to receive the bond dividends (coupon payments). Tangermann suggested a 15-year duration of the bond, after which no further compensation is warranted. This time would be enough to adjust to new policies and market conditions. Moreover, Tangermann proposed that bonds be issued to farmers rather than landlords, to avoid capitalising bond payments and values in the value of the land. However, there were no initial proposals on the distribution between landlords and tenants.

Poole [17] developed the idea further and introduced a new element called exit bond. In his proposal, a farmer could choose between an annual income bond with zero redemption value or a zero coupon without yearly income but a fixed capital sum on maturity. Both could be sold in the capital markets and could be introduced on a voluntary basis.

### **3.2. The steps of conversion**

Swinbank and Tranter [19] proposed six steps to convert direct payments into a bond scheme:

1. Decouple crop payments from current land use (already largely complete);
2. Decouple livestock payments from the number of animals kept (already largely complete);
3. Decouple payments from land and attach the entitlements to individuals;
4. Limit the duration of payments and possibly make them degressive over time;
5. Definitively fix the future level of payments;
6. Transform payments entitlements to bonds.

The authors argued that, to be most effective, these steps should be taken at the same time, and that, furthermore, the logical sequence should be preserved.

Swinbank and Tranter argue that the benefits of the bond would be that: farm incomes would rise (as markets adjust to unsupported conditions); the EU economy would be better off (as a result of efficiency gains and eventual lower tax costs); administration costs and effort would decrease significantly; farmers would have more flexibility on their land use decisions and more certainty about their future. Moreover, they argue, the bond scheme would help converting the CAP to something like the Buckwell Report's CARPE (*op cit.*), assisting the release of funds from Pillar 1 to Pillar 2; help to correct historical unequal support; help making the EU negotiation position stronger in the WTO. These benefits can be summarized in Table 1.

**Table 1:** Summary of the benefits of a bond scheme

Step	Benefits
1 and 2: Decouple payments from production	<p>Allows farmers to make more productive use of their resources</p> <p>Alternative uses of farmland would become sensible</p> <p>Administrative controls could be dismantled</p> <p>Payments switch from the WTO's blue box to the green box</p>
3: Decouple payments from land and attach the entitlements to individuals	<p>Land prices are no longer distorted (artificially inflated)</p> <p>New entrants into agriculture no longer have the expectation of receiving payments</p>
4: The period over which future payments will be made is fixed	<p>Restores a level of certainty about policy, enabling more secure farm investment decisions.</p>
5: The level of future payments is fixed irrevocably	<p>Reinforces the level of certainty in the industry</p> <p>Removes the political uncertainty, and consequent dispute about future payments.</p>
6: Introduction of bonds and the full transferability of payment entitlement	<p>Locks-in policy reform, as payments can not be altered without impacts on bond holders</p> <p>Enables the original recipients to sell their bonds, releasing funds for productive uses.</p>

Source: Own composition based on Swinbank and Tranter [19], pp. 65

Despite its apparent benefits, the Bond has never been introduced. The factors causing this failure, particularly in 1992, are well summarized by Swinbank and Tranter (*op cit.*): poor timing; lack of coalition building; scope and extent of the reform; interests of the Commission; interests of the (dominant) French-German axis.

The timing was poor because the Bond scheme was viewed as an alternative (perhaps over complicated and unnecessary) to the mainstream “compensation for price cuts” at the time. When the Bond scheme was first presented, the Commission mainstream proposal (decoupled support) had been discussed for more than a year and preparations for the reform had been going on for more than three years. It was too late to re-visit the basic principles of reform: compensation via direct payments against the abolition of coupled support. The lack of coalition building arises from the fact that according to the Treaty of Rome, the Commission proposes and the Council decides. Commissioner MacSharry could only pursue his policy objectives with the support of the Council of Ministers, and no majority coalition could be built for the Bond. Swinbank and Tranter also argue that the scope and extent of the reform limited the scope for an even more radical (bond) idea. Path dependent reforms are much easier to adopt than path breaking reforms (Hall, 1993). Uncertainty about the consequences of the bond, as well as the potential loss of political power or administrative positions were always likely to militate against the more radical bond. Additional confusion was added by the potential extent of the concept (over three or more regimes) and its scope. Furthermore, and perhaps critically, the Commission has always feared re-nationalisation of agricultural policy, which it feared would have serious consequences for European integration. The bond scheme was seen as a proposal for such re-nationalisation, since any bond would have to be financed and implemented by the member states (the EU Budget cannot engage in capital transactions). The bond idea was strongly opposed for this reason [15]. Finally, the French-German axis has always been central to a reform outcome. As both were strongly oriented towards the *status quo*, to preserve high prices or at least continued support, the bond scheme held no attractions for the dominant political players.

### 3.3. CAP Bond & the Future of the CAP

Are things different now? We believe they are. The present SFP (SPS) system is intellectually indefensible without severe restructuring to pay for public goods and services. It is, as a consequence, becoming increasingly illegitimate and politically unsustainable. Furthermore, it is far from common – not only are the NMS responsible for co-funding their own programmes, in contrast with the 15, but also the payment rates show substantial and incoherent differences between and within member states. Bureau and Witzke (*op cit.*) note and illustrate both the substantial fractions of farm revenues accounted for by direct payments, and the wide variations between and within countries of these payments per labour unit (section 1.1.6, p. 30–36). The system needs to be reformed, as all parties to the current debates about the future of the CAP beyond 2013 well recognize, if not fear.

However, it is also apparent that, for many farmers, the payments are practically indispensable. Without them, many would be effectively, if not actually, bankrupt. As a consequence, farm groups and politicians dependent on farmer support cannot be expected to argue or vote for substantial change. Vrolijk et al. [23] estimate that only 18% of European farmers would continue to thrive without direct payments, in the sense that they would continue to earn positive incomes over and above competitive returns to their labour and capital resources. On the basis of farm income accounts (FADN) data for 2004 – 2006, they estimate that almost 65% might be able to survive with positive incomes, although these incomes would be lower than their labour, land and capital could earn outside farming. As a result, these farmers (or their heirs and successors) would be expected to leave the industry and do something else in time. 11% would experience negative incomes without direct payments, and 6% would find their already negative incomes made worse.

The Vrolijk *et al.* (*op cit.*) study (p. 10) “makes clear that in some countries and regions the viability of farms is more affected by the abolition of direct payments than in general in the EU. The viability of farms in Spain, Poland, Lithuania, Latvia, Belgium and Austria is hardly affected, whilst farms in Denmark, Ireland Sweden and the UK, as well as farms of some types in France, Germany, Hungary and Slovakia are heavily affected. In these countries, abolition of decoupled payments results in a large share of farms with negative farm incomes.”

Does this mean that European Agriculture as we know it cannot survive and prosper without direct payments? The answer is no. It is inconceivable that much of European agriculture, blessed with some of the world’s best farm land and good agro-climatic conditions, surrounded by a large and rich market, and well-functioning supply and marketing chains, could not survive and prosper in free market conditions. Vrolijk et al. note the following *caveat* (p. 8) on their estimates: “It is important to note that the analysis illustrates only the first-order impact of the abolishment of subsidies, and this gives a ‘worst-case’ assessment. It does not take into account farmers’ behaviour, although the past has shown that farmers do adapt to changes in the Common Agricultural Policy. It also assumes a fixed cost structure and abstracts from changes in factor prices and structural change, all elements which would reduce the impact of reform on farm incomes.” Without direct support both farm households and businesses and the whole agricultural sector would adapt and adjust, and much would survive and prosper eventually. But this does not mean that the adjustment would be welcome enough to attract political support, or that there would not be substantial costs and effort associated with the adjustment. Virtually all analysts recognise this, and the typical, near universal, response is that any radical change, especially elimination, needs to be phased in over time, perhaps a long time (e.g. Bureau and Witzke, *op cit.*, p. 90).

In fact, as Swinnen (*op cit.*) argues, a primary reason for most agricultural support in the first place is precisely to ease and assist the transition from a predominantly agrarian to a

commercial/industrial/urban economy. The natural economic signals for this transition are declining relative farm incomes, while the adjustments favour those who either have the greatest comparative advantage in farming (and hence are able to expand their businesses and incomes) or those who have the greatest transferable skills and capital base (and hence can more easily earn good livings doing something else). Those, perhaps many, with neither of these advantages become stuck in a declining industry with falling relative incomes, though with substantial political support. This political support easily translates to economic support, which in turn quickly dissipates into higher input and factor costs, and probably lower market prices as well<sup>1</sup>, thus completely failing to achieve the political objectives of improving farm incomes. We end up in the present condition, with the agricultural system, including its politicians, dependent on support which fails to meet its social objectives and hence is commonly perceived, outside the special interest groups, as being illegitimate and obsolete.

Elimination of direct payments is the only sensible and sustainable option. However, does a phased elimination of support help farmers adjust? Time is not the major constraint on adjustment and adaptation of businesses or households. Timing, on the other hand, is often the critical impetus for change at the farm household level, as generations and successions change. Planning for such changes is often a priority for farm families, and a major difficulty in making such plans is the uncertainty about future market and policy conditions. Phasing out current direct payments, even, or perhaps especially, over a 7 or 10 year horizon (as suggested by Bureau and Witzke, *op cit.*, for example) is likely to make this uncertainty far worse, not better. Not only will the consequent adjustment of factor, input and product markets not be apparent until after the full adjustment or transition period, but also there will continue to be uncertainty about whether or not future governments will stick to the apparent commitment to carry through the full transition and not back-track. In fact, it makes economic sense for many farmers to contribute effort and funds to persuading governments to rescind the decision to abolish the payments, as the recent US farm policy experience well demonstrates.

If phased elimination does not appeal to the primary constituency (farmers), is a transition of the SPS to specific and targeted payments for public goods any better? In principle, this seems like a good idea, at least at first sight, and the option is well argued, for instance, by Bureau and Witzke (*op cit.*) among others. However, the devil is in the detail. Who should be paid how much for what particular public goods? There is absolutely no reason to suppose that the present payment rates to farmers, either by type, region or country are at all related to the value of the public goods they would otherwise not provide. In fact, there is no reliable information about what public goods would not be provided in the absence of direct payments – we can only make more or less educated guesses, about which there will be continued dispute. Similarly, there is no hard evidence about how much it would be necessary to pay to secure delivery or provision of the missing goods. Farm families have no way of making sensible projections of how much they might be able to earn or what sort of public (care<sup>2</sup>) goods and services they might be best advised to provide. Bureaucrats and governments have no way of determining, without continued contest, appropriate payment rates or even appropriate menus of environmental and ecological services, to say nothing of cultural provisions.

---

<sup>1</sup> There is good reason to suppose that the provision of public (government) support to farmers both encourages them to produce more than they otherwise would, hence depressing market prices, and also insulates the downstream food chain from full appreciation of the full economic costs of, and hence necessary prices to be paid for sustained food production.

<sup>2</sup> Conservation, amenity, recreation and environmental (care) services



Even if some agreement could be reached about appropriate menus and payment rates for care services across the whole Union, presumably heavily differentiated by type, region and circumstance, the transition between present payments and the indicated care payments still presents very major problems, both for farmers, and for their representative politicians and member states. How should the losers from the necessary redistribution be compensated (or appeased)? Who should pay – the European budget or the member state exchequers? These difficult problems need solutions or negotiated compromises, but the difficulties of doing so strongly suggest a number of false starts and ongoing re-negotiation and change. None of this contributes at all to solving the necessary adjustment problems facing farmers and their families and the continued debilitating uncertainty about future conditions.<sup>3</sup>

A solution is to separate the quite distinct issues of adjustment to the removal of direct payment support from that of the appropriate mechanisms for delivery and provision of public goods. None of the present contributions to the CAP reform debate pursue this point, conflating (and confusing) some continuation of flat rate direct support payments with more or less cross-compliance with public good provision.

The inevitable negotiations about revising the payment rates, and hence the distribution both between farms and countries, of the continuing direct payments will be hard enough, without trying to encumber these with additional arguments about their relation to the provision of (European or national or regional or local) public goods. Why not restrict attention to the primary question – how to abolish the direct payments – before addressing the subsequent question – how to ensure provision of missing public goods? How? By using the Bond idea.

We do not pursue the difficult and contentious details of the various possible proposals about which farmers/farms should get what levels of compensation, and hence who should get what particular value of bond. These negotiations will happen anyway, as an inevitable and unavoidable part of the post 2013 debate. Since at least temporary continuation of some form of single farm payments seems practically inevitable, the real debate should focus on the legitimacy of these payments. It is practically impossible to sustainably legitimise them on public good (care) delivery grounds, which are hopelessly and continually contestable. The critical issue is to gain acceptance for the principle that single farm direct payments are an obsolete anachronism, which fail to deliver any legitimate social objective, and hence should be abolished. Whatever the outcome of the reform negotiations, many will continue to hold this view, and (we argue) future experience with continued single farm direct payments will simply re-inforce the view and consequent harassment of the system. As a consequence, failure to accept the principle of abolition during this reform will simply postpone the inevitable. Meanwhile, the supposed beneficiaries will continue to be plagued by uncertainty about the future while being inappropriately and ineffectively supported in the present.

All this unnecessary, diversionary and wasteful debate and effort could be avoided by agreeing a commitment to elimination and abolition of (untied) direct payments. This commitment cannot be achieved without both compensating the losers adequately, and making it obvious that the means of compensation actually helps farm families and their dependents to adjust. Promises of continued direct payments for a limited period – the phased elimination option - do neither. Yet that is the practically inevitable outcome of the present reform discussions and negotiations. Our key and critical points are: i) simplify the inevitable debate and negotiations by restricting attention to the single objective of eliminating these payments – recognizing that this cannot be achieved without appropriate adjustment assistance; ii) having done so, follow the logic and the practicality of rolling up the stream of

---

<sup>3</sup> One of us has analysed elsewhere the (im)possibility of effectively reflecting either the social value or the social opportunity cost of care provision through uniform (even if differentiated) single farm payments (Harvey, 2003). This paper also proposes a possible resolution of these difficulties.

agreed time-limited of annual direct payments into a single, once-and-for-all payment – the Bond.<sup>4</sup>

In making these points, we do NOT argue that every and all payments to farmers should be eliminated – there are strong grounds for paying for public and social goods not otherwise provided by well functioning markets, and for specific assistance with infrastructure and institutional support for the better functioning of markets – some of which could well be best satisfied by making specific and targeted payments to specific farmers and/or farms. All we are arguing is that it is either foolishly difficult and expensive, or simply not possible, to get to such a system from where we are now in one (or even several) adjustments to the present SPS/SFP system.

How would elimination of direct payments really damage current farm businesses? The answer to this question indicates how the necessary compensation needs to be provided. The answer is that family businesses would suffer a major reduction in the value of their farm capital, the leverage this capital provides, and their ability to service their debt (much of which reflects the inflated value of land and farm capital because of the support). The consequence is that elimination of direct payments substantially erodes farm family pension and business adjustment funds. Appropriate compensation would replace this balance sheet damage with an equivalent and completely fungible asset – the CAP Bond.

The bond, and associated commitment to elimination of direct support, would provide the necessary and critical capacity for farm families and the farm sector to adapt and adjust to an essentially unsupported world. To do so, any family needs both the confidence and the capital to adapt and adjust appropriately. At present, there is no confidence because no one knows what an unsupported business and industry would look like, so many fear the worst. At present, there is very limited capital, and what there is (including the capacity to generate capital from current income) is obviously and substantially threatened by elimination of support. The Bond provides both the necessary capital, and the required confidence. The latter is especially critical. Only by actually generating the conditions of an unsupported industry can we hope to learn what sort of conditions actually emerge, and therefore what adjustments and adaptations are necessary and useful to cope. Only by providing the bond can we achieve this necessary experiment without compromising the livelihoods of the subjects of the experiment. How much insurance, or investment, or management practice, or market development, or business/family relocation is going to be needed in a future (unsupported) world? What will happen to product, input, land and capital plant and machinery prices? How much land will actually be abandoned, rather than bought up or taken over by others? How much ecological damage, or regeneration will happen? How will people respond to conditions without support, and what will be the consequences? We do not know unless we try, and we cannot afford to try because we do not know, and because it is our livelihoods we are experimenting with. The Bond provides the essential capability to undertake the experiment. The Bond is a serious answer to these critical questions, which are implicit in any and all discussions of CAP reform, and especially about the future of direct payments. No other proposal on the table comes close to answering these questions.

Note, finally, four strongly supporting points. First, the justification for the bond is explicitly the provision of necessary adjustment capacity for a presently dependent sector (collection of

---

<sup>4</sup> Based on 2007 payments (around €37 billion - EC, 2010), bonds would be issued to around five million claimants (FADN, 2010) and the initial annual payment would average €7400. However, there would be a very large number of small payments and a small number of large payments, of course. Payments would be made in euro in order to manage different exchange rates. The bond scheme would have a neutral impact on the EU's Budget, however, administration costs would surely decrease. Moreover, member states would still have the right to tax the income from the bonds differently (the bond could be treated as unearned income).

family businesses and livelihoods) who have, through no fault of their own, been encouraged and persuaded to stay in farming and go on doing what they have always done by (misguided) public policy. This argument applies to farmers in both the 15 and the NMS – the latter promised access to EU support, bolstered by their own governments. As already argued, the practically inevitable agreement to continue these payments already acknowledges the political logic of the justification, but notably fails to articulate a legitimate rationale (other than preservation of established interests). Second, the bond scheme would clearly meet the Commission's goal of simplification of the CAP (which seems an impossible aspiration under any other alternative option). In so doing, it would substantially reduce inherently unproductive bureaucracy and administration, and the similarly wasteful effort on continued debate about the future of direct payments. Thirdly, adoption of the Bond and elimination of direct payments would insulate the CAP completely from any possible policy disruption or challenge arising from present or foreseeable future WTO agreements. Finally, on expiry of the bonds, the European budget would be finally freed to concentrate on adding value to the Union, its people and markets, rather than continuing to pay obsolete and often counter-productive direct payments, currently only justified by 'squatters' rights' and vested interests.

## 4 Conclusions

It is apparent that the tendency of the political system to preserve the *status quo* reflects the dependencies which the policy history has generated [11]. Reforming the policy depends on 'weaning' the interested parties (farmers, their political representatives and the administrative bureaucracy) from this dependence. The common perception is that many farms would be bankrupted by elimination of the SFP support. As a consequence, it is usually argued that any proposal to do so must involve progressive and gradual change, rather than abrupt reform. One interpretation of the Commission's strategy (presuming there is one) for the reform of the CAP is that it has been progressively shifting the perceptions of European farmers towards a largely unsupported future. Conversion of support to direct payments, and subsequent incorporation into the SFP has focused attention on what the European taxpayer is supposed to be getting for this spending. As a result, it could be argued, many farmers are already aware of the pressures to reduce this spending and are already anticipating the eventual elimination of the SFP, or (at least) substantial conditioning of these payments on the basis of provision of public goods and services. If so, then it may become possible to actually eliminate the payments in due course, without raising irresistible opposition. On the other hand, this increased awareness of the pressures on SFP can also be expected to increase farmers' (and their representatives') actions and efforts to resist the pressure and preserve the payments.

There is no sound reason for continuing direct payments and there is an excellent option for getting rid of them - introducing the CAP bonds. The adoption of the original idea to current policy circumstances has shown several advantages. We have already made the first two steps on the 'path to bond scheme' by partial decoupling – why not going further and relieve the CAP once and for all from the old and obsolete compensatory logic? There will always be fears about radical new policy options and about conditions without support. But it is also clear that the uncertainties generated by the present condition – continued SPS, though with an increasingly indefensible future – are helping no one. In addition, there is no clear indication of what corrections and assistance an unsupported industry would really need to provide public goods.

The CAP Bond would solve several problems of the direct payments. First, farmers would both be compensated properly for the elimination of support, and given a chance to make the most appropriate adjustments to cope with an unsupported world. Second, the causes of uncertainty on the future of direct payments and their exact sums would be reduced, and their need for adjustment and adaptation would be better defined as the markets adjust. As the bond scheme would bring a continued certainty about the future of the present agricultural policy, it

would help strategic decision making at the farm level.

Moreover, the bond scheme includes several benefits to the EU. First, such a system would result in significantly decreased administration costs enabling to decrease bureaucracy. It would also help cancelling the logic of historical unequal support once and for all. Furthermore, substantial funds would be released from Pillar 1 (once the bonds expire) and could be converted into Pillar 2, strengthening the role of rural development in line with the original idea of CARPE. Finally, the EU negotiation position would be much stronger in the WTO as problems with direct payments would entirely be eliminated.

Without a clean break of the CAP bond, it is likely that the policy will continue to generate wasteful argument, continued unnecessary uncertainty, and consequently unproductive policy instruments and farm adjustments.

## Acknowledgements

I gratefully acknowledge the critical assistance provided during the preparation of this paper by Dr. Attila Jambor, Corvinus University, Budapest, who is, nevertheless not at all responsible for any errors or misconceptions.

## References

1. Anania, G.: The EU Agricultural Policy from a Long Run Perspective: Implications from the Evolution of the Global Context, Invited paper presented at the BEPA (Bureau of European Policy Advisers) Workshop, Brussels, 26 February 2009.
2. Antón, J.: What role for Policy in Agricultural Risk Management? AES-DEFRA Conference on 'Coping with Risk in UK Agriculture', London, 22 January 2009.
3. Buckwell, A. E., Harvey, D. R., Parton, K. A. Thomson, K. J.: The Costs of the Common Agricultural Policy. Croom-Helm, London, 1982.
4. Bureau, J. C., Mahé, L. P.: CAP reform beyond 2013: An idea for a longer view, Notre Europe Report, Paris, 2008.
5. Bureau, J. C., Witzke, H. P.: The Single Payment Scheme after 2013: New Approach – New Targets, Study for European Parliament: Directorate General for Internal Policies, Policy Department B: structural and cohesion policies, 2010.
6. EC: Towards a Common Agricultural and Rural Policy for Europe, European Commission DG VI/A1, Report of an Expert Group (the Buckwell Report), April 1997.
7. EC: A reform agenda for a Global Europe - Reforming the budget, changing Europe, Communication from the Commission to the Council and Parliament, Brussels, 2009b
8. Gorton, M., Hubbard, C., Hubbard, L.: The folly of the European Union Policy Transfer: Why the Common Agricultural Policy (CAP) does not fit Central and Eastern Europe?, *Regional Studies*, 43(10), 2009, pp. 1305-1317.
9. Ferrer J.N., Kaditi, E.A.: The EU added value of agricultural expenditure – from market to multifunctionality – gathering criticism and success stories of the CAP, Report prepared by the Centre for European Policy Studies (CEPS) for the European Parliament, 2010.
10. Harvey, D. R.: European Union Cereals Policy: an Evolutionary Interpretation, *Australian Journal of Agricultural Economics*, 35(3), 1995, pp.193–217.
11. Harvey, D. R.: Policy Dependency and Reform: Economic Gains versus Political Pains, *Agricultural Economics*, 31, 2004, 265–275.
12. HM Government: The 2007/08 Agricultural Price Spikes: Causes and Policy Implications, Global Food Markets Group, 2010.

13. Jambor, A., Harvey, D. R.: Review of the challenges of CAP reform, Centre for Rural Economy Discussion Paper Series No. 27, 2010, Newcastle University, UK.
14. Josling, T. E.: A formal approach to Agricultural Policy, *Journal of Agricultural Economics*, 20(2), 1969, pp. 175–196.
15. Kjendahl, R., Tracy, M (eds): Renationalisation of the Common Agricultural Policy, Valby/la Hutte, Institute of Agricultural Economics/Agricultural Policy Studies, 1994.
16. OECD: Farm Household Income: Issues and Policy Responses, OECD, Paris, 2003.
17. Poole, P.: Reform of the Common Agricultural Policy: the Use of Exit Bonds, European Policy Forum, London, 1993.
18. Ribbe, L.: The long term development of the Common Agricultural Policy (CAP) - Analysis and recommendations for an ecological orientation of agricultural policies, Paper on Common Agricultural Policy, IFOAM – EU Group, Brussels, Belgium, 2009.
19. Swinbank, A., Tranter, R. (eds): A Bond Scheme for Common Agricultural Policy Reform. CABI Publishing: Wallingford, 2004.
20. Swinnen, Johan F. M.: On the Future of Direct Payments, Paper presented at the BEPA Workshop. February 26, 2009, European Commission, Brussels.
21. Tangermann, S.: A Bond Scheme for Supporting Farm Income, in Marsh, J. S., Green, B., Kearney, B., Mahe, L., Tangermann, S., Tarditi, S. (eds.): *The Changing Role of the Common Agricultural Policy: the Future of Farming in Europe*. Belhaven, London, 1990.
22. Tangermann, S.: How can direct payments be justified after 2013?, *Agra Europe*, AE2400, Feb. 19th 2010 [available at: <http://www.reformthecap.eu/blog/how-can-direct-payments-be-justified-after-2013>].
23. Vrolijk, H. C. J., de Bont, C. J. A. M, Bockland, P. W , Soboh, R. A .M. E.: *Farm Viability in the European Union: Assessment of the impact of changes in farm payments*, LEI Report 2010-011, LEI, Wageningen University, The Hague, 2010.
24. Zahrt, V.: *Public Money for Public Goods: Winners and Losers from CAP Reform*, ECIPE Working Paper, No. 08/2009, Brussels, Belgium.



# Socio-economic Characteristics impact on Peruvian Cocoa Farmers' Welfare: Acopagro Cooperative-A Case Study

Angie Higuchi<sup>1</sup>, Masahiro Moritaka<sup>2</sup>, Susumu Fukuda<sup>2</sup>

<sup>1</sup>Graduate School of Bio-resource and Bio-environmental Science, Kyushu University, Fukuoka

<sup>2</sup>Faculty of Agriculture, Kyushu University, Fukuoka

**Annotation:** In the Peruvian jungle, there are two main cocoa marketing channels. First, there are the intermediaries who just focus on the high prices. Second, there is the cooperative, which participates in the international market and provides benefits to its members [9]. The Acopagro Cooperative, a Peruvian organization, for example, has contributed to the shift from illegal crops like coca to an alternative crop like cocoa which gives small scale farmers a sustainable welfare. This study analyzes Peruvian cocoa farmers' socio-economic characteristics as these personal attributes affect their decision-making process in the cocoa commercialization for their long term self-improvement.

As part of this analysis, a survey of 243 farmers in Juanjui, San Martin-which is the main cocoa production area in Peru-was carried out between December 2009-January 2010. A binary logistic model was then used in order to show how these characteristics impact on the farmers' choice of which marketing channel to distribute their products. The results demonstrated that those farmers who possess willingness to receive technical assistance among other features would like to participate as cooperative members. Moreover, although, former studies showed that education had a positive effect on being a cooperative member, in this particular case, the findings indicate a non significant impact due to the elementary school level of the farmers who chose Acopagro. In addition, these characteristics also illustrated that farmers who join the cooperative not only think about commercializing their cocoa but are also concerned about their own knowledge and well-being. Therefore, policy makers and farmers' organizations should consider how these socio-economic attributes encourage farmers' marketing channels for contributions not only towards the development of these organizations' but also to that of their communities as a whole.

**Key words:** cooperative, socio-economic characteristics, logistic model, marketing channel, farmers' organization

**JEL classification:** Q13

## 1 Introduction

The value of agricultural cooperatives can be very significant because they can assist small farm producers to effectively access new niche markets for their products, offering a promising option for rural poverty reduction [3]. In the Peruvian jungle, there are two main marketing channels. First, there are the intermediaries who just focus on the high prices in the national market without concern about the quality of the beans [6]. Then there are the cooperatives who pay attention to cocoa beans differentiation due to their participation in the international market. These cooperatives provide benefits, such as, credits and technical assistance, as well as international prices information to members [9].

Since 1972, the Peruvian jungle was a perfect terrain for cultivating coca, which was the most profitable crop in remote areas. Presently, Peru is the second world coca leaves producer with 56,000 hectares, being 92% used for drugs usage [8]. In spite of this trend, Acopagro cooperative, a Peruvian organization created in 1992 with United Nations support, for example, has contributed to the shift from illegal crops like coca to an alternative crop like cocoa. This shift helps small scale farmers in the Peruvian jungle to increase and diversify

their income in a legal and sustainable way in the free market, preserving the environment at the same time.

Measuring farmers' perceptions as well as studying the socio-economic characteristics and information-seeking behavior that influence those perceptions should be the preliminary steps towards the development of extension programs to promote sustainability among farmers and rural population [5]. Therefore, it is necessary to understand the socio-economic characteristics for making judgments about the effects of different policies on economic welfare [2].

Participation in an institution like the cooperative involves the adoption of quality standards and specific production techniques for exporting the product [9]. Consequently, mainly having access to extension services which help farmers to increase the quality of their cocoa is presumed to have a positive influence on their participation in Acopagro.

It is expected that having a higher education level can influence the probability of participating in the cooperative positively. This is because naturally, farmers are more able to adopt new technologies; understand price and market information; and have more access to credit and other forms of capital [7]. Experience in cocoa cultivation is also expected to be positively associated with participation in the cooperative as farmers can demonstrate a greater capacity to bear the risk involved in adoption of innovations [9]. Another characteristic like being older is also positively related to participation due to intergenerational differences in cooperative values. In addition, female membership is also positively related as gender equity improves their process of economic development [9].

The main aim of this paper is to identify and analyze the socio-economic characteristics that influence membership in the Acopagro cooperative by comparing cooperative members to cocoa farmers who distribute their product through intermediaries. These personal characteristics are important because they contribute to the decision making process about which marketing channel they should choose for their long term self-improvement.

## **2 Data and Methodology**

A survey of the cocoa producers was carried out in December 2009-January 2010 in Juanjui, San Martin (which is the largest cocoa producer region in Peru). Primary data was gathered by using a structured questionnaire at the study site with cooperative support, covering topics as the socio-economic characteristics of households and marketing information. As a result, a total sample of 243 farmers was collected. Personal interviews with the general manager as well as one farmer community leader were also conducted for qualitative description purposes.

Socio-economic variables are commonly used by many researchers to compare or study the influence of different factors on some behaviors of a specific group of people [5]. To identify the factors that make farmers choose which marketing channel they would like to use in order to commercialize their cocoa, a bivariate logistic regression was used to analyze and examine the effect of each explanatory variable on the dichotomous dependent variable. In this case study, the dichotomous dependent variable is the membership in Acopagro or distribution of their products through intermediaries.

The logistic regression equation is based on the principle which uses logarithmic terms to express the multiple linear regression equation. Thus, the problem of violating the assumption of linearity is overcome. For interpretation purposes, the odds ratio is reported as this proportionate change in odds. Moreover, it can be interpreted as a multiplier of the odds of being a member or not of the cooperative. If the value is greater than 1, then it indicates that as the predictor increases, the odds of cooperative membership increase. Conversely, a value



less than 1 indicates that as the predictor increases, the odds of cooperative membership decrease [4].

$$P(Y) = \frac{1}{1 + e^{-(b_0 + b_1 X_1 + b_2 X_2 + \dots + b_n X_n + \mu)}} \quad (1)$$

Using the Binary logistic regression model equation (1) for the model purposes, Y is the marketing channel that the farmer chooses (if Y=1, the farmer belongs to Acopagro cooperative, otherwise if Y=0, the farmer chose the intermediaries). P(Y) is the probability of participation in a marketing channel; b<sub>0</sub> is the intercept; b<sub>i</sub> (i= 1~n) are the estimated model coefficients; x<sub>i</sub> (i= 1~n) are the independent variables and finally, μ is a random error term. Summary statistics for the variables included in the logistic model are given in Table 1.

**Table 1.** Summary Statistics

Variable	Description	Total (n=243)		Coop member (n=103)		Non coop member (n=140)	
		Mean	SD	Mean	SD	Mean	SD
Coopmemb	Dummy variable which takes the value of 1 if the farmer participates in Acopagro; 0=not a member	0.42	0.03	1.00	0.00	0.00	0.00
Experience	Experience in cocoa cultivation (years)	6.31	0.20	7.77	3.29	5.24	2.43
Livestock	Land for livestock (ha)	0.51	0.14	0.82	2.65	0.28	1.81
Othercrop	Land for other crops except cocoa (ha)	0.91	0.08	1.16	1.43	0.73	1.17
Maleadult	Number of male farm workers (>18 years old)	1.50	0.05	1.27	0.73	1.66	0.66
Parttime	Number of workers hired as part time labor	1.17	0.11	1.51	2.05	0.91	1.41
N.intcha-1	No. of institutions that gave technical assistance discarding the cooperative (No. Institutions – 1)	0.53	0.73	0.89	0.78	0.26	0.57
Coca	Coca cultivation before (1= yes, 0= no)	0.48	0.03	0.64	0.48	0.36	0.48
Distance	Distance to gathering center > 2 km (0= yes, 1= no)	0.65	0.03	0.31	0.47	0.90	0.30
Sex	Sex (1= male, 0= female)	0.96	0.01	0.93	0.25	0.99	0.12
Age	Farmer's age (years)	45.35	0.76	49.22	12.27	42.50	10.82
Education	Farmer's education (years)	8.78	0.23	7.66	3.50	9.58	3.42
Married	Farmer's civil status (1= married, 0= other)	0.57	0.04	0.52	0.50	0.56	0.50
Occupation	Farmer's main occupation (Agriculture=1, Other=0)	0.91	0.02	0.98	0.14	0.86	0.35
Cocoaprod	Cocoa production (tons)	1.72	0.78	1.81	1.21	1.65	1.23

### 3 Results

Table 2 shows the results of the logistic regression model, previously testing the presence of multi-collinearity between the explanatory variables used in this model. The aftermath confirms the positive effect of receiving technical assistance for participating as a member in the Acopagro cooperative. Particularly in this case, bias was controlled by not considering Acopagro as an institution that gives technical assistance to the farmers (N.instcha-1). This was because if cocoa farmers belong to the Acopagro cooperative, they would then have free access to technical assistance—an advantage for members over non members. This factor would then become a potential source of partiality in this model. As the number of institutions that give technical assistance to the farmers increased by a unit, the change in the odds of

membership to Acopagro is 2.53. In other words, farmers who belong to Acopagro are concerned about learning competitive sustainable techniques based on high export standards. This knowledge acquisition then translates into high income for them.

Although former studies conducted by Boz and Akbay [1], M. Wollni, M. Zeller [9], Füsün Tathdil, F. et. al. [5] showed education as a significant variable for a positive effect on cooperative values, the results in this case demonstrated the opposite. Namely, most of the farmers who are Acopagro members have only an elementary school level and agriculture is their main income source. Thus, the theory that mainly the education level can influence the probability of becoming a member in the cooperative positively is rejected as it did not have a significant impact on participation in the Acopagro cooperative. Instead, the farmers who commercialize on their own have higher level of education than the ones who chose Acopagro.

As it was expected, being older than 40 years old and the experience of cultivating cocoa have a positive effect on the odds of cooperative membership (1.06 and 1.33 respectively). Also, the number of male household members has a significant but negative effect (decreasing 0.32,  $p < 0.05$ ). This is because farmers who belong to Acopagro prefer to send their young people to study at school instead of having them help out on the farm. Consequently, part time labor, used by the farmers, is a positive variable and significant in this model (1.31). In 2007, Acopagro increased their female members to 12% in 2007 (Ruiz, R., 2007). It is confirmed in this study's model that the odds of a woman entering a cooperative as a member is nine times more likely than her commercializing through intermediaries. The longer the distance to distribute the product and the larger cocoa production (significant at 1 and 5% respectively), the more positive the effect for commercializing through intermediaries. This is because farmers who are independent prefer to sell more cocoa in order to receive higher prices for their product.

**Table 2.** Results from binary logistic regression analysis of Acopagro membership

Variable	B (SE)	95% confidence intervals for odds ratio		
		Lower	Odds ratio	Upper
Intercept	0.53(2.12)			
Experience	0.29(0.09)***	1.12	1.33	1.56
Livestock	0.07(0.11)	0.87	1.08	1.33
Other crops	0.12(0.17)	0.81	1.13	1.57
Male adult	-1.13(0.30)***	0.18	0.32	0.58
Part time	0.27(0.14)**	1.01	1.31	1.71
N.instcha-1	0.93(0.32)***	1.36	2.53	4.72
Coca	0.40(0.44)	0.63	1.49	3.53
Distance	-3.25(0.48)***	0.02	0.04	0.10
Sex	-2.23(1.33)*	0.01	0.11	1.44
Age	0.06(0.02)***	1.01	1.06	1.11
Education	-0.03(0.07)	0.86	0.98	1.11
Married	-0.21 (0.47)	0.33	0.81	2.02
Occupation	0.53(1.10)	0.20	1.71	14.65
Cocoa product	-0.50(0.21)**	0.40	0.61	0.92

Note: [a]  $R^2 = 0.52$  (Cox & Snell),  $0.70$  (Nagelkerke),  $0.26$  (H&L goodness of fit), \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

[b] B are the estimated coefficients. Standard errors are in parenthesis (SE).

[c] SPSS version 15.0 was used for estimating the binary logistic model.

## 4 Conclusions

Acopagro cooperative offers a promising option for rural poverty reduction, providing benefits that influence the participation of the cocoa farmers in this institution. Numerical results along with personal interviews made by the author, illustrate that farmers who join the cooperative possess strong willingness to learn through technical assistance. This is because they can learn more techniques to improve their welfare. They can also improve their cocoa production to yield higher revenues that can provide stability to their families. Although earlier works mentioned education as a significant variable, this research's outcomes show that farmers who belong to Acopagro have just an elementary school level of education. Thus, this is not a significant factor for their joining the cooperative.

Lack of access to main cities due to the wide geography of the jungle made it difficult for cocoa farmers to receive a good education and have access to health services. Consequently, they found in Acopagro a way to overcome poverty by cooperating with farmers who belong to their communities. In this way, they try to pursue long term prosperity, for example, by sending their children to the school.

Results also demonstrated that farmers who possess the following attributes were more likely to participate in the Acopagro cooperative: 1) older than 40 years old 2) cultivation of cocoa experience 3) less family male members on the farm 4) hired part time labor and 5) female. Alternatively, farmers who commercialize through intermediaries have more cocoa production and go further to gather their crops in order to receive higher prices for their raw material.

In a nutshell, farmers who belong to Acopagro depend on the Cooperative for commercializing their cocoa due to their basic education and their willingness to learn more techniques. This gives them a means to compete more effectively against farmers who sell through intermediaries. The farmers who rely on intermediaries sell their cocoa to those who pay higher prices. At the same time, these farmers do not think about the quality of their cocoa because their product is mainly destined for the national market. Finally, these same farmers also think that by working independently they can obtain more revenues.

The Peruvian Government should consider these socio-economic facets when constructing bridges for connecting districts; improving the roads as well as building good schools and hospitals for the enhancement of these farmers' communities. Conversely, contemplating these factors are important for the development of farmers organizations as well as the long term improvement of the region as a whole.

## Acknowledgements

The author is grateful to Sir Gonzalo Ríos, Lusmila Paredes and Don Hilmer Macchiavello for their constant support during the survey and to the farmers for their sincere responses. I would like to express my special thanks to Stephanie Weston for proofing this document.

## References

1. Boz, I., Akbay, C.: Factors influencing the adoption of maize in Kanhranmanmaras province of Turkey. *Agricultural Economics*, 33, 431-440. 2005.
2. Glewwe, P.: Investigating the determinants of household welfare in Cote d'Ivoire. *Journal of Development Economics*, 35 (1991) 307-337. North- Holland, 1991.

3. Donovan, J.: Diversification in international cacao markets: opportunities and challenges of smallholder cacao enterprises in Central America. August, 2006.
4. Field, A.: Discovering statistics using SPSS. Sage Publications LTD, England, 2009.
5. Füsün Tathdil, F. et. al.: Farmers perception of sustainable agriculture and its determinants: a case study in Kahramanmaraş province of Turkey. 2009.
6. IICA (Inter-American Institute for Cooperation in Agriculture). Situation and perspectives of the Peruvian cocoa-chocolate channel. Peru. 2009.
7. Norton, G. W.: The economics of agricultural development. Routledge, an imprint of Taylor & Francis Books Ltd, 2006. ISBN10: 0415770467.
8. ONUDD (United Nations Office on Drugs and Crime) web page: <http://www.un.org/spanish/Depts/dpi/boletin/drogas/>.
9. Wollni, M. and Zeller, M.: Do farmers benefit from participating in specialty markets and cooperatives? The case of coffee marketing in Costa Rica. *Agricultural Economics* 37, 243-248. 2007.

# The evaluation of disparities in economic performance in the regions of the Czech Republic

Jaroslav Jánský<sup>1</sup>

<sup>1</sup>Faculty of Regional Development and International Studies,  
Mendel University in Brno,  
Zemědělská 1, 613 00 Brno, Czech Republic  
jansky@mendelu.cz

**Abstract:** The Regional Development Strategy of the Czech Republic for the years 2007 – 2013 conceives the mitigation of imbalance between regions in the economic, social and environmental spheres as one of its principal objectives at respecting the European Union's regional policy goals. A thorough analysis of the quality of life in the individual regions and identification of the factors causing regional disparities remain the cornerstones in determining suitable instruments for the mitigation of regional disparities.

The paper sets out to analyze the disparities in regional economic performance in the Czech Republic by using the multidimensional statistical method of factor analysis. In total 68 indicators were identified for the individual regions of the Czech Republic out of which 11 indicators were chosen for the calculation of the index of development potential by using the factor analysis, such as the number of enterprise-type registered units in agriculture, industry, civil engineering, trade, accommodation, boarding, transport sector, warehousing and communications, per capita gross domestic product in CZK, per capita gross added value in thousands of CZK, per capita gross fixed capital generation in CZK and per capita receipts and expenditures in CZK. The above specified indicators of economic performance in the regions of the Czech Republic were analyzed for the years 2002 – 2007.

Factor analysis determined the index of development potential, which allows for expressing and quantifying the existing disparities in economic efficiency of specific regions of the Czech Republic.

The paper presents results of the research project no. WD-57-07-1 "Possibilities of overcoming the disparity between selected regions" elaborated with the financial aid from the Ministry for Regional Development.

**Key words:** region, economic performance of the region, competitiveness in the region

**JEL classification:** R11

## 1 Introduction

Regional development is subject to various influences affecting the quality of life. Among the most important ones are development of entrepreneurial activities and of economic potential in each region, development of human potential associated with increasing employment levels, sufficient technical facilities and equipment, transport services in the area in question, environmental care and, last but not least, tourism from its position of one of the principal entrepreneurial activities [3]. All of the above stated factors consequently affect the economic performance of a given region.

Significant expanding disparities in the rate of economic performance however occur between regions [10]. The existence of disparities can be considered a strong impulse for social development and a premise for the creation of more efficient forms of specialization and regional division of labour [2]. The causes for the origination of disparities have to be analyzed since only then the activation strategies of the entire regional potential can take place in which economic efficiency plays a crucial role.

At present, a balanced development of regions constitutes one of the principal objectives of the regional policy of the state as well as of the European Union. It is a complex set of processes contributing to positive transformations in the economic, social and environmental situations of the regions. Svatošová [9] points out that socio-economic changes in the regions will not do without substantial allowance from structural funds. The aim of the support is to increase activities of regions towards the ensurance of harmonic and well-balanced development, reduction of unemployment, development of human resources, environment protection etc.

The existence of disparities appears desirable and necessary [6]. However, too big disparities between the regions have no longer stimulating effects and their social and political consequences are serious and far-reaching. This is why they are usually considered a negative phenomenon. A concrete manifestation of community's effort in the abatement of regional disparities represents regional policy.

## 2 Data and Methodology

The paper sets out to compare economic performance of the regions of the CR. Impacts affecting the disparities in specific regions derive from economic performance indicators such as gross domestic product (GDP), gross added value (GAV) and also gross fixed capital formation (GFCF). The level and variability of indicators were monitored for the period of study in all administrative regions of the Czech Republic and the data were used to determine regions exhibiting larger disparities.

With respect to the accessibility of empirical data needed for the comparison of economic performance between regions, the paper works with the administrative regions of the CR. The suggested methodology is applied to data from individual regions of the Czech Republic in the time series from 2002 to 2007.

The assessment of the regions employs basic statistic characteristics such as arithmetic mean and variation coefficient. For the research of developmental dynamics in the timeseries we used mean increment coefficients and mean growth coefficients; the latter was calculated as follows [7]:

$$\bar{k} = \frac{n-1}{n} \sqrt{\frac{y_n}{y}} \quad (1)$$

where:  $k$ .....average growth coefficient,  
 $y_n$ .....value of variable in the  $n$ -th period,  
 $y$ .....value of variable in the *zero*-period,  
 $n$ .....number of periods.

The following part of the paper uses factor analysis, a multidimensional statistical method clarifying the structure of observed dependencies and simplifying the system of studied variables. It was used to discard variables affected by information double counting and to measure the level of unobserved ideal variables. Factor analysis was used to reduce the number of initializing variables by dint of hypothetic factors (in the process of reduction only minimum amount of information becomes lost). Pivotal result of the analysis is a calculation of development potential index for all regions of the Czech Republic in the analyzed period. The index is a starting point for the ranking of regions.

Factor analysis divided the selected variables into two factors [1]. The most suitable variables were chosen to determine the regions' ranking according to the economic indicators and standardised on the basis of the following relation:

$$\frac{x_i - \bar{x}}{s_x} \quad (2)$$

where:  $x_i$ ...variable in the  $i$ -th period,  
 $\bar{x}$ ...average value,  
 $s_x$ ...standard deviation.

Subsequently only the standardised values were considered. After the multiplication of these values by weights assigned to individual variables, the group indices were obtained for the individual regions. If an indicator had a negative line of action, the sign was changed.

In the individual regions of the Czech Republic, a total number of 68 indicators was established related to the evaluation of their economic performance [4]. Of these, eleven below listed indicators were selected through the factor analysis for the calculation of the index of development potential: (1) Number of "enterprise-type" registered units, (2) Agriculture, game management, fisheries, (3) Industry, (4) Civil engineering, (5) Trade, repairs, accommodation, boarding, (6) Transport sector, warehousing and communications, (7) GDP per capita in CZK, (8) GAV per capita in CZK, (9) GFCF per capita in CZK, (10) Receipts per capita in CZK, (11) Expenditures per capita in CZK.

### 3 Results and discussion

Economic performance of a specific region is determined by its economic base. This base can be considered a system formed by economic entities, their interrelations and relations they maintain with their environment. The action of market forces results in the concentration of economic activities into selected regions and in their development together with the ensuing benefits and creation of new activities.

Regional economic performance is markedly impacted by entrepreneurial skills of the entrepreneurs. These skills are at the core of overall regional competitiveness which in turn conditions the income and employment levels. Incomes reflect in the *creation of the gross domestic product* defined as a market value of final goods produced in a country over a specified period. Final goods are products deemed the final result of a production process. The contribution of a region to GDP can be measured by several indicators: chiefly by the proportion of the regional GDP in the total national GDP and by a regional per capita GDP. The selected data on indicators drawing on GDP are listed in Table 1.

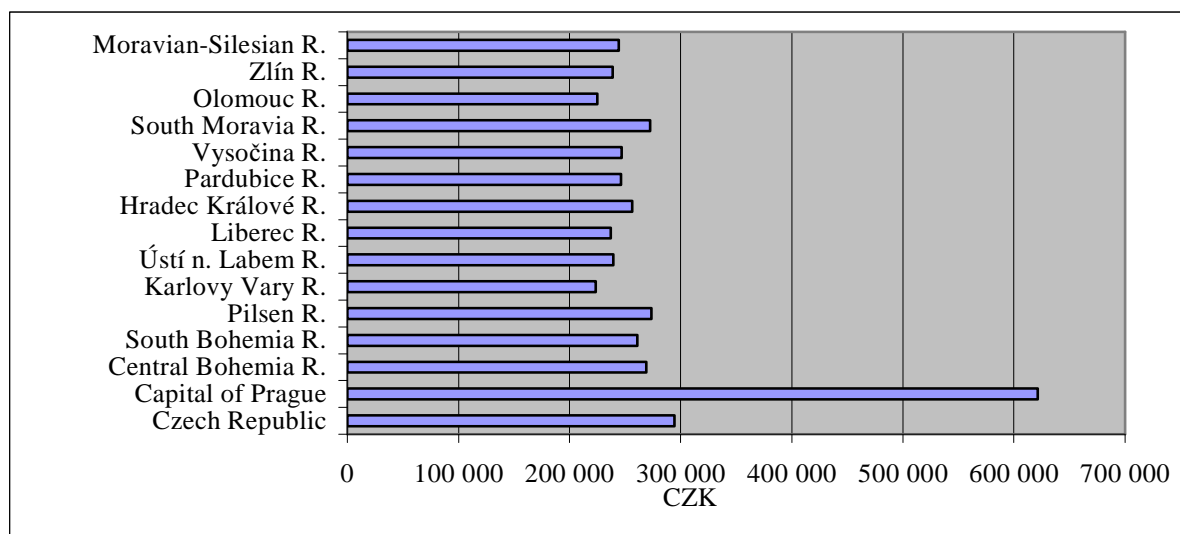
In the surveyed period, the macroeconomic development in the Czech Republic is favourable and the rate of growth of GDP compared to other EU countries is fairly high. This is also attributed to the development of the value of GDP created in the monitored regions since the value of this indicator between 2002 and 2007 is of a rising tendency. The highest share of the individual regions in the state's GDP is attributed to Prague followed by the regions of Central Bohemia, South Moravia and Moravian-Silesian Region. The regions marked by the lowest share in the GDP are Karlovy Vary and Liberec Regions. With the exception of the Capital of Prague, the calculated values of the regional per capita GDP indicators in all surveyed regions lie below the average levels of the Czech Republic (see Graph 1).

Individual industries represented in the region substantially participate in the creation of regional GDP. Their contribution to the creation of regional GDP can be assessed by way of the gross added value (GAV) indicator determined as a difference between the market price of products or services and the price of inputs purchased from other industries. It is the result of variance between the total production of goods and services measured in base prices on the one hand and intermediate consumption in purchase prices on the other. The data concerning GAV are stated in Table 1.

**Table 1.** Chosen indicators of economic performance in the regions

Region	Generation of GDP			GAV			GFC		
	Average (in mil. CZK)	Variation coefficient	Mean growth coefficient	Average (in mil. CZK)	Variation coefficient	Mean growth coefficient	Average (in mil. CZK)	Variation coefficient	Mean growth coefficient
Czech Republic	3025796.57	0.147	1.073	2716588.39	0.168	1.101	744665.67	0.093	1.059
Capital of Prague	736369.65	0.156	1.071	632384.86	0.127	1.075	207185.30	0.115	1.044
Central Bohemia R.	313832.90	0.185	1.104	280399.16	0.134	1.079	77725.99	0.120	1.081
South Bohemian R.	164114.79	0.138	1.068	144321.66	0.115	1.067	40618.76	0.142	1.062
Pilsen R.	149478.19	0.151	1.070	134352.68	0.128	1.079	39790.65	0.239	1.149
Karlovy Vary R.	68245.88	0.102	1.056	59723.35	0.068	1.041	18557.19	0.073	1.031
Ústí n. Labem R.	197394.37	0.139	1.073	172258.93	0.120	1.075	46859.63	0.064	1.032
Liberec R.	101936.01	0.134	1.055	90689.75	0.114	1.058	24076.51	0.114	1.031
Hradec Králové R.	140830.68	0.123	1.064	124567.44	0.095	1.058	28729.75	0.061	0.998
Pardubice R.	125069.17	0.144	1.073	109804.23	0.122	1.074	24162.72	0.057	1.012
Vysočina R.	126711.54	0.148	1.082	112141.47	0.110	1.065	25628.01	0.081	1.029
South Moravia R.	308677.72	0.142	1.070	342253.02	0.555	1.273	76604.12	0.123	1.083
Olomouc R.	143704.09	0.134	1.070	126297.77	0.105	1.064	35326.97	0.225	1.097
Zlín R.	141209.25	0.145	1.074	124209.82	0.120	1.070	31163.28	0.081	1.014
Moravian-Silesian R.	305952.33	0.154	1.069	262518.10	0.145	1.086	68236.62	0.209	1.103

Source: Regional statistical yearbooks of the CR 2003 – 2005 [8], own calculations

**Figure 1.** Per capita GDP (CZK) in the regions

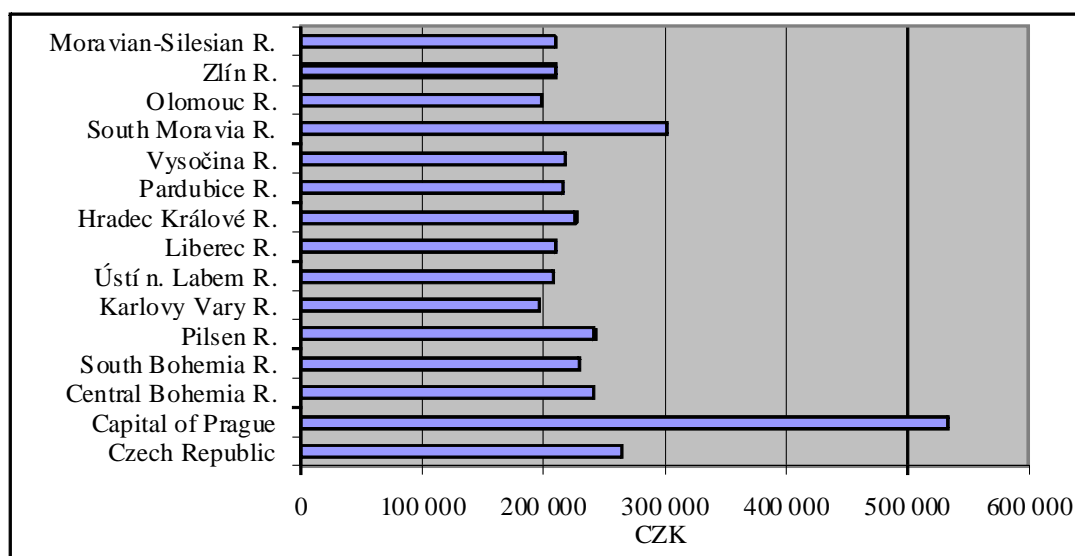
Note: The per capita GDP value is calculated as an average of the period between 2002 and 2008.

Source: Regional statistical yearbooks of the CR 2003 – 2008 [8], own calculations

The gross added value in fact expresses the volume of work input the amount of which is affected by the pricing of the outputs, inputs and the efficiency of economic activity of the business entities. The amount of GAV gives indirect evidence of the level of mechanization, effective use of technologies and labour productivity. GAV forms the basis of the creation of GDP. The GAV share of the individual regions correlates with their GDP. A useful indicator for the comparison of GAV creation is the GAV per business entity calculated in the individual regions, as shown in Figure 2. The Capital of Prague exceeds the national average by 30.1 %. The Czech average for this indicator is also surpassed by the South Moravia



Region. In contrast, the lowest mean value of GAV was registered in the Karlovy Vary and Olomouc Regions.

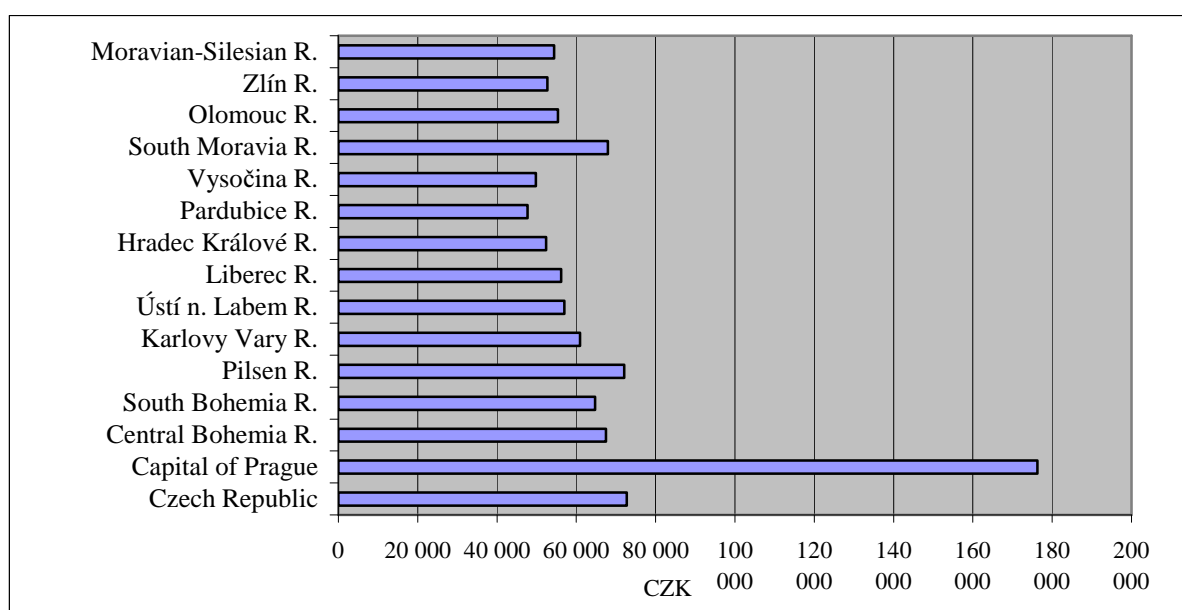


**Figure 2.** GAV (thous. CZK) in the regions per business entity

*Source:* Regional statistical yearbooks of the CR 2003 – 2008 [8], own calculations

The potential for a favourable development of regional economic performance in the coming years forms a high percentage of the expenses on gross fixed capital. Gross fixed capital formation expresses the renewal and acquisition of new tangible and intangible fixed assets having the character of long-term consumption. The value of GFC indicates the level of investment activities of a given region. The level of investment activities can be measured by the indicators of the total regional GFCF, share of regional investments in the total national investments and regional per capita GFC. The data on investment activities of the surveyed regions are stated in Table 1.

An important indicator for domestic as well as international comparison, the regional per capita GFCF in CZK (see Figure 3), among other indicators, is used to determine whether the regions are eligible to draw on financial and other types of aid from the structural funds of the EU.



**Figure 3.** Per capita GFC in the regions in CZK

*Source:* Regional statistical yearbooks of the CR 2003 – 2005 [8], own calculations

The evaluation of the share of the surveyed regions in the renewal and acquisition of new investments in the above specified time period, an identical ranking of the regions is obvious once again as in the case of GDP with leaders being the Capital of Prague and newly also the South Moravia Region.

It follows out from the results of the conducted analysis of disparities between the individual regions by way of indicators of economic performance that [5]:

- A marked variation exists between Prague and all other regions in numerous indicators of economic performance,
- Prague and its hinterland (adjacent areas of the Central Bohemia Region) represent the principal pole of excellence of the Czech Republic to which some regions of larger cities (marked by low unemployment rates), such as České Budějovice, Hradec Králové, Pardubice and other cities, draw near but at a considerably lower level,
- The Moravian-Silesian Region affected by extensive transformation of production basis structure (downsizing of coal mining, metallurgical industry and some other branches of heavy industry) suffers from high unemployment and fails to implement necessary structural changes quickly and effectively,
- Social and economic problems in some rural regions deepen due to declining agricultural activities, particularly in regions with less favourable conditions; the problems concentrate mainly in some montane and submontane areas of the borderland (Jeseníky Mts., Šumava Mts., Krušné hory Mts., the region of Znojmo, etc.),
- Disturbed environment due to industrial production in the past shows especially in the Moravian-Silesian Region; however, the area has seen remarkable improvements recently - also thanks to the downscaling of heavy industries,
- At the same time, relatively great internal socio-economic differences exist within the majority of regions (at a level of individual districts or smaller territorial units).

### **Determination of the development potential index**

To determine the sequence of the regions in the Czech Republic we selected the most suitable indicators (variables) from the individual factors by using the factor analysis (see Table 2 and 3) – orthogonal rotation - varimax method maximizing the variance of squared factor loadings standardised by relevant communalities. These indicators were subsequently standardised based on the relation (2). Based on the factor analysis, individual indicators can be taken into account in so-called factors whose informative values differ. The factor analysis was applied for all administrative regions of the Czech Republic with the use of all 11 established indicators. The purpose of this factor analysis is to find an as low as possible number of acceptable factors – in our case 2. Factor loads of the respective indicators are presented in Table 2.

The following four indicators for the regions of the CR were standardised to determine the partial index of development potential for economic performance: number of enterprise-type registered units, industry, per capita GDP in CZK and per capita receipts in CZK.

**Table 2.** Rotated matrix of factors

Indicator	Factor 1	Factor 2
Number of 'enterprise-type' registered units	0.895	0.451
Agriculture, game management, fisheries	0.421	-0.712
Industry	0.989	-0.001
Civil engineering	0.954	0.249
Trade, repairs, accommodation, boarding	0.880	0.411
Transport, warehousing, communications	0.812	0.545
Per capita GDP in CZK	0.498	0.865
Per capita GAV in thousands of CZK	0.581	0.788
Per capita GFCF in CZK	0.505	0.847
Total per capita receipts in CZK	0.319	0.929
Total per capita expenditures in CZK	0.322	0.925

Source: own calculations

For the evaluation of the index of development potential, the indices are listed in a descending fashion by the respective regions to express their ranking level. As to the established index of development potential in the regions of the CR, we can state that the disparities are recorded with a growing negative value of the index.

The evaluation index of the Capital of Prague markedly exceeds those of the other regions. It can be noted in this respect that using these indices for the evaluation of disparities renders the Capital of Prague rather incomparable as a region. Its valuation by using partial indices would only come into consideration for guidance or if a comparison is applied with other large European conurbations.

**Table 4.** Index of development potential

Region	Index
Zlín R.	-0.1908
Vysočina R.	-0.4988
Ústí n. Labem R.	-0.4126
South Moravia R.	0.5929
South Bohemian R.	-0.2822
Pilsen R.	-0.3125
Pardubice R.	-0.4243
Olomouc R.	-0.3939
Moravian-Silesian R.	0.0957
Liberec R.	-0.4816
Karlovy Vary R.	-0.8739
Hradec Králové R.	-0.2443
Central Bohemia R.	0.5674
Capital of Prague	2.8589

Source: own calculations

**Table 3.** Factor scores

Region	Factor 1	Factor 2
Capital of Prague	1.533	3.083
Central Bohemia R.	2.125	-1.233
South Bohemia R.	0.337	-0.429
Pilsen R.	-1.537	0.830
Karlovy Vary R.	-0.605	-0.125
Ústí n. Labem R.	-0.513	-0.198
Liberec R.	-0.500	-0.154
Hradec Králové R.	-1.041	0.618
Pardubice R.	-0.438	-0.369
Vysočina R.	-0.553	-0.021
South Moravia R.	1.540	-1.041
Olomouc R.	-1.039	0.169
Zlín R.	-0.175	-0.359
Moravian-Silesian R.	0.864	-0.770

Source: own calculations

The evaluation of the development potential index of the economic performance of regions indicates that apart from the Capital of Prague, the highest levels are achieved by the regions of South Moravia and Central Bohemia. On the other hand, the regions of Karlovy Vary, Vysočina, Liberec, Pardubice and Ústí n. Labem are in a completely opposite situation which –in respect of the informative value of this index- gives once again the evidence about the disparate position of these regions. According to Dufek [1] who analyzed the development potential with using 14 indicators for 2000-2007, the best ranking region is the Capital of Prague, which is followed by the regions of Central Bohemia, South Bohemia and Karlovy Vary. The regions of Ústí and Moravian-Silasian region had the worst ranking. Discrepancies in the results of our analysis and the analysis made by Dufek [1] are due to the different focus of indicators. Indicators employed in our analysis are focused only on the evaluation of regions' economic performance while the development potential assessed according to Dufek is focused on the enhancement of environmental potential, competitiveness and social standard of regions.

The paper presents results of the research project no. WD-57-07-1 “Possibilities of overcoming the disparity between selected regions” elaborated under financial aid provided by the Ministry for Regional Development. The main scope of the project consists in the elaboration of methodology for the comparison of regional disparities, which includes three partial goals: Determination of the regions' index of development potential (1) in the field of natural resources, (2) in the field of social and cultural resources, and (3) in the field of economic performance. In our paper, we deal only with the issue of partial goal (3).

## 4 Conclusion

The evaluation of regions has been paid attention particularly in the recent years. The goal of this evaluation is to learn about the current state of the regions as expressed by various indicators but also to compare and identify disparities in the socio-economic level of the regions that can be overcome or at least mitigated by focusing the regional policy onto concrete issues and by using adequate instruments.

The average growth coefficient of GDP indicator for the analyzed period shows that all regions exhibit interannual growth. The highest growth was recorded in the region of Central Bohemia and the lowest growth in the regions of Liberec and Karlovy Vary. The reason of this growth in the region of Central Bohemia is particularly a high concentration of industries, services and tourism – also with respect to the vicinity of Prague. On the other hand, the regions of Liberec and Karlovy Vary with the lowest average growth coefficients are among other things affected by their size. The highest growth coefficient of GAV indicator was recorded in the region of South Moravia, which indicates a high standard of mechanization, effective use of technologies and high labour productivity. The lowest growth coefficients were recorded in the regions of Karlovy Vary, Liberec and Hradec Králové. The average growth coefficient of GFC indicator shows an increasing trend in all regions with an exception of the Hradec Králové region. Characteristics of the standard and variability of the above indicators point to different economic performance of individual regions in the period 2002-2007. These disparities have to be considered in setting out objectives for regional development strategies.

The highest development potential expressed by the index is recorded by the Capital of Prague. Regions occupying ranking places are those of South Moravia and Central Bohemia. The regions of Karlovy Vary, Vysočina and Liberec were given the worst scores. Our research results represent an important information for the implementation of regional policy not only on a national scale but also in the administration of individual regions.

## References

1. Dufek, J., Minařík, B.: Analýza indikátorů pro hodnocení cílů realizace strategie regionálního rozvoje v České republice. 1. vyd. Brno: MZLU, 2009, 119 s. ISBN: 978-80-7375-366-5.
2. Hampl, M. Regionální diferenciace současného socioekonomického vývoje v České republice. Sociologický časopis/Czech Sociological Review, 2007, Vol. 43, No. 5.889-910.
3. Hrabánková, M., Boháčková, I.: Conditions of sustainable development in the Czech Republic in compliance with the recommendation of the European commission. Agricultural Economics - Czech, 2009, 55: p. 156–160.
4. Jánský, J., Somerlíková, K.: Analýza disparit ekonomické výkonnosti regionů v ČR. In Region v rozvoji společnosti. 1. ed. Brno: Mendel University of Agriculture and Forestry in Brno, 2009, p. 98-104. ISBN 978-80-7375-330-6.
5. Jánský, J., Živělová, I.: Faktory ovlivňující ekonomickou výkonnost regionů. Proceedings from the international scientific conference Entrepreneurship and Company Competitiveness. Bratislava 2008, p. 184-188, ISBN 978-80-225-2552-7.
6. Kolektiv autorů: Úvod do regionálních věd a veřejné správy. Vydavatelství a nakladatelství Aleš Čeněk, s.r.o., Plzeň 2004. ISBN 80-86473-80-5.
7. Minařík, B.: Popisná statistika I. 1. vyd. Brno: MZLU, 2001, 207 s. ISBN: 80-7157-427-9.
8. Regional statistical yearbooks of the Czech Republic 2002-2008.
9. Svatošová, L., Boháčková, I., Hrabánková, M.: Regionální rozvoj z pozice strukturální politiky. JČU České Budějovice 2005. ISBN 80-7040-749-2.
10. Wokoun, R., Mates, P.: Management regionální politiky a reforma veřejné správy. Linde, Praha 2006. ISBN 80-7201-608-3.



# Stochastic Frontier Model with Fixed Management of Czech Organic Agriculture

Zdeňka Malá<sup>1</sup>, Michal Malý<sup>1</sup>

<sup>1</sup>Department of Economics, Faculty of Economics and Management,  
Czech University of Life Sciences Prague,  
Kamýcká 129, 165 21 Prague 6 Suchbát, Czech Republic  
{malaz, maly}@pef.czu.cz

**Annotation:** Organic agriculture is the fastest-developing branch of Czech agricultural production. Nevertheless, economic research proves that it is not endowed with efficient production technology. This research has been realized in the Czech Republic by Cobb-Douglas frontier production function specified in two types of random effects models – Pitt-Lee, and Batesse-Coelli. Both models omitted one important but unobservable factor of production – management. This implicated so call management bias, which causes distorted technical inefficiency. Therefore, the aim of the proposed paper is a quantification of the technical efficiency of Czech organic farms by including managerial ability in the stochastic frontier production function and the comparison with the results of mentioned random effects models. The partial goal is also a quantification of the differences in technical efficiency between organic and conventional farming. The methodological tool for achieving this aim is an analysis using a stochastic frontier production function specified like Alvarez Fixed Management model, in which management is treated as an unobservable fixed input of a random coefficients model of production. The analysis was conducted on the basis of unbalanced panel data from 143 organic and 388 conventional enterprises, obtained over the time period 2004 – 2008. The farms whose data was entered into this database are legal entities, concentrated primarily on mixed agricultural production. The sample of organic farms represents 58 % of the entire population of organic legal entities. Results of the analyses indicate the strong role of management in measuring technical efficiency and declare the inferiority of organic production technology, by documenting that conventional producers operate, on average, closer to the frontier production function than organic producers.

**Key words:** Organic farming, stochastic frontier analysis, technical efficiency, managerial ability, random coefficients model.

**JEL classification:** Q12, Q18

## 1 Introduction

Organic agriculture, distinguished by limitations and bans on the use of artificial fertilizers, chemical preparations, sprays, hormones and other artificial substances, and a positive relationship with animals, plants and nature, is one of the most dynamic branches of agricultural production not only in the Czech Republic, but also in the whole European Union. [5] However, economic research (e.g. Jánský and Živělová, Chavezová) which indicates a lower productivity of the mentioned economic system, on account of specific technological requirements which manifest themselves by limitations in the use of some inputs commonly used by conventional agriculture, or, for example, in a greater emphasis on the quality of the environment of bred animals, speaks against the mentioned developmental tendency of organic agriculture. [8,9] Other foreign research declared that organic farmers suffer also with lower technical efficiency than conventional farmers (e.g. Madau, Kumbhakar). [10,11,12] Mentioned research was based especially on Cobb-Douglas stochastic frontier function [10,11], Madau used also trans-log function [12]. The explanatory variables were specific factors such as number of working hours, value of capital, consumption of material and energy. The management as unobservable factor was omitted. Alvarez et al. defined that omission of management can lead to so called management bias.

The solution of mentioned problem found Alvarez et al. at an inclusion of management as a fixed input in trans-log frontier production function specified as random coefficients model. [2]. Since Alvarez model has not yet been worked out for the Czech organic farming, the aim of the proposed paper is a quantification of the technical efficiency of Czech organic farms by including managerial ability in the stochastic frontier production function on the base of Alvarez approach and the comparison with the results of random effects models and also with the True Fixed Effects model. The partial goal is also a quantification of the differences in technical efficiency between organic and conventional farming. The results of mentioned research questions have an important implication for agricultural policy.

## **2 Data and Methodology**

### **2.1 Data**

The efficiency analysis of Czech organic agriculture was based on panel data obtained over the years 2004 – 2008 from 143 organic and 388 conventional agricultural enterprises – legal entities. The most important database resource was the Creditinfo Firms' monitoring database and the Companies register. The data from final accounts were further complemented by acreages of managed land obtained from the database LPIS, with the number of employees determined as the ratio of wage costs of particular subjects to the average wage earned, according to the database of the Czech Statistical Office in the region where the examined enterprises resided.

The elaboration of an efficiency analysis also required a delimitation of the total production indicator of the monitored enterprises. This indicator was set as the sum of outputs and the consumption of an enterprise's own intermediate product. The influence of price development in determining production was eliminated by a transfer into real value by means of price indexes of agricultural producers, taking into account their production specialization as published by the Czech Statistical Office, with a base period of 2005. Data obtained in the above-mentioned procedure were further purged of incomplete and remote observations. The resulting data collection, used for estimation, contained 390 observations of 129 organic farms and 1,533 observations of 379 conventional enterprises. The organic farms represented a basic collection of 52 %.

Enterprises, whose final accounts were entered in the database, can be ranked from the viewpoint of production specialization, and are engaged above all in mixed production (OKEČ 013000). In terms of size structure, farms with an average acreage of 500-999 ha prevailed, which represented 34 % of the collection of organic enterprises. In the collection of conventional farms, 32 % of subjects managed within this production range. The researched organic enterprises reached on average 11,294,800 CZK of production in constant 2005 prices, with the use of 844 ha of managed agricultural land, 18 employees, and 17,136,400 CZK of constant assets, on average. Table 1 shows an obvious growth tendency in most mentioned indicators throughout the monitored period.



**Table 1.** Annual average of selected indicator values of the selected collection

	Organic farming					Conventional farming				
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Production f.p. [ths. CZK]	10721	10787	12175	11294	11497	49931	50850	48153	45450	37138
Revenue from sale own products and services [ths. CZK]	8510	7742	8205	9459	10412	43290	40864	39456	45423	38835
Subsidy [ths. CZK]	6900	7703	7902	9366	10776	4289	7310	8060	9233	7659
Average work units	16	16	18	19	22	61	57	54	53	43
Land [ha]	887	809	811	834	880	1334	1276	1261	1283	1135
Intangible fixed asset [ths. CZK]	280	679	260	132	77	286	864	1153	868	127
Tangible fixed asset [ths. CZK]	12133	13248	15354	16100	19824	42090	41845	42577	46994	43471
Financial fixed asset [ths. CZK]	1137	4755	4479	7844	1683	3197	3050	3111	3014	2030
Consumption of material and energy [ths. CZK]	4402	4230	5479	5413	5478	22951	21053	22424	24681	23109
Profit [ths. CZK]	1702	1535	1991	2704	2694	3171	1715	1871	4848	1860

Source: Own calculation

The observed organic enterprises gained an average of 8,865,600 CZK from the sale of produced commodities. Almost the same sum (8,529,400 CZK) was achieved by the previously-mentioned eco-farms through endowment support of agricultural production. The observed organic enterprises terminated their economic activity with an average profit of 2,656,500 CZK. Conventional enterprises, whose final accounts were entered in the research database, reached an average production in constant 2005 prices of 46,304,500 CZK. To achieve the mentioned production they used an average of 54 employees and 1,258 ha of agricultural land, with constant assets of 46,094,600. By the sale of their production they obtained, on average, 41,573,600 CZK. Moreover, their economic results were supported by a total of 7,310,100 CZK obtained by means of subsidies financed by the Czech Republic and the European Union. Finally, the economic activity of these farms was also profitable, at an average level of 2,692,800 CZK. However, from Table 1 it is obvious that selected indicators of conventional agriculture show contradictory tendencies towards organic agriculture. The apparently decreasing trend can be seen in the number of employees, the acreage of managed land, and in production in constant prices.

## 2.2 Methodology

The model used to analyze the efficiency of Czech organic agriculture stemmed from a functional delimitation of a frontier production function done by Meeusen and van der Broeck, who defined the frontier production function by the following transcription presents the mentioned model with an adjustment for panel data of „k“ subjects and „t“ period:

$$y_{kt} = f(x_{kt}; \beta) e^{\varepsilon_{kt}}, \quad (1)$$

$$\varepsilon_{kt} = v_{kt} - u_{kt}, \quad (2)$$

where:  $y_{kt}$ .....a production level of the k-th subject at time t,  
 $x_{kt}$ .....a vector of inputs in a production process of size [Nxj] corresponding with consumption of input of work, land and capital of the k-th subject at time t,  
 $\beta$ .....a vector of estimated parameters of size [Jx1],  
 $\varepsilon_{kt}$ .....an error term of estimation containing a random component ( $v_{kt}$ ) and a rate of technical inefficiency ( $u_{kt}$ ) corresponding with the k-th subject and time t,  
 $j = 1, 2, \dots, J, k = 1, 2, \dots, K, t = 1, 2, \dots, T$ . [13]

The error of estimation of the above-mentioned model was divided into two parts:

- A random component with a symmetric and normal distribution  $v_{kt} \sim N(0, \sigma_v^2)$  representing errors of measurement of variable values, the influence of factors not included in the analysis, and errors due to simplification of the analytical form of the chosen production function.
- A non-negative rate of technical inefficiency representing a divergence of production of the k-th subject from the margin of production possibilities, independent of the

distribution of the random component and with the supposed half-normal  $u_{kt} \sim \text{iid}/N(0, \sigma_u^2)$ . [1]

The output quantified by the mentioned function was represented by production in constant prices for the year 2005, in thousands of crowns. The following factors entered in as explanatory variables in the above-mentioned frontier production function:

- Land, defined as hectare acreage of managed agricultural land;
- Work, represented by an average number of workers;
- Capital, expressed as a summary of tangible and intangible long-term property, in thousands of crowns.

The rate of technical farm efficiency of k-subject and t-period was expressed according to the relation defined by Bravo-Ureta and Pinheira [3]:

$$TE_{kt} = \exp(-u_{kt}). \quad (3)$$

The use of panel data required performing an analysis of heterogeneity; omitting such an analysis could cause a deviation of parameter estimates of the constructed model. Existence of heterogeneity was examined by means of variance analysis of the explained variable value. Due to verification of heterogeneity for individual subjects, specification of the boundary production function model was based on the so called Error Components models, i.e. Random Effect Model (Pitt & Lea, Battese & Coelli), Random Parameters Model, and True Fixed Effects Model.

Random Parameters Model was used as the foundation for analyzing the effect of management on technical efficiency of ecological farms. Construction of the aforementioned model was based on the approach of Alvarez et al. who consider management as unchanging in time and incorporated it in the boundary production function model. The resulting inefficiency is defined by these authors as the difference between the estimated management level in a company and the optimum management level that would enable the company to achieve the boundary of production capabilities. [2]

Parameters of Random Parameters Model were estimated using the maximum simulated likelihood method. Parameters of the other models mentioned herein were quantified using the maximum likelihood method. Existence of inefficiency was tested in all models using the Likelihood Ratio test (LR) with the null hypothesis of non-existence of technical inefficiency:

$$H_0: \lambda = \frac{\sigma_u}{\sigma_v} = 0. \quad (4)$$

### 3 Results

In order to evaluate the results of the drawn up models, it is advisable to divide the analysis into several areas. The first one consists in assessment of the quantified parameter values themselves in individual models, together with evaluating the intensity of the effect of the given explaining variables. Another important aspect of the results is represented by subsequent comparison of the drawn up models in terms of achieved complex outputs while focusing on specific action within the framework of obtained estimates of the given model types (shown in Tables 2 and 3). Comparison of achieved outputs among individual production technologies (conventional x ecological) is the last area assessed, as follows from the results summarized in Tables 3 and 4.

Table 2 below provides a summary of achieved estimate results for selected types of the boundary production function models, while two versions are distinguished for the models Battese & Coelli and Pitt & Lea, which differ in whether heterogeneity and heteroskedasticity are or are not considered.

**Table 2.** Technical coefficients of organic stochastic frontier

	Battese & Coelli	Battese & Coelli heterogeneity	Pitt & Lea	Pitt & Lea heterogeneity, heteroskedasticity	True Fixed Effects Model	Fixed Management Model
Land	0.256***	0.239***	0.252***	0.2489***	0.124***	0.342***
Work	0.552***	0.535***	0.551***	0.5251***	0.646***	0.463***
Capital	0.155***	0.124***	0.140***	0.1433***	0.183***	0.089***
Const.	5.201***	5.619***	5.362***	5.3236***	-	5.037***
Log-prob.	-234.89	-226.51	-238.58	-221.5506	-187.78	-200.75
$\lambda$	3.034***	2.120***	2.814***	1.2224**	0.592***	3.025***
Management						0.091***

Source: Own calculation

A certain agreement of the models in terms of assessing the intensity of effects of the selected exogenous variables on the explained boundary production of ecological farms follows clearly from the estimates obtained. The input variable “Work” exerts the most intensive effect in all the model types, whose percentage increase causes more than 0.5% production increase in almost all models. Fixed Management Model is the only exception where intensity does not achieve the value mentioned above; however, its level is lower only slightly, approaching 0.5%, as well. No considerable deviation of parameters was caused by delimiting the factors that imply corporate heterogeneity in the selected model types, which is apparent only from a slight reduction of the intensity of exogenous variables. “land” is the second most intensively acting variable whose 1% increase induces production increase by approximately 0.25% in the models of Battese & Coelli a Pitt & Lea (only a slight reduction of the effect is caused again by including specified heterogeneity). Land is the second most strongly acting variable in Fixed Management Model, as well; however, its intensity is increased to 0.34%. True Fixed Effects Model reaches quite a different value; lower intensity of the effect is assigned to land according to this model’s estimate (only 0.12%), even when compared with the third explaining variable “capital,” which thus acts more strongly in this model type (0.18%). Evaluation of the effect of the capital variable shows the highest variances in the drawn up models. With the exception of True Fixed Effects Model as commented upon above, capital is the variable that shows the least effect, while the parameter values range from 0.09% (Fixed Management) to 0.12% and 0.16% (Battese & Coelli) and approx. 0.14% (Pitt & Lea), up to 0.18% (True Fixed Effects). Upon closer consideration of heterogeneity, relatively marked reduction of the effect of capital in the Battese & Coelli model is furthermore apparent from the values achieved; however, no effect was found in the Pitt & Lea model in this respect where consideration of heterogeneity and also heteroskedasticity caused an increased effect of capital, on the contrary.

Comparison of the parameter values achieved among individual model types is important. In general, it can be stated that the models of Battese & Coelli a Pitt & Lea provide very similar estimates, which differ only slightly in the specified parameter values; this indicates that the estimate should be robust in combination with various model specifications. Similar results are also provided by True Fixed Effects Model, while the differences in parameter values are probably caused by short duration of the time component in panel data due to which the parameters are deviated and inconsistent. In the final consequence, this fact may also lead to distortion of technical inefficiency values. The analyzed model also shows the lowest  $\lambda$  value that can be interpreted as significance of technical inefficiency in the models applied, representing the lowest difference between the model error (statistical noise) and technical inefficiency variability – in all other models,  $\lambda$  value is higher than 1, meaning that inefficiency can be considered as significant in such models.

Outputs of Fixed Management Model then provide relatively most different values of quantified parameters compared to the previous models. Incorporation of management as a stochastic explaining variable in the model exerts a considerable effect on the values of other parameters (in particular, marked reduction of the capital variable occurred), thus indicating that management incorporation as one of input variables may be justified. Direct incorporation of management, which represents both natural and social conditions of the production process, provides a 0.09% contribution to potential production achievement. In terms of statistics, it can be concluded based on the complete results that all quantified estimates are statistically significant on the significance level 0.01.

Table 3 below provides a summary view of the minimum, mean and maximum technical efficiency values of ecological farms.

**Table 3.** Descriptive statistics of estimated technical efficiency of organic farmers

	Battese & Coelli	Battese & Coelli heterog.	Pitt & Lea	Pitt & Lea heterogeneity, heteroskedasticity	True Fixed Effects Model	Fixed Management Model
Minimum	17.7%	16.6%	17.0%	17.1%	59.1%	16.1%
Maximum	96.6%	97.1%	96.7%	98.1%	85.3%	98.4%
Mean	50.4%	51.1%	50.8%	55.1%	77.9%	70.5%
Standard deviation	0.207	0.217	0.208	0.224	0.023	0.163

*Source: Own calculation*

Based on estimates of the defined panel data set, Fixed Management Model reaches the widest span of technical efficiency values of ecological farms, while this model also exhibits the lowest (16.1%) and highest (98.4%) technical efficiency value of the evaluated model types. The highest average efficiency value is provided by True Fixed Effects Model, which is due to the highest value of minimum technical efficiency of the selected sample of farms, reaching almost 60%. At the same time, this model type exhibits the smallest standard deviation value, indicating the lowest variability of the technical efficiency values achieved. The last two commented models differ considerably in average technical efficiency values, reaching on the average approx. 70% or 78%, respectively, in these models, while ranging slightly above 50% in the remaining models. Random Effects Models can be thus generally denoted as models that overestimate technical inefficiency (similarly as Čechura [4]). Technical inefficiency distortion may also be the consequence of the little probable achievement of the non-correlated nature of farm specifics and explaining variables of the model (similarly as Green [7]). Results of Fixed Management Model thus seem to be most probable and for the future analysis mentioned model can be strongly recommended.

Comparison of the technical efficiency level of Fixed Management Model for ecological and conventional enterprises (see Table 4) provides evidence of lower technical efficiency of ecological farming by 18% on the average. Furthermore, absolute values of quantified coefficients show that conventional enterprises achieve higher average efficiency values compared to ecological farms, while this value reaches the level of approx. 60% based on the models Battese & Coelli a Pitt & Lea, and even exceeds 86% and 88%, respectively, in the models True Fixed Effects and Fixed Management. Nevertheless, the differences among the evaluated model types is similar to that of the models quantified based on a selected set of ecological farms.

**Table 4.** Descriptive statistics of estimated technical efficiency of conventional farmers

	Battese & Coelli	Battese & Coelli heterog.	Pitt & Lea	Pitt & Lea heterogeneity, heteroskedasticity	True Fixed Effects Model	Fixed Management Model
Minimum	20.3%	22.3%	13.2%	13.8%	85.8%	33.3%
Maximum	98.6%	98.8%	99.1%	99.1%	87.8%	99.6%
Mean	60.4%	60.4%	59.7%	63.7%	86.7%	88.5%
Variance	0.147	0.144	0.167	0.174	0.001	0.093

Source: Own calculation

## 4 Conclusions

The primary aim of this contribution is to quantify the level of technical efficiency in ecological farms in the Czech Republic, and subsequently to evaluate model output changes upon incorporating and without incorporating, respectively, management as one of explaining input variables. The results of Random Effect Models were furthermore compared continuously with Fixed Effect Model, and last but not least, technical efficiency of ecological farms was compared to a selected set of conventional enterprises. The results achieved indicate that Czech ecological farms reach 70% average level of technical efficiency according to Fixed Management Model, while incorporation of management among explaining variables is a significant aspect that changes the effect structure of other exogenous variables. Comparison of ecological and conventional farms then provides conclusions that lead to considerably higher values of technical efficiency of conventional technology, reaching the average value of 89% of the potential product. In conclusion, it can be thus stated that technical efficiency of ecological farms is lower by more than 15% compared to the values of conventional farms, indicating that significant differences may exist in the principles of the models applied, and duly justified choices should be made in terms of approaches applied to any potential analysis of enterprise characteristics.

## Acknowledgements

Pieces of knowledge introduced in this paper resulted from execution of an institutional research intention, MSM 6046070906 „Economics of resources of Czech agriculture and their efficient use within the framework of multifunctional agri-food systems“.

## References

1. Aigner, D. J., Lovell, C. A. K., Schmidt, P.: Formulation and Estimation of Stochastic Frontier Production Function Models. *Journal of Econometrics* 1977 (6), p. 21-37.
2. Alvarez, A., Arias, C., Green, W. H.: Accounting For Unobservables In Production Models: Management And Inefficiency. [on-line] [cit. 2010-02-20] *Econometric Society* 2004 Australasian Meetings. Melbourne, 2004. URL:<[http://163.117.2.172/temp/alvarez\\_pinilla.pdf](http://163.117.2.172/temp/alvarez_pinilla.pdf)>.
3. Bravo-Ureta, B. E, Pinheiro, A. E.: Technical, Economic, and Allocative Efficiency in Peasant Farming: Evidence from the Dominican Republic. [on-line] *The Developing Economies*, 1997 (35), p. 48-67. [cit. 2009-11-20] URL:<[http://www.ide.go.jp/English/Publish/Periodicals/De/pdf/97\\_01\\_03.pdf](http://www.ide.go.jp/English/Publish/Periodicals/De/pdf/97_01_03.pdf)>.
4. Čechura, L.: Estimation of Technical Efficiency in Czech Agriculture with Respect to Firm Heterogeneity. *Agricultural Economics*, 56, 2010 (4), p. 183-191. ISSN 0139-570X.

5. Doležalová, H., Pícha, K., Navrátil, J.: Analysis of the organic food marketing – chain store companies (South Bohemia). *Agricultural Economics*, 55, 2009 (9), p. 446-458. ISSN 0139-570X.
6. Green, W. H.: *Limdep Version 9.0 - Reference Guide*. New York: Econometric Software, Inc., 2007.
7. Green, W. H.: Reconsidering Heterogeneity in Panel Data Estimators of the Stochastic Frontier Model. *Journal of Econometrics* 126 (2005), p. 269-303.
8. Chavez, D. M.: Production Technology and Production Risk in Organic and Conventional Arable Dutch Farming. [on-line] [cit.2009-12-01] URL:<<http://www.inta.gov.ar/salta/info/documentos/Economia/produccion.tech.pdf>>.
9. Jánský, J., Živělová, I.: Economic Evaluation of Chosen Plant Bioproducts. *Proceedings of the Agrarian Perspectives Conference 2007*. Prague, 2007. p. 173-179. ISBN 978-80-213-1675-1.
10. Kumbhakar, S. C., Tsionas, E. G., Sipiläinen, T.: Joint Estimation of Technology Choice and Technical Efficiency: an Application to Organic and Conventional Dairy Farming. *Journal of Productivity Analysis*, 2009 (31), p. 151-161. ISSN 0895-562X.
11. Madau, F. A.: Technical Efficiency in Organic Farming: Evidence from Italian Cereal Farms. [on-line] *Agricultural Economics Review*, 2007 (8/1), p. 5-21. [cit. 2009-12-19] URL:<<http://ageconsearch.umn.edu/bitstream/42141/2/Paper1-Madau.pdf>>.
12. Madau, F. A. Technical Efficiency in Organic Farming: an Application on Italian Cereal Farms Using a Parametric Approach. [on-line] XI. Congress of the European Association of Agricultural Economics. Copenhagen, 2005. [cit. 2009-11-19] URL:<<http://orgprints.org/5802/1/Madau.pdf>>.
13. Meesen, W., van Den Broeck, J.: Efficiency Estimation from Cobb-Douglas Production Functions with Composed Error. *International Economic Review*, 1977 (18), p. 435-444.

# How applicable is the GTAP database in agriculturally oriented CGE modelling for the case of the Czech Republic? An empirical analysis

Zuzana Křístková<sup>1</sup>

<sup>1</sup> Department of Economics, Faculty of Economics and Management,  
Czech University of Life Sciences Prague,  
Kamýčká 129, 165 21 Prague 6 Suchbát, Czech Republic  
kristkova@pef.czu.cz

**Annotation:** The aim of the paper is to assess the extent to which the GTAP database can serve as a reliable source for the agricultural simulations based on the general equilibrium approach. In the paper, the results of selected simulations derived from the locally constructed SAM are compared with the results derived from the CGE model based on the GTAP database. The CGE model applied in this paper contains a sector of agriculture disaggregated into seven sub sectors and aggregated sectors of manufacturing and services. Three scenarios, which model the situation of subsidy removal, subsidy decoupling and import tariff removal, were applied and the results under both database alternatives compared. The analysis shows that the strongest discrepancies can be found in the lowest (industry/sector) level when comparing the cross-commodity effects. With respect to the discrepancies in the structure of agriculture and subsidy rates, the impacts of the agrarian policy can produce completely contradictory results. Regarding the more aggregated sector level, the changes are more modest as they reflect average impacts of the particular agricultural sub sectors. Finally, no significant differences were found out regarding the macroeconomic aggregates, which shows that the structure of the agriculture has a negligible impact on the GDP. Based on this evidence, it can be concluded that the GTAP database should be used carefully if applied in the CGE models with a detailed agrarian policy orientation. Special importance should be paid on the detailed per sector subsidy rates as these can substantially affect the results of simulations.

**Key words:** Social Accounting Matrix, GTAP, CGE model, agriculture, Czech Republic, subsidies.

**JEL classification:** D5, Q1

## 1 Introduction

Computable General Equilibrium (CGE) models translate the concept of Walrasian general equilibrium into the realistic representation of specific economies by means of formulating a set of nonlinear simultaneous equations which are derived from the microeconomic theory of producer and consumer optimization embedded in the macroeconomic framework. In the field of agrarian policy, the CGE models have been frequently applied to assess the impact of CAP reform options or to calculate the effects of EU enlargement with respect to agriculture. Whereas plenty of works can be found in the area of agricultural CGE modelling, the common feature of these works is the use of the GTAP as the primary source of data. The application of CGE models requires having data arranged in the form of a Social Accounting Matrix (SAM). However, for the agriculturally oriented simulations, the SAM needs to be well disaggregated to capture the effects at the detailed agricultural level, including specific crop and animal production sectors and commodities. Currently, the only publically available database which provides data for the construction of SAM in such a disaggregated level is the GTAP database. This paper focuses on the applicability of the GTAP database in the local conditions of the Czech agricultural simulations. The quality of the dataset is the primary determinant of the quality of the model results and the resulting simulations. The paper draws from the SAM built in cooperation with the Czech Institute of Agricultural Economics based

on surveys on the production structure and costs of the Czech agricultural companies. The aim of the paper is to compare the results of selected simulations derived from the locally constructed SAM with the results derived from the CGE model based on the GTAP database. In summary, the goal of the paper is to quantify the differences in datasets and estimate the effects of these differences in data on the simulation results.

## 2 Data and Methodology

### 2.1 Identification of main discrepancies in SAM GTAP versus SAM-CR

In the following text, two terms will be used – “GTAP”, which represents a Social Accounting Matrix based on GTAP database (year 2001) and “SAM-CR” which represents a database that has been constructed locally on basis of the Czech national accounts and disaggregated with the use of cost surveys and commodity balances, published by the Institute of Agricultural Economics and Information. The explanation of the SAM and its process of construction with respect to the agriculturally oriented CGE models can be found in Křístková ([6] and [7]).

A crucial problem in the construction of agriculturally detailed SAM is the unavailability of certain parts of the respective accounts. For instance, the highest possible disaggregation in the supply and use tables, which are commonly used for the derivation of the production and commodity accounts, is the NACE 01 level, which represents the aggregate sector of agriculture including hunting.

Most of the authors solve the problem of data unavailability of their local agricultural accounts by adopting the GTAP database, which contains all necessary accounts in a greater agricultural detail. Despite its detail and conformability, it is apparent that the GTAP database cannot reflect perfectly local conditions in agriculture. The sources of discrepancy particularly stem from the following factors:

- *Relevancy of the commodity structure*: the commodities that can be relevant locally may not be considered important from the world point of view. In the Czech Republic, this is particularly the case of potatoes and hop, which are not individually listed in the GTAP database.
- *Regionally different employment of production factors and cost structure*: the intermediate consumption reflects the interconnection of agriculture with other industries and provides information on the structure of materials and services used from other sectors. While this tends to be relatively stable and comparable across different regions, the structure of value added might be very variable. In the Czech Republic, where the land market is very rigid and the land price is undervalued compared to EU15, the share of land in total value added is significantly lower than estimated by GTAP (Table 1).

**Table 1.** Comparison of net value added

	GTAP	SAM-CR
labour	50%	53%
capital	13%	46%
land	37%	1%

- *Different benchmark periods*: for a long time the latest GTAP database was available for 2001, only recently has there been an update covering 2004. Taking 2001 as a benchmark for the Czech economy would cause a serious bias given that this was the period before the entry to the European Union and the convergence process. Furthermore, the focus of the agrarian policy in 2001 was substantially different, with



the remaining importance of animal production sectors and pre-CAP structure of subsidies.

- *Bias caused by final balancing of the SAM*: the final part of the construction of the SAM is its adjustment in order to obtain a balanced matrix. In doing this, different techniques can be used; either simply a manual balancing in Excel, or using specific methods such as linear programming or a more advanced method of cross entropy.

## 2.2 Description of the CGE model applied in the simulations

In this section, a description of the CGE model that is used in the simulations is described. The CGE model has been built for the economy of the Czech Republic. According to Piermartini ([8]), the general equilibrium models (CGE models) provide a consistent, rigorous and a quantitative way of assessing economic policies and they serve as supporting tools in the decision making process. Decreaux and Valin [2] further emphasize that the CGE models are based on robust and generally accepted behavioural patterns of the economic agents. Based on Elbehri, Umstaetter and Kelch [4], the explicit modelling of production factors market, which connects the production with the household economy, makes the CGE models preferred over the partial equilibrium models. According to Gelan, Ayel and Schwarz [5], the CGE models are suitable for a quantification of the spill-over effects, which comprise all effects in the economy.

The CGE models have seen an increasing use in the agricultural policy applications. One of the earliest contributions in the geographical region of the Czech Republic is a study on the impact of the EU accession on the agricultural markets [9]. Besides nationally oriented CGE models, there has been also developed a regional CGE model applied for the scenarios concerning rural areas of the Czech Republic [1].

In order to define the relationships that exist between the various elements of the model, choices need to be made on how to represent the behaviour of agents. Besides, the equilibria in all markets need to be defined by means of market clearing equations, and assumptions on the market structure, typically leading to zero profit conditions.

### Production structure and technology

The producers minimize the costs of employing production factors of capital, land and labour subject to their production technologies expressed by Constant Elasticity of Substitution function (CES). The CES function was first introduced by Arrow and Sollow in 1961. In the first stage, the value added is formed by the combination of labour ( $L_i$ ) and capital-land bundle ( $KD_i$ ) based on the *CES I* production function (equation 1) based on which the demand functions of labour and capital-land are derived.

$$CES I: VA_i = aF_i \cdot \left( \chi F_i \cdot KD_i^{-\rho F_i} + (1 - \chi F_i) \cdot L_i^{-\rho F_i} \right)^{-1/\rho F_i}, \quad (1)$$

where  $aF_i$  is the efficiency coefficient and  $\chi F_i$  a  $(1 - \chi F_i)$  are the distribution parameters of the production function. Parameter  $\rho F_i$  in the exponent is derived from the elasticity of substitution  $\sigma F_i$  between the production factors  $KD_i$  and  $L_i$ .

Analogically, in the second stage, the optimal combination of capital and land is modelled with the use of the *CES II* production function (Equation 2):

$$CES II: KD_i = aG_i \cdot \left( \chi G_i \cdot K_i^{-\rho G_i} + (1 - \chi G_i) \cdot D_i^{-\rho G_i} \right)^{-1/\rho G_i} \quad (2)$$

The production structure further incorporates the depreciation of capital, which is modelled as a fixed proportion from the current level of capital stock.

### Households' behaviour

The behaviour of households in the Czech economy is simulated by introducing two representative households – farmer households and other households, which optimise their utility subject to a budget constraint. Whereas microeconomic theory provides numerous suggestions, a standard choice in the field of CGE models is the Stone-Geary Linear Expenditure System (LES) (Equation 3).

$$U = \prod_j (C_j - \mu H_j)^{\alpha HLES_j}, \quad \sum_j \alpha HLES_j = 1 \quad (3)$$

where  $U$  is the consumer's utility,  $C_j$  is the amount of consumption of the  $j$ -th commodity,  $\mu H_j$  represents the subsistence level of consumption of each  $j$ -th commodity and  $\alpha HLES_j$  is a preferential parameter of the respective  $j$ -th commodity in the consumer basket.

The households' consumption budget is determined by the net value of its income after taxation and transfers, reduced by its savings.

### Government's behaviour

The government maximizes utility modelled by the Cobb-Douglas utility function subject to the disposable budget which is derived from incomes received on basis of tax collections:

$$U = \prod_j CG_j^{\alpha CG_j}, \quad \text{where} \quad \sum_j \alpha CG_j = 1 \quad (4)$$

Where  $CG_j$  is a governmental consumption of a commodity  $j$  and  $\alpha CG_j$  represents a preferential parameter in the government's consumption basket.

Whereas various possible closures dealing with governmental account can be applied, such as fixing the governmental savings or maintaining balanced budget, in this model, the closure of governmental account is arranged by fixing a ratio of governmental consumption to GDP. Governmental savings are thus adjusted to the difference between governmental incomes and expenditures.

### Modelling foreign sector

Total supply in the market is represented by a *composite commodity* consisting of the bundle of domestically produced goods supplied to domestic markets and imports. The composite commodity is a result of two simultaneous forces in the model, first the intention of producer to find the most profitable combination of supply between foreign and domestic markets, expressed by a Constant Elasticity of Transformation (CET) function, and the intension of consumer to find optimal combination of combination of imported and domestically produced commodity in the, expressed in the CES Armington function.

The functional form of the CET function is given in Equation 5.

$$CET(I) \quad XC_j = aT_j \left( \chi T_j \cdot E_j^{-\rho T_j} + (1 - \chi T_j) XDD_j^{-\rho T_j} \right)^{-1/\rho T_j} \quad (5)$$

where  $XC_j$  is the amount of domestic production of the  $j$ -th commodity,  $E_j$  is the amount of exports of  $j$ -th commodity to the Rest of the World and  $XDD_j$  is the amount of domestic production of  $j$ -th commodity supplied to domestic market. Analogically to the CES function,  $aT_j$ ,  $\chi T_j$  and  $-\rho T_j$  are the parameters of the CET function.

CES function with Armington assumption is used to determine the extent of substitutability of the components of the composite commodity where it is assumed that there is no perfect substitution between domestically produced and imported commodity. The functional form of the Armington CES function is provided in Equation 6.

$$CES \text{ Armington (I)} \quad X_j = aA_j \left( \chi A_j \cdot M_j^{-\rho A_j} + (1 - \chi A_j) XDD_j^{-\rho A_j} \right)^{-1/\rho A_j} \quad (6)$$

where  $X_j$  is the amount of total supply of the  $j$ -th commodity in the domestic market,  $M_j$  is the amount of imports of  $j^{\text{th}}$  commodity from the Rest of the World,  $XDD_j$  is the amount of domestic production of  $j^{\text{th}}$  commodity supplied to domestic market. Analogically to the CES function,  $\alpha A$ ,  $\gamma A_j$  and  $-\rho A$  are the parameters of the CES function.

Furthermore, the model is based on the following closure options and factor market assumptions:

- Fixed supply of production factors: capital, labour and land.
- Capital is fully employed in all sectors, whereas land is employed only in sub-sectors of agriculture.
- Certain amounts of labour are not employed, modelled by a Phillips curve determining the level of unemployment.
- Governmental consumption is modelled as a fixed proportion of the GDP.
- The model follows a standard macroeconomic balance of savings and investment.
- Following the assumption of a small country, both world export and import prices are fixed.
- Foreign sector closure consists in endogenous balance of current account adjusting to the exogenously set exchange rate.

## 2.3 Formulation of scenarios

The best way to assess the suitability of GTAP is to formulate a set of scenarios which can test the behaviour of model and compare the results provided by the two databases. As the crucial discrepancies are concentrated in the agricultural accounts, the proposed scenarios are focused on changes in agrarian policy:

Scenario 1: Total subsidy removal in agriculture: in this scenario, all subsidies that affect agricultural production are removed. Special attention should be paid to the cross-commodity effects in the absence of subsidies and the reaction of the production factor markets.

Scenario 2: Complete decoupling of subsidies: In this scenario, all subsidies are removed from production, yet they remain in the economy as pure financial transfers to farmer households. Scenario 2 should reveal differences in the impact of farmer households on the economy under the two different data sources.

Scenario 3: Liberalization of foreign trade: In this scenario, import tariffs charged on agricultural commodities from the non-EU member states are completely removed. As an external shock, scenario 3 should shed light on the differences in foreign trade mechanisms, produced by the two different datasets.

Scenario 4: Benchmark: It is necessary to include a status quo scenario which will enable to measure the effects of the realised policy shocks.

## 3 Results

Before the results are commented, it is useful to briefly characterize both data sets. The GTAP SAM was built with the use of disaggregated data provided by the official GTAP 2001 database [3], embedded to the structure of the national economy for the year 2005, which was resembled by the Czech national accounts. In particular, the GTAP data source was used to disaggregate agricultural accounts, taking only the relative shares. The balancing of the SAM was carried out by the linear programming method.

The SAM-CR was constructed with the use of the national surveys and commodity balances, embedded to the structure of the national economy for the year 2006. Given that the aim is to

compare the reaction of the model with respect to the baseline, potential differences in benchmark periods play only a minor role. Furthermore, given that the structure of the economy has been relatively stable after 2004, the benchmark equilibria under both datasets are closely comparable.

The factor market is modelled equally under both data sets; however, the structure of value added is substantially different (as shown in table 1). Furthermore, the differences in the two data-sets are significant when taking into account the subsidy rates per sector. Whereas the subsidy rates used in GTAP version are strongly biased in favour of the pork and poultry production sectors, the subsidy rates applied in the SAM-CR suggest that currently the most protected sectors in the Czech Republic are cattle and the sectors of crop production such as cereals, oilseeds and sugar beet.

**Table 2.** Comparison of subsidy rates in both data sets (as a share of GVA)

	cereal	fruits and veg	oilseeds	sugar beet	cattle	pork+poultry	milk
GTAP	-20%	49%	-24%	7%	-15%	69%	-19%
SAM-CR	29%	2%	23%	27%	39%	5%	14%

*Note: The subsidy rates in the GTAP SAM might not be fully consistent with the official GTAP database due to the balancing issues.*

### Effects on the agricultural sector

In order to assess the effects of different SAM on the results of simulations, suitable indicators that reflect the situation in the agricultural sectors and the national economy have been chosen. First of all, it is necessary to evaluate the changes in gross agricultural production. The quantification of the changes with respect to the benchmark level concerning all analyzed scenarios is displayed in Table 3.

With respect to the first Scenario – a complete removal of subsidies to agriculture, substantial discrepancies are revealed, particularly stemming from the cross-sector effects. Whereas under the SAM-CR data matrix, all agricultural sectors would see a decline in the production (where cereals, sugar beet and cattle would be the most affected), under the GTAP database, the decrease of production would only involve the sectors of pigs- poultry and fruit-vegetables. Surprisingly, the other agricultural sectors would see significant improvement. Differences in the subsidy rates between GTAP and SAM-CR are fully responsible for these biases. Nowadays, as the Czech Republic fully adopted the Common Agricultural Policy, the Czech farmers are supported by the CAP instruments especially direct payments. Assuming that the direct payments are mostly distributed as a land subsidy, the sectors of the crop production, which employ substantial quantity of land in the production process, benefit more from the support than the sectors of the animal production. This is the reason why the sectors of pigs-poultry and fruit-vegetables, which are currently the least supported production sectors in agriculture, would face the smallest decline of the production.

**Table 3.** Effect on gross production (% change vs. benchmark)

	Scenario 1		Scenario 2		Scenario 3	
	GTAP	SAM-CR	GTAP	SAM-CR	GTAP	SAM-CR
cereals	10.83%	-22.42%	10.61%	-22.42%	0.57%	-0.20%
fruit and veg	-42.80%	-1.79%	-42.70%	-1.79%	-5.30%	-0.37%
oilseeds	88.64%	-15.78%	88.82%	-15.78%	0.74%	0.41%
sugar beet	2.47%	-22.77%	2.19%	-22.77%	0.37%	-0.01%
cattle	22.34%	-21.02%	22.27%	-21.02%	0.58%	-0.33%
pigs and poultry	-31.17%	-9.33%	-31.26%	-9.33%	0.66%	0.26%
milk	17.52%	-11.99%	17.55%	-11.99%	0.65%	0.16%
Agriculture total	3.72%	-12.85%	3.64%	-12.50%	0.08%	0.04%
industry	1.61%	0.14%	1.17%	0.58%	0.03%	-0.05%

services	-0.54%	-0.33%	-0.24%	-0.07%	0.04%	0.04%
----------	--------	--------	--------	--------	-------	-------

Source: own calculations

Resulting cross-sector effects have clear repercussions in the structure of the agricultural production. This can be best demonstrated graphically (Fig. 1). Under the GTAP database, the removal of subsidies would result in a significant decrease of pigs-poultry share (from 21% to 14%), in favour of cereals, oilseeds and milk, which is in sharp contradiction with the results under the SAM-CR matrix.

The effect of Scenario 2 on the gross agricultural production is comparable with the first scenario. This can be explained by the fact that a full decoupling of the agricultural subsidies does not have distortive effect on the agricultural markets, as the subsidies are granted as financial transfers. Given that the farmer households' consumption participates in total household consumption by less than 10%, the effect of increased farmer income on the production side of the economy is limited.

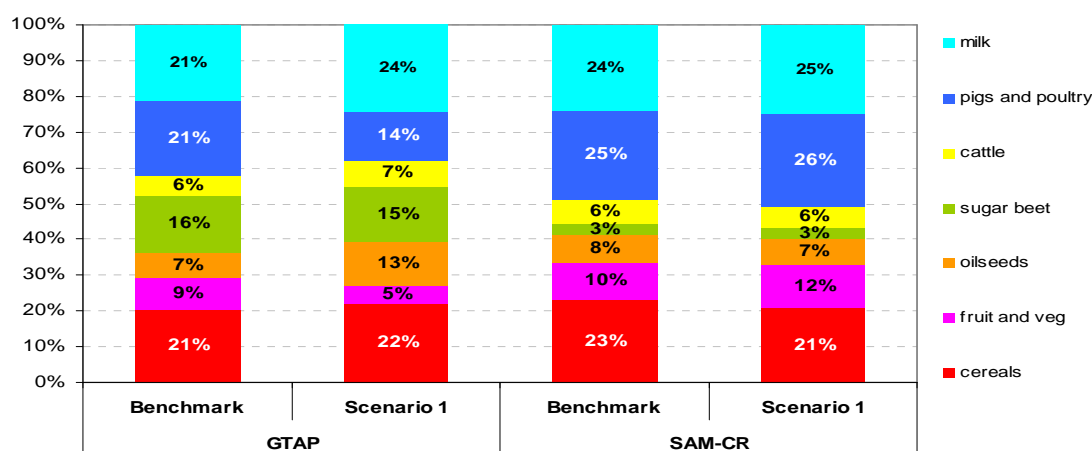


Fig. 1. The effect of subsidies removal on the structure of the agricultural production

The last considered Scenario evaluates the impact of the import tariff removal on the economy. In line with the fact that the European Union is the major trading partner, the effect of the trade liberalization with the non-EU member countries is limited. Whereas under the GTAP scenario, negative effects only concern the production of fruits and vegetables, under the SAM-CR matrix, a decline in production also happens for cattle and cereals, as these sectors produce most of the export oriented commodities that are supplied to non-EU markets.

With respect to the effect of considered scenarios on the other sectors of national economy, differences in reaction are negligible. The strongest impact would be seen in the Scenario 1, which would lead to increase of industrial production at the expense of agriculture and services. Full decoupling of subsidies would have modest effects on industry and services as the farmer household consumption does not play a significant role in the total domestic demand.

### Effects on the production factor markets and households' income

An interesting insight on the effect of the considered scenarios can be obtained when analysing the production factor markets (table 4). The price impacts are in a similar direction in most of the cases; however, the magnitude of reaction in the SAM-CR alternative is higher. The development in the production factor markets must be interpreted taking into account the changes in the gross production. As the removal of subsidies does not cause a decline in production across all agricultural sectors under the GTAP alternative, the demand for land does not fall to such extent as in case of the SAM-CR, which leads to a lower reduction of the land price index. Differences can be also noted in case of capital market, where the removal

of subsidies would cause increase of the return to capital in agriculture (due to the increase of the specific sectors), but according to SAM-CR, the value of capital would substantially decrease. With respect to the third scenario, import tariff removal has a negligible impact on the production factor markets, however, the GTAP would indicate slightly stronger changes.

**Table 4.** Effect on the market of production factors (% change vs. benchmark)

	Scenario 1		Scenario 2		Scenario 3	
	GTAP	SAM-CR	GTAP	SAM-CR	GTAP	SAM-CR
Wages	1%	0%	1%	0%	0%	0%
Price index of land	-40%	-66%	-41%	-65%	-1%	0%
Price index of capital (agriculture)	31%	-54%	31%	-53%	-1%	0%

*Source: own calculations*

The effect of the analyzed scenarios on the households' income is shown in table 5. According to the assumptions, the removal of subsidies to agriculture will cause a decline in the incomes of farmer households, which is confirmed in both alternatives. If the farmer households are compensated by financial transfers as in the Scenario 2, their situation should improve, which is confirmed by SAM-CR where the incomes rise by 7%, but not in the GTAP version, which shows a decline of incomes. However, in comparison with Scenario 1, where the farmer incomes decrease by 17%, in the Decoupling Scenario, the farmer incomes face substantially lower decline, leading to the conclusion, that under both database alternatives, the decoupling policy turns out to be effective in maintaining living standards of farmer population.

**Table 5.** Effect on the households and unemployment (% change vs. benchmark)

	Scenario 1		Scenario 2		Scenario 3	
	GTAP	SAM-CR	GTAP	SAM-CR	GTAP	SAM-CR
Other Households' Income	1%	0%	1%	0.0%	0.1%	0.0%
Farmer Households' Income	-17%	-4%	-1%	6.8%	-0.1%	0.0%

*Source: own calculations*

### Effects on the GDP components

Finally, the effects on the GDP and its components can be analyzed. Despite all previous discrepancies found out on the micro level, the macroeconomic aggregates performance is relatively similar under both database alternatives (table 6). Regarding the final consumption, with the removal of subsidies (scenario 1) the final consumption decreases as the incomes of farmer households deteriorate. On the other hand, subsidy removal increases governmental budget and leads to increased governmental consumption. The performance of investment is negative in both first and second scenario and comparable across the databases. This is due to the fact that the savings of firms and households decline and thus fewer funds are available to finance the investment. Net exports are the most variable item in the GDP structure, the subsidy removal would contribute to a considerable increase of exporting activity, mainly due to the reallocation of resources from agriculture to industry, which is more export oriented. With respect to the Scenario 3, modest positive effects can be seen when analysing changes in consumption and investment. As the import tariffs are removed, the imported goods from the rest of the world become cheaper and they stimulate domestic consumption. The effect on net exports is negative, as the balance of foreign trade deteriorates.

**Table 6.** Effect on the households and unemployment (% change vs. benchmark)

	Scenario 1		Scenario 2		Scenario 3	
	GTAP	SAM-CR	GTAP	SAM-CR	GTAP	SAM-CR
GDP	0.44%	-0.02%	0.50%	-0.02%	0.05%	0.01%
CONSUMPTION	-0.05%	-0.29%	0.56%	0.37%	0.06%	0.02%
GOVCONS	0.90%	0.45%	0.92%	0.40%	0.02%	-0.02%
INVESTMENT	-6.15%	-4.57%	-6.46%	-5.32%	0.90%	0.45%
NETEXPORT	57.85%	34.99%	52.68%	31.89%	-6.92%	-3.17%

*Source: own calculations*

## 4 Conclusions

The paper tackles an important and often discussed topic of the suitability of particular databases for their application in the agriculturally oriented CGE models. As the most commonly used and the only publically available database providing disaggregated data for the CGE model is the GTAP, the aim of the paper was to assess into which extent the GTAP database can serve as a reliable source for the agricultural simulations. In concrete, the GTAP database was compared to SAM-CR database which has been developed from locally available data on the agricultural sector and thus represents a realistic abstraction of the Czech agriculture.

Three scenarios, which model the situation of subsidy removal, subsidy decoupling and import tariff removal, were applied and the results under both database alternatives compared. The analysis shows that the strongest discrepancies can be found in the lowest (industry/sector) level when comparing the cross-commodity effects. With respect to the discrepancies in the structure of agriculture and subsidy rates, the impacts of the agrarian policy can produce completely contradictive results. Regarding the more aggregated sector level, the changes are more modest as they reflect average impacts of the particular agricultural subsectors. Finally, no significant differences were found out regarding the macroeconomic aggregates, which shows that the structure of the agriculture has a negligible impact on the GDP.

Based on this evidence, it can be concluded that the GTAP database should be used carefully if applied in the CGE models with a detailed agrarian policy orientation. Special importance should be paid on the detailed per sector subsidy rates as these can substantially affect the results of simulations.

This paper also shows that the results of the CGE model applications should be always interpreted in a close relation to the data framework it is based on. Then, the CGE models can bring a valuable contribution to understanding the complexity of the economy and the mutual linkages between the individual sectors and institutions.

## Acknowledgements

Research presented in this paper is the result of a research grant MSM 6046070906 “Economics of Czech agriculture resources and their efficient usage within the framework of multifunctional agri-food systems”.

An important contribution in the elaboration of this paper has been made by the Institute of Agricultural Economics and Information (UZEI) which has provided valuable inputs for the construction of the Social Accounting Matrix.

## References

1. Bednaříková, Z., Doucha, T.: Impact of agricultural policy scenarios on the development of remote rural areas – a case study of Bruntál and Ostrava districts. *Agricultural Economics*, 55, 2009 (4), pp. 161-168.
2. Decreux Y., Valin, H.: *MIRAGE, Updated Version of the Model for Trade Policy Analysis Focus on Agriculture and Dynamics*. CEPII, 2007.
3. Dinamaran, B.: *Global Trade, Assistance and Production. The GTAP 6 Data Base, Software documentation*. Centre for Global Trade Analysis, Department of Agricultural University, Purdue University, December 2006.
4. Elbehri, A., Umstaetter, J., Kelch, D.: *The EU Sugar Policy Regime and Implications of Reform*. Economic Research Report Nr.-59. Economic Research Service/USDA, July 2008.
5. Gelan, A., Schwarz, G.: *Policy Impact Evaluation Model for Scotland: Decoupling Single Farm Payments*. Aberdeen Discussion Paper Series: People, Environment and Development, Scotland, 2006. ISSN 1743-9965.
6. Křístková, Z. a): „Effect of soaring world cereal prices on the Czech Economy (with use of general equilibrium approach)”. *Scientia Agriculturae Bohemica*, 40, 2009 (3): 143-154. ISSN 1211-3174.
7. Křístková, Z. b): *Možný přístup k sestavování sociální matice (SAM) v zemědělských aplikacích*. Sborník ze semináře *Ekonomika zdrojů českého zemědělství a jejich efektivní využívání v rámci zemědělskopotravinářských systémů*, Praha, 2009. ISBN 978-80-213-2011-6.
8. Piermartini, R.: *Modelling Methods for Trade Policy I: Simulations Models* Economic Research and Analysis Division, WTO, Bangkok, April 2006.
9. Tangermann, S. Banse, M.: *Central and Eastern European Agriculture in an Expanding*. 2000.
10. European Union. CABI, New York, 2000. 224 s. ISBN: 978-0-85199-425-3.



# The Financial Crisis: Implications for Nigeria's Seven-Point Agenda

Lenihan Éamon<sup>1</sup>, Stephen Onakuse<sup>1</sup>

<sup>1</sup>Centre for Sustainable Livelihoods, National University of Ireland College - Cork, Ireland.  
{elenihan, s.onakuse}@ucc.ie

**Annotation:** This paper argue that achieving “the seven-point agenda” would be nearly impossible taking into consideration the current global economic crisis, huge budget deficits and in addition to the declining fall in international oil prices. However, the analysis suggests that the relationship between the global economic crisis, budget deficits, inflation and the declining stock market as well as the fall in international oil prices on the one hand, weak economic policies monitoring and implementation in Nigeria on the other coupled with complex and unending political corruption, constantly escalate the risks of failure associated with policy reform programmes. The paper demonstrates that constant changes and inconsistencies in government policies and corruption lead to wild adjustments in the quality of results from the various reforms over the years. In view of the above, reform programmes in Nigeria often become a thing of the past in the midst of structural corruption, poor budgetary implementation and a political quagmire – a common phenomenon in Nigeria’s governance system. It therefore becomes imperative that corrupt political machinations and budgetary indiscipline are totally insulated from the seven-point agenda if policy goal are to be achieved even with the current economic crisis. Finally, the results from the analysis suggest that the current economic crisis and budget deficit will have a significant effect on the expected impact of the seven-point agenda.

**Key words:** Nigeria, development, global economic crisis, food security.

**JEL classification:** E 40, O1

## 1 Introduction

*“The global financial crisis has led to slowing growth across the world's economies, resulting in lower demand for commodities, especially oil. While speculative investment activities had helped buoyed oil prices in recent months, the reality of the global recession is beginning to be fully appreciated across the globe and more poignantly in Nigeria by its adverse impact on the international price of oil.”*

*President Yar'Adua, Dec. 2<sup>nd</sup> 2009*

With roughly over 140 million Nigerian citizens, 36 states, a weak political and economic system, and persistent ethnic and religious conflicts in Nigeria, it remain one of the poorest countries in the world, ranking near the bottom in many human development indices (National Bureau of Statistics, 2009, [6], [7], [11]). Corruption is endemic; unemployment is growing, illiteracy rate is near 50 percent, HIV/AIDS is on the rise. Crime and violence in the Niger Delta has handicapped oil production, while sectarian fighting between Muslims and Christians has killed thousands (National Bureau of Statistics, 2009). The Federal Office of Statistics indices, over the years, show that poverty incidence in Nigeria in 1960 was about 15%. This grew to 28% in 1980 and 46% in 1985. By 1996, the poverty incidence was estimated to be about 66%. Additional data from the FOS [3] further indicated that life expectancy at birth is 51 years; literacy rate is 56%, and 70% of the rural population lacked access to potable water, healthcare and electricity. However, the latest figures released by the (National Bureau of Statistics (2009) indicate that economic growth has turned stronger since 1999. From 1995 to 1999 real GDP growth averaged 2.8%, again between 2000 and 2004, it was 6.0%, peaking at 10.23% in 2003; that overall poverty incidence also fell from 65.6% in 1996 to 57.8% in 2004.

Despite the claimed economic growth indices, the dearth of infrastructure and poverty is on the increase, the serial economic programme mutations over the decades have produced rich acronyms and phrases, introduced as reform agenda developed to move the country forward. From the austerity measures and Economic Stabilisation Acts of the 1970s and early 1980s to the infamous Structural Adjustment Programme (SAP), successive governments had come up with similar programme all geared towards alleviating the suffering of the ordinary masses of Nigeria through the provision of basic needs of life. Some examples of these programmes are the "Green Revolution" of the Shagari regime (1980); "Operation Feed the Nation" of Obasanjo (1978) "War Against Indiscipline" of the Buhari/Idiagbon (1983); "Structural Adjustment Programme" MAMSER and DFFRI of Babangida (1994): Vision 2010 of Sani Abacha and the recent "NEEDS" of Obasanjo (1999-2007). These programmes are conceived with the intention that their implementation will bring about an all round development at various sphere of Nigerians national life. The threshold of history has again presented us with the Seven Point Agenda by the Yar' Adua administration 2007 -2011; with the aim to transform Nigeria by resolving the energy crisis and revamp the ailing economy.

Nigeria, over the years, modelled its economy along the path of casino capitalism, fuelled by corrupt activities without a solid productive base. This model presents sure risks and uncertainty for the seven-point agenda. If the quality of the economic infrastructure determines the level of a country's development, then the quest for economic development and structural transformation within the framework of the seven-point agenda, based on a single commodity economy face dire consequences in the face of the global economic crisis.

The large literature on the limitations of economic growth and development in Nigeria points to the lack of infrastructures for long-term economic development and human capital development. Whilst there have not been any acceptable explanations for the poor state of infrastructural development in Nigeria, nevertheless, a series of reform agendas continue to dominate every succeeding government's development agenda. However, corruption, fraud, mismanagement, poor follow-up mechanisms, conflicting political interests and hidden agendas have hampered policy programme attempts in Nigeria over the years. Both political and infrastructural terrains in Nigeria are complexly intertwined. This obvious intertwine brings about poorly conceived, implemented and coloured political considerations in every aspect of the country's development. The lacks of infrastructure has accounted for all the standard rationalisations of poor growth in Nigeria, with a substantial unexplained negligence attributable to the role of government ministries institutions.

This research is conceptually anchored on the position that with huge budget deficits and high levels of political corruption and dwindling oil prices; the actualisation of the seven-point agenda within the current global economic crisis cannot be achieved. This paper examines and makes a qualitative discussion on the impact of the current global economic crisis on the one hand and the sharp fall on international oil price on the budget with huge deficits – an instrument for the actualisation of the seven-point agenda, on the other. This is in order to better estimate and understand the likely impacts of the current global financial crisis<sup>1</sup> on the actualisation of the seven-point agenda.

## 1.1 Nigeria Development an Overview

Nigeria's first three national development plans (1962 -1980) include transformations like the Operation Feed the Nation, the Green Revolution, the medium-term rolling plans, the poverty alleviation initiatives, the millennium goals of 2000 and the Obasanjo second era of 1999

---

<sup>1</sup> Financial crises historically have three crisis 'waves'. The first 'wave' is financial in nature and visible in changes in the exchange rate and stock market, interest rates, etc. The second wave is that whereby there is transmission from the financial to real sector effecting notably construction and manufacturing sectors and visible in falls in investment and GDP contraction. The third wave is then the transmission from the real economy (and finance) to visible household level and intra-household level impacts

reforms packaged under NEEDS 1, a veritable development plan strategized along lines of poverty reduction strategy programmes. The NEED 1 plan's preview indicate such targets as doubling current growth rates of all non-oil sectors, creating 10 million jobs by 2011 and growing GDP annually by over 10 per cent. "Our goals", "remains wealth creation, employment generation, and sustainable poverty reduction that is production-driven... What the administration needs are action plans for facilitating development of infrastructure...action plans for real sector growth and development, and action plans for providing enabling environment for local manufacturing" (Obasanjo, 2000). This development rhetoric is a common feature of every government in Nigeria.

Since the inception of the Obasanjo administration in 1999, various reforms and were initiated in order to reform the institutions of governance and ensure a structural transformation of the economy. Some of the key reforms include the followings:

Establishment of the anti-corruption commission - directed at reforms in public procurement practices - substantially in line with the Country Procurement Assessment Review (CPAR) and consequently, the Budget Monitoring and Price Intelligence (BMPI) established to ensure due process<sup>2</sup> as well as compliance in the evaluation, contracting and monitoring of capital projects;

Approval of the recommendations in the Country Financial Accountability Assessment in January 2001 as a basis for reforms in financial management to ensure value-for-money;

The setting up of the Debt Management Office (DMO) with a mandate to consolidate, reconcile and manage Nigeria's external and domestic debt and setting up of a separate Budget Office in the Ministry of Finance, with a Permanent Secretary in charge to tackle the perennial budgetary problems of government (National Bureau of Statistics, 2009);

Setting up of the Economic Policy Coordinating Committee under the office of the Vice-President to ensure internal consistency and coordination of government economic policies;

Setting up of and nationally televising open-sittings of the Human Rights Violations and Reconciliation panel, akin to the South African Truth and Reconciliation Commission;

Sale of cellular (GSM) phone licenses to three firms at \$750 million to help ease the problems of communication in the country;

Privatising the Nigerian Telecommunications Ltd (NITEL);

Restructuring and energizing Nigerian Electric Power Authority with targets to significantly improve electricity supply by December 2001 through the generation of 4,000 MW of electricity - about double the generation capacity;

Implement major reforms of the university system including licensing of new private universities and to review plans for granting increasing autonomy for individual higher institutions;

Adopt a new National Water Supply and Sanitation Policy that makes privatisation or private sector participation in water supply a major aspect of government policy; and

Streamline government poverty alleviation institutions.

The Obasanjo administration also set up a panel to take stock of performance under past poverty programmes and to suggest ways to improve design and implementation of future programmes.

Vision 2020 began to gain acclaim since May 29, 2007, with the goal to make Nigeria one of the 20 most developed economies in the world by the year 2020. (The implementation of the

---

<sup>2</sup> Due Process implies that governmental activities and businesses can be carried out openly, economically and transparently without favouritism and corruptible tendencies.

7-point agenda is supposedly, to catapult Nigeria to become one of the twenty biggest economies by the year 2020). While the Vision is the target, the seven-point agenda remains the substance for achieving the target. The key Goals for Vision 2020 – is to make Nigeria one of the 20 largest economies in the world and been able to consolidate its leadership role in Africa and establish itself as a significant player in the global economic and political arena by 2020. To achieve these set goal, a three stage approach has been set as follows: **STAGE I:** Building a solid foundation for Vision 2020 (2008–2010) - this stage includes the Seven Point Agenda, the NEEDS 2 and other relevant documents, as well as preparing a Statement of National Priorities that will form the core elements of the country's development plans and budgets during the period 2008 to 2010 and that will also constitute the foundation for Vision 2020; refine the Vision 2020 framework and develop guidelines for the Vision 2020 development process. **STAGE II:** This includes the achievement of the Millennium Development Goals by 2015 en-route to achieving Vision 2020 (2011 – 2015). **STAGE III:** Aims to establish Nigeria as a top 20 economy globally by 2020 (2015 – 2020) – this entails developing detailed key goals and targets that must be met in order to achieve convergence with the projected positions of the world's top 20 economies.

The current government of President Yar'Adua in 2008 initiated a medium-term National Development Plan (2008-2011) coined as the 7 point agenda aimed at fast-tracking the country's development process. The Federal government's Seven-Point Agenda includes the followings:

1- **Power and Energy:** - The Federal government is committed to infrastructure reforms in this sector that will lead to the development of sufficient and adequate power supply to ensure Nigeria's ability to develop as a modern economy and an industrial nation by the year 2015

2- **Food security and Agriculture:** - On the development of modern technology, research, financial injection into research, production and development of agricultural inputs to revolutionise the agricultural sector, leading to a 5-10 fold increase in yields and production; leading to massive domestic and commercial outputs and technological knowledge transfer to farmers.

3- **Wealth Creation and Employment:** - To focus on wealth creation through diversified production especially in the agricultural and solid mineral sector.

4- **Mass transportation:** - Develops the transport sector - rehabilitation and modernisation of the railway

5 - **Land Reform:** - To optimise Nigeria's growth through the release of lands for commercialised farming and other large scale business by the private sector.

6- **Security:** - The Federal Government is to ensure that security is not only a constitutional requirement but also a necessary infrastructure for the development of a modern Nigerian economy.

7- **Qualitative and Functional Education:** - The two-fold reforms in the educational sector will ensure firstly the minimum acceptable international standards of education for all.

The seven-point agenda enumerated above represents Nigerians' Common Future - development that meets the needs of the present without compromising the ability of future generations to meet their needs. The obstacles to the common future rest on infrastructural development, civic empowerment and rural entrepreneurship which translate to building a strong infrastructure for democratic self-government and sustainable economic development.

However, despite all the past and current programmes, Nigeria and its citizens still face the problems of inadequate infrastructural facilities, institutional decay, lack of access to good roads, lack of quality health care systems, poor educational development, strife, inadequate shelter, as well as other unresolved problems that are leading to an increasing cost of living as

well falling living standards. This is as a result of the influence of political entrepreneurs who suppress, and/or distort the truth with simplistic generalisations. The unprecedented upsurge in crime, typified by robbery, kidnapping, cultism, rape, violence and youth restiveness are the current output that have developed from the gross failures of the various policy programmes mentioned earlier. The level of unemployment has risen beyond expectation. In 2009, The National Bureau of Statistics highlighted that the national unemployment rate increased from an average of 10.9 per cent in 2005 to an estimated 54.5 per cent at the end of 2008.

The World Bank has estimated that in the year 2009, 53 million more people will be plunged into poverty as a result of the global economic meltdown [12]. It is reasonable to assume that Africa, being the poorest continent, will account for a disproportionate share of that estimate. Nigeria, due to its large population, has a lion share of the poverty estimates because of the monoculture nature of its economy. While per capita income remains very low in Nigeria, corruption, poor infrastructure and lack of political will continue to undermine economic growth and investment. The majority of the population is engaged in small-scale farming, which accounts for over one-third of formal sector (GDP) while oil and gas accounts for about one-third of yearly GDP but provides over 70 per cent of the Federal Government's revenues and 90 per cent of exports (National Bureau of Statistics 2009, [1]). Also, the dependency on petroleum makes it a wasting asset for which the country has no control over its price and volume demanded; this depend largely on OPEC and the state of the global economy. The Infrastructure Concession Regulatory Commission (ICRC) 2009 estimated that Nigeria needs between \$12 and \$15 billion yearly (This translates to between N60 and N75 billion that will be needed in the next 5 to 6 years) to develop its infrastructure in the foreseeable future, taking into consideration the state of infrastructure decay in the country, which constitutes a serious obstacle to economic growth and prosperity.

## **2 Methods and Research Process**

A macroeconomic analysis of the budget and its externalities was conducted to evaluate the extent to which the current global financial crisis could significantly affect the implementation of the seven-point agenda by the federal government, calculating from it huge budget deficits. The main data used for the research are secondary, as well as the requisite responses to evident distress situations in the macro-economy and budgetary analysis of financial activities of the federal government of Nigeria. The research has been constrained by a severe lack of both qualitative and quantitative data on a national level. The paper draws on a number of background papers and media analysis and publication that are specific to the subject matter; based on a secondary literature review, as well as secondary data analysis from the federal ministry of finance and the Central Bank of Nigeria and National Bureau of Statistics.

## **3 Results**

### **3.1 The Global Economic Crisis and Nigeria Development**

The global financial crisis<sup>3</sup> has spread rapidly since the fall of 2008. Over time, there has been gross mispricing of risk as asset prices sky-rocketed leading to a Global downturn of uncertain severity and duration ([10], [6], [7], [1]). Nigeria is more exposed to the current global downturn as the growth and development of the economy depends on international

---

<sup>3</sup> There is no precise definition of financial crisis but a common view is that disruptions in financial markets rise to the level of a crisis when the flow of credit to households and businesses is constrained and the real economy of goods and services is adversely affected [8]

crude oil prices, foreign direct investment (FDI) as well as trade and remittances ([6], [7], [11], [13]). While the global financial crisis has worsened the budgetary position of Nigeria has deteriorated because of the crude price crash. The Federal government revenues are now exposed to and suffer from slow or negative economic activity - an indication that the budget, on which the seven-point agenda is based, both for development, institutional quality, and provision of infrastructure and poverty reduction will suffer severe financial contraction.

The current economic crisis affects Nigeria in two major ways: firstly, the plunge in the price of crude oil on the international market has a negative revenue implication as Nigeria is a mono-export economy (depending on the exchange rate and local currency depreciation)<sup>4</sup> - from an all time high price of \$147 to benchmark price hovering between \$35 and \$40; secondly, the withdrawal of foreign direct investment from the economy is affecting the credit receipts of banks and other financial institutions. While wealthier economy countries are experiencing a vicious circle of negative interactions between financial markets, product markets, trade, and now labour markets, the IMF ([7]) estimated that World growth was expected to come to a virtual halt, estimated at only 0.5% for 2009. This type of contraction will bring about reduced trade flows in Nigeria as well as a decline in commodity prices, reduced liquidity and tightening of credit markets - affecting both the private and public sectors, reduced flows of remittances, a drop in Foreign Direct Investment (FDI), and exchange rate depreciation and uncertainty ([1], [6], [7]). In many countries, governments and Central Banks are seeking ways and means to encourage inter-bank lending; clean up the toxic assets of banks and strengthen their capital; reverse the widening credit crunch; restore flow of trade credit and boost domestic demand, that is, purchasing power. But the intensity and volume of toxic assets in Nigeria make such a clean up difficult, if not nearly impossible.

The reduction in net capital flows, both in terms of investment and concessional resources are part of the luggage associated with the financial crisis. While Nigeria has not been a major recipient of official development assistance (ODA), the country does benefit significantly from bilateral and multilateral aid resources [10]. In the current situation, investment flows, both in terms of FDI and portfolio, are negatively affected. In addition, remittances from the Nigerian Diaspora, which, exceed US\$10 billion annually ([1], National Bureau of Statistics 2009, [12]) are drying up considerably. Further, the lowering of growth in the OECD countries translates into lower growth in Africa, this in turn is adding to the already high levels of infrastructural decay in Nigeria, undermining its strategic position in Africa. The reduction in growth worldwide has a consequent effect on the implementation of the seven-point agenda. While the driving factors for growth such as commodity prices, capital inflows, and remittance flows are all in decline, the decline in remittances has direct negative effects on low income households, given that these households rely heavily on remittances to cover their basic needs such as food, education and health.

Remittance flows to developing countries were expected to be USD 304 billion in 2009, down from an estimated USD 328 billion in 2008, said the World Bank. Nigeria receives \$10 billion per year in remittances ([11], [13]). With the current economic crisis there is strong evidence of reduced dynamism of remittances across the world. In the case of Nigeria, in particular, remittances form part of family incomes to both low and medium income households, and in many cases these are used to generate and support income generating activities

Between September 2008 and May 2009, the market capitalisation of United States (U.S.) and European banks declined by 60 per cent or \$2 trillion ([13], World Bank, 2009). If the world

---

<sup>4</sup> Often it is rapid falls in exchange rates that are viewed as the key indicators of a crisis and later on GDP contractions. The Frankel and Rose (1996) definition of a (currency) crisis is often cited in the literature on crises: [A crisis is a situation whereby there is] a nominal depreciation of the currency of at least 25 percent that is also a 10 percent increase in the rate of depreciation.

trade continues to decline as seen since the end of 2008 first quarter of the year at a yearly rate of more than 40 per cent, then developing countries like Nigeria that derives its income from the global market will experience a deeper downturn.

Foreign portfolio investors have withdrawn some US\$15 billion from the Nigeria capital markets [2], an indication of palpable crisis of confidence in the economy, which affects both the implementation and actualisation of the seven–point agenda of the current administration. The contagion of economic crisis has taken hold of many countries across the globe. An estimated US\$1.7 trillion in bailout funds have been committed by OECD countries ([6], [7]), but these bail outs have signalled the beginning of the end for many small and medium sized companies that do not have access to such fund. Further, ordinary citizens are continually being burdened with higher taxes and levies as well as reduced levels of services to enable the state to provide these bail outs. Recent reports shows that the world stands in need of a staggering US\$4 trillion to fully resolve the global economic crisis ([6]). For example, most automobile giants were virtually on their deathbeds, a good number of other industries are struggling to survive, while many others have long been buried from civilisation, largely due to the current economic crisis.

Financial booms and busts are not a new phenomenon but what is disquieting about the current meltdown is that it represents a seismic tremor of earth-shaking proportions which cuts across every facets of the society. Nigerians witnessed the fallout of a global economic recession, similar to the one which is unfolding, during the Second Republic under former President Shehu Shagari (1979-1983). In the middle of 1981, there was a fall in the prices of oil on the global market resulting to a drop in revenue. The explanation for the economic recession was based on the glut in the oil market; where producers of crude oil rushed to increase exports resulting in market was saturation. By 1982, the debt profile of the Nigerian government had soared, the prices of household goods skyrocketed and rationing of staple items became the norm in most homes while the Nigerian markets become the trading outposts for overseas manufacturing firms (CBN 1999)

With the general expectation that in 2009 highly developed economies would post negative growth rates, emerging market economies like Nigeria registered sharp slowdown as a consequence. This situation caused Nigeria's fiscal and external payments positions to further weaken in 2009. The existing and current economic crisis has further contributed to millions of Nigerians losing their jobs while the devaluation of the naira, inflation, the high cost of inputs, poor infrastructure, inconsistent policies and the lack of a clear-cut industrial policy continued to jeopardise any efforts articulated towards economic growth and development. With most of the Foreign Direct Investment (FDI) concentrating in the oil and extractive sectors and the recently developing communications industry, the economic structure remains highly undiversified, with oil accounting for 95% of exports, and manufacturing sector accounting for less than one percent of exports (National Bureau of Statistics 2009). Lustig and Walton [9] posit that financial crises affect society through; changes in labour demand; changes in prices; changes in public spending; changes in the value of economic, human, social, environmental and financial assets; as well as long-term impacts on capabilities

### **3.2 The Global Crude Oil Market impact of Nigeria infrastructural development**

Equations, Nigeria's current production capacity is estimated at 2.6 million barrels per day with a proven reserve of 32 billion barrels that could result in an increment from the present quota of 1.787million bpd all things being equal – for instance, resolution of the Niger Delta crisis (National Bureau of Statistics 2009). Though logical, the current economic crisis makes it not feasible and impracticable. Globalisation has resulted in significant inter-relationships between economies throughout the world. No country is isolated from the current global down-turn. What affects one country directly or indirectly affects many others. The

international demand for crude oil has fallen resulting in a more than 50% fall in the price of crude oil and other commodity prices have declined sharply since the acknowledgment of the economic recession in developed economies; further aggravating the existing slow economic growth of developing countries economies, such as Nigeria. The International crude oil market, rather than being a means to social production, has become the conduit for economic relations between OPEC and other countries of the world. Crude oil prices, which peaked at \$147 per barrel on July 11, 2008, dropped below the Federal Government's oil benchmark of \$45 per barrel for 2009 in the fourth quarter of 2008. The oil prices currently hovers around \$75 per barrel.

OPEC forecasts have also indicated that crude oil demand worldwide would continue to be soft for the rest of 2009/10 due to the global economic crisis [5], a clear indication that reliance on oil revenue cannot sustain the realisation of the seven-point agenda. The current economic meltdown has further created visible indices such as the rising exchange and interest rates, crashing crude oil prices, downturn in the fortunes of the local capital market, loans (especially from the West) being recalled, credit lines withdrawn and investments cancelled. The consequential impact has been the continuous increases in prices of goods, especially those manufactured locally; while imported goods will come in more expensive as a result of the less favourable exchange rate. It should be noted that as most developing countries have over the years benefitted from developed countries wealth, so also the current austerity will be exported to the developing countries. With the dwindling fortunes in the international oil market coupled with the disruptions in the Niger Delta, will the seven-point agenda be able to measure up to the set goals? If Nigeria had received approximately \$300 billion from oil exports since the mid 1970s as at 2000, with a lower per capita income of 20% when compared to the level attained in 1975, then it will be difficult to actualise the seven-point agenda since the political filtering channels are still not plugged.

The drastic budget deficit in Nigeria is attributed to the fall in the price of crude in the international market occasioned by the global economic crisis, restiveness in the Niger Delta oil rich region, and drastic reduction in Organisation of the Petroleum Exporting Countries (OPEC) quotas [1]. The British Petroleum statistical review of World Energy (2009) posits that global oil consumption fell by 420,000 barrels per day in 2008, the biggest decline since 1982 while the oil and gas sector has accessed the debt markets to the tune of \$52.6 billion since the start of 2009, relatively high considering all of 2008 which was around \$70 billion capital raised in the debt market. However, the Federal Government of Nigeria's 2009 budget is based on projected higher oil revenues but the declining international oil prices and production constraints such as militant activities in the Niger Delta has declined to as low as 1.6mbpd from a projection of 2.209 mbpd. The low production and the average price falls to \$40/barrel from the original budget projection of \$45/barrel has induced a fiscal deficit increase to N1.35 trillion or 5.24 per cent of GDP, which is well above the three per cent allowable limit under the Fiscal Responsibility Act.

The 2009 budget allocated 91% of the N796bn capital vote (an increase of 162bn when compared 2008 allocation) also in the following areas such security, critical infrastructure, (including power, roads and bridges, and transportation); human capital development, land reforms and food security. Precisely, N361Billion is allotted to critical infrastructure in addition to the N628 Billion excess crude funds targeted at the power sector. In addition, N88 Billion is allocated to the power sector to raise generation capacity to 6,000 megawatts. The 2009 budget also takes into consideration human capital development with a total estimate of N131bn including N39.6bn on health and N32bn on education, down from N49.3bn and N47.8bn respectively in 2008 [1].



### 3.3 Challenges to the Seven-Point Agenda

The actualisation of the seven-point agenda is dependent on two main factors: the price of oil and the government's capacity to implement the budget effectively. Given that the oil price assumption for the 2009 budget is largely uncertain as the price of oil at the international market, which hit a peak of \$147 per barrel in July 2008 currently hovers around \$75 per barrel (September 2010), it is therefore evident that the seven-point agenda, which is heavily focused on infrastructure development, could not be achieved in such an uncertain oil price regime. There are the further self-inflicting limitations imposed by the Nigeria state – failure to address corruption and the persistent low levels of technology.

The current global crisis challenges have resulted in a sharp drop in the Federation Account allocations from N435.40 billion in January 2008 to N285.58 billion in February 2009, due to the fall in international oil prices. The totally distributable revenue by all the tiers of government was N30.894 billion in May 1999, N196.383 billion in May 2007, N746.745 billion in May 2008, ([1], National Bureau of Statistics 2009). Despite the fact that the thirty-six states including the federal capital territory has primary responsibility to providing social welfare, education, health, and infrastructure to the teeming population, the prevailing low per capita income tends to curtail consumption capability, reduce economic absorption capacity, reduce propensity to produce even at local levels and ultimately result in sub optimisation of the available factors of production including labour.

Some schools of thought have argued that confidence has been lost in both past and current economic reforms including the seven-point agenda. For example, the 2009 Appropriation Act signed by President Umaru Musa Yar'Adua with a total budget of N3.1018 trillion is not in tandem given the current realities of declining international oil prices, downturn in the capital market and production constraints. The budget has a deficit of N836.6 billion or 3.02 per cent of (Gross Domestic Product - GDP). This is also the same with the 2008 budget of N2.87 trillion deficit or 3.95 per cent of GDP ([1], National Bureau of Statistics 2009). The above deficits notwithstanding, the revised fiscal frame-work subsequently agreed with the National Assembly, the budget would have a projected deficit of N654 billion or 2.36 per cent of GDP. The naira has lost about 25 per cent of its value against the United States dollar since the beginning of the current economic crisis. The Nigeria stock market, once a choice investment destination, has not escaped the adverse effects of the economic downturn. For example, within a two month period March – May 2009, the naira has cascaded from N116, to N165 to a dollar in the parallel market, losing N49 in the process. These developments have grave implications for macro-economic stability, economic growth, sustainable development and the actualisation of the seven-point agenda in Nigeria.

The supposedly underlying philosophy of the seven-point agenda constitute ensuring effective and targeted implementation of critical projects and instituting efficiency and accountability in the management of scarce public resources which might constraint the success of agenda. However, the ultimate target of the seven-point agenda is the eradication of absolute poverty among the people of Nigeria [1]. The eradication of poverty in Nigeria is therefore to ensure that all Nigerians are provided with: a steady source of real income; high purchasing power; abundant, good quality and high nutritional food; basic healthcare facilities; good quality education; good quality drinking water; good standard of housing units; good quality roads and other means of transport; stable and affordable power supply; good urban and rural communication facilities; cheap and affordable quality consumer products; and conducive environment for production and provision of quality services.

*"The 2009 Federal budget is to deliver on our promises to reduce poverty and attain our Millennium Development Goals... By enhancing physical infrastructure through improving the power and road transportation sectors; we can improve the capacity of our non-oil sectors such as agriculture and manufacturing to contribute to more sustainable and enduring economic growth and development." (President Yar'Adua, 2009)*

Over the years, budget speeches have been long on rhetoric but fall short on implementation. The Seven-point Agenda, more than two years since its inception, fails to demonstrate any success on any of its stated objectives. The 2009 budget which depended on two factors: the price of oil and the government's capacity to implement the budget effectively has not departed from the usual platitudes of the previous budgets that allocate funds as deemed fit to some sectors that are considered priority. Substantially, the 2009 federal budget with an inbuilt deficit of 1.09 trillion naira, a figure that is unsustainable with the current financial crisis, shows an aggregate expenditure of N140.7 billion for Statutory Transfers, N283.6 billion for Debt Service, N1.649trillion for Recurrent (Non-Debt) expenditure and N796.7 billion for capital expenditure, based on the assumed benchmark oil price of US\$45/barrel and forecast production of 2.292mbpd.

The 2009 budget was based on the following assumptions: of crude oil production of 2.292 million barrels per day; 8.9 per cent GDP growth rate; reduced inflation rate of 8.2 per cent; and the naira exchange rate of N117 per dollar. However, the inflation rate and other set parameters put constant pressure on the naira on the inter-bank market, partly due to over optimism on the part of the state in the face of the current economic crisis. Furthermore, the N1.09tn deficit built into the budget (which doubles the N560bn 2008 projection) threatens the realisation of the GDP growth projections. The final concern concerns the implementation of the budget. For example, the 2008 budget implementation consumed less than 50% of the projected spending, with the remainder being filtered out through corrupt activities.

The national inflation rate has risen steadily since the second quarter of 2008, standing at 9.7 per cent in May before soaring to 12 per cent in June and 14 per cent in July owing to the effects of the global food crisis. There was a significant increase in inflation between September and October 2008, 13.0 per cent to 14.7 per cent. This increase is driven by both food and non-food components. Similarly, core inflation rose to 7.9 per cent in October from 6.9 per cent in September 2008 [1]. The rate of inflation is officially placed at 9.5%, but could, in reality, be more than five percentage points higher (National Bureau of Statistics 2009, [1]). With a GDP of \$195.289 billion, and a GDP growth rate of 6.2%, relative to many other developing countries, the Nigerian economy has not grown appreciably. Also, Nigeria's foreign reserves have dropped from US\$67 billion in June 2008 to US\$53 billion in December 2008. With a GNP per capita of less than US\$1,286, and a GDP per capita of US\$1,317, Nigeria is classified as one of the poorest countries in the world.

The dynamics of the current economic crisis are so complex that it is impossible to predict its exact impact. Another challenge to the seven-point agenda is market capitalisation, making the Naira purchasing power parity (National Bureau of Statistics 2009). However, the link between the general impact of the crisis and human development is obvious. Nigeria is directly hit by the global crisis through:

- Declining demand for its exports (crude oil),
- Reduced investment (including FDI),
- Shrinking remittances, and
- Reduced development assistance.

This in turn will negatively affect growth, tighten national budgets, increase underemployment, and reduce household incomes [11]. The decreases in the four key themes outlined above will exacerbate the crisis with respect to the achievement of the seven-point agenda.

## 4 Conclusions

The seven-point agenda is supposed to represent a long-term process that integrates different areas both of economic and human capital policy and attitude development. It is certain that to make Nigeria a member of the top 20 economies of the world the areas to be addressed must include infrastructures development, macroeconomics stabilisation, the rule of law, and changes in the government's and its institutions behaviour in order to enable economic growth and development. The seven-point agenda requires a coordinated, development-oriented, people-centred, inclusive, and of course urgent political will to sustain the reform if the failures of past reforms, that slide into a black hole, are to be halted. The success or failure of the seven-point agenda depends on the Nigerian government's public/private partnership, the promotion of a liberal environment which encourages private initiatives, establishment of a positive investment climate, development of infrastructural facilities, establishment of appropriate regulatory codes, the creation of legislative and policy environments that ensure fair, equitable and efficient budgetary and tax regimes.

Infrastructural development is one of the most dynamic aspects of macroeconomic and social life development. This means that the seven-point agenda requires extra funds to from the federal government to be able to implement the seven-point agenda. Achieving the seven-point agenda depends on the changing fortunes of crude oil price and the current plummeting Naira value – which are requisite for an economy which is import-dependent.

The future of the seven-point agenda depends in part on the role and take of the federal government on mutual support with public private partnership. It also depends on factors such as local empowerment towards an all-inclusive decision-making in governance and democracy, trade and market development, strengthening local institutions for empowerment of rural poor, and combining capacity building for participatory local governance with genuine cooperative enterprise development.

It's clear that both from poverty and a vulnerability perspective, the current financial downturn crisis is having a significant impact on the actualisation of the seven-point agenda. The effect of the downturn makes it impossible for government to provide the much needed funds for the execution of the agenda. There is clearly a need, not only for better budgetary regime but also the avoidance of over-dependence on the international price of crude oil on the nations' budget. This will provide an improved way of preventing the accumulation of large and unsustainable macroeconomic imbalances on the budget

## References

1. Central Bank of Nigeria: Global Financial and Economic Crisis: How Vulnerable is Nigeria? January 2008, 2009.
2. Federal Executive Council: The 2010 Fiscal Strategy Paper and the 2010 - 2012 Medium Term Revenue and Expenditure Frameworks. Federal Government of Nigeria, 2009.
3. FOS: Poverty Profile for Nigeria 1986-1999, FOS Lagos, 1999.
4. Federal Republic of Nigeria: National policy of education. Lagos, Nigeria: Federal Ministry of Information, 1981.

5. IFPRI: Global Food Crisis: Monitoring and Assessing Impact to Inform Policy Response. Washington DC., 2009.
6. IMF: The Implications of the Global Financial Crisis for Low-Income Countries. Washington DC: IMF, 2009a.
7. IMF: World Economic Outlook 2009, April Washington DC: IMF, 2009b.
8. Jickling, M.: Averting Financial Crisis. Washington, DC: Congressional Research Service, 2008.
9. Lustig, N., Walton, M.: Crises and The Poor: A template for Action. World Bank: Washington, DC., 2009.
10. World Bank: Weathering the storm – Economic policy responses to the financial crisis, Washington DC., 2008.
11. World Bank: Lessons from World Bank Research on Financial Crises. World Bank Development Research Group. Policy Research Working paper 4779. Washington, DC: World Bank, 2008a.
12. World Bank: Global Financial Crisis and Implications for Developing Countries. Background Paper for G20 Finance Ministers Meeting. Sao Paulo, Brazil, November 8, 2008b.
13. World Bank: Global Financial Crisis: Responding Today, Securing Tomorrow. Background Paper prepared by the World Bank Group, G20 Summit on Financial Markets and the World Economy, November 15, 2008c.

# The debt analysis of agricultural companies in the Slovak Republic

Silvia Miklovičová<sup>1</sup>, Jana Miklovičová<sup>1</sup>

<sup>1</sup>Slovak Agricultural University, Faculty of economics and management,  
Tr. A. Hlinku 2, 949 76 Nitra, Slovak Republic  
{silvia.miklovicova, jana.miklovicova}@fem.uniag.sk

**Annotation:** In the paper we aimed to bring the debt analysis in the agricultural companies in the Slovak Republic. We analyzed 662 agricultural companies during period 2000 – 2008. We divided the companies according to the regions on the companies operate in the less favoured areas (LFA) and productive areas (PROD). For the debt evaluation we used the indicators of financial analysis ex post – debt indicators. The data were gained from the Information Sheets of Ministry of Agriculture SR which were prepared by The Research Institute of Agricultural and Food Economics. The followed companies make accounting account in the system of the double entry bookkeeping. The information from the financial reports (balance sheet and income sheet) is not enough to show us the frame of financial health of the enterprise. It is needed to elaborate and quantify the indicators of financial analysis which are specialized on the evaluation of present and past aspect and for the prediction of financial health to the future. The structure of own and foreign sources influences the financial stability of the company. The higher share of the equity indicates higher financial independence and stability of the company. It is desirable that enterprises should be into debt, because the foreign capital is cheaper than equity. The agricultural companies in the Slovak Republic had problems with utilizing of the credits because they were not solvent clients for banks. After the entrance of the Slovak Republic to the European Union the situation got better because of assert Common Agricultural Policy. In the presence the agricultural companies are supported by subsidies and subventions particularly from the EU. In the LFAs there is generally lower production costs and returns than in the PROD areas because of the more extensive production. The adverse economic results in the LFAs have been compensated through the system of LFA subsidies.

**Key words:** agricultural companies, financial analysis, debt, debt indicators

**JEL classification:** Q14 - Agricultural Finance

## 1 Introduction

With influence of economical crises in 2009 the price continued decreasing and there was not a commodity which could keep farmers on the market. According to the minister of agriculture Slovakia DOES NOT HAVE long-term conception of agricultural development and agrarian complex and subsidies go by the extensive way. The solution could be the act of parliament and the resort of agricultural prepares the vision intra the Strategies of development of Slovak association till 2030 which was elaborated by Slovak Academy of Sciences. Direct payments decreased in this year too however euro funds might bring new sources to the resort. State`s assistance will be directed at insurance coverage of farmer`s in crop and animal production (50%), at support of utility control (70%) – particularly to the milk sector and at the support of irrigation system.

In 2008 commercial banks in consequence of crises followed very strictly the degree and sales of commodities funds in agricultural companies. In agriculture the current liquidity gently decreased (about 0,04) but the asset debt increased (credit debt about 2,49% and total debt about 0,87%) and the share of the credits on the liabilities increased too (about 5,32%) in the comparison with last year. So the farmers utilized credits from the commercial banks. The

state's guaranty of Slovak guaranty and development bank contributed to this situation. In the credit structure short-term credits were mostly used credits (43%). These credits were used by agricultural companies for financing their activities. More than 50% of total credits comprised of middle-term and long-term credits which were very important part in the invest questions of companies.

## 2 Data and Methodology

In the paper we deal with the debt analyze of agricultural companies operating in the Slovak Republic. We gained the data from the Informational sheets of Ministry of Agricultural which were prepared by The Research Institute of Agricultural and Food Economics in Bratislava. The followed period was 2000 – 2008. We analyzed the collection of 667 agricultural companies. We divided these companies into 2 groups according the regions: the companies operating in less favoured areas (374 companies) and companies operating in productive areas (293 companies). Less favoured areas can be characterized by lower competitiveness of agricultural production caused by worst condition of climate and production. Farms in the LFA reach a lower profit due to increased cost/revenues ratio of agricultural production caused by a shorter vegetation period, poor land productivity and the increased slope [7]. All companies were personal companies or agricultural co-operatives. Every business is connected with the risk creation. We differentiate many types of risks and debts invoke financial risks. The source of the financial risk is all types of borrowed capital. Financial risks are as combination for company's lenders and indirect for the owners [3]. Information about the asset and capital structure gives us accounting sheet – balance sheet. For the debt analyze we will follow the degree and development of equity and debt together (side of liabilities). The company can gain the capital from own sources it is called the equity and from the borrowed sources and then it is the debt. Considerable item of borrowed sources compose short-term liabilities and credits. Debt introduces the reality that the company uses for financing its asset borrowed capital – debt. In real economy of big companies is out of question TO FINANCE ALL their ASSETS from equity or only from debt. The usage of equity IS CAUSING THE DECREASE of return on equity. One of the basic problems of financial management of company is also allocation of capital and the choice of correct structure of financial sources [6].

For the evaluation of present and past financial situation WE used financial analyze of ex post, which shows us the reasons of reached results and its conclusions are used for the next financial management [4]. Decision about the measure of debt depends on many factors such as: dynamic of cash flows, return on asset, interests which the company pays for borrowed capital. From the financial analysis indicators we chose for the evaluation of the financial situation of agricultural companies the debt indicators. According TO many authors the most used debt indicator is the debt ratio INDICATOR:

$$Debt\ ratio = \frac{Debt}{Total\ Capital} \quad (1)$$

The indicator informs about the structure of financial sources, more particularly about the share of debt on the total capital. The highest value of this indicator means the higher risk of lenders. Recommended value should not overpass 50% and value 70% is considered to be excessive in developed market. From the better predicative ability it is needed to split the debt. Then we can better consider the level of the company debt. We distinguish from the time point of view the long-term and short-term debts. According to this classification we divide total debt on long-term and short-term:

$$\text{Long-term indebtedness} = \frac{\text{Reserves} + \text{Long-term Liabilities} + \text{Long-term Credits}}{\text{Total Capital}} \quad (2)$$

This indicator expresses share of long-term debts on total capital. The credits are part of debts so the recommended indicator value should not be lower than 50% (Chajdiak, J. 2004).

$$\text{Short-term indebtedness} = \frac{\text{Short-term Liabilities} + \text{Short-term Credits} + \text{Short-term financial assistance}}{\text{Total Capital}} \quad (3)$$

Short-term indebtedness is labelled too as current indebtedness and gives to ratio items of short-term borrowed capital to total capital.

Equity ratio is additive indicator to total indebtedness. Sum these both indicators should equal 1 but there can be low difference what is caused by not counted accrued liabilities.

$$\text{Equity ratio} = \frac{\text{Equity}}{\text{Total Capital}} \quad (4)$$

Equity ratio expresses share of equity on total capital of company. It is regarded as one of the most important indicator of indebtedness indicators which is used for company financial situation analysis.

Credit carrying capacity expresses a share of used credits (short-term and long-term) and short-term financial loans of company on total capital. Recommended value should not BE lower than 0,5 [4].

$$\text{Credit carrying capacity} = \frac{\text{Credits and financial assistance}}{\text{Total Capital}} \quad (5)$$

Interest coverage predicated of how many times is EBIT higher as interest. If the value of indicator is equal to 1 it means that the company earns money only on the interests and it is only in that case if the earning is equal to 0 [2].

$$\text{Interest Coverage} = \frac{\text{EBIT}}{\text{Interest}} \quad (6)$$

Primary and secondary insolvency gives to ratio short-term liabilities with short-term receivable. This indicator confronts with 1. If it is higher than 1 it is primary insolvency and if it is lower than 1 it is secondary insolvency [8].

$$\text{Insolvency} = \frac{\text{Short-term liabilities}}{\text{Short-term receivables}} \quad (7)$$

Average interest rate gives to ratio interest with credits. Desirable is relation which is expressed by following disparity: ROE > ROA > interest rate [1].

$$\text{Average interest rate} = \frac{\text{Interest}}{\text{Credits and short-term financial assistance}} \quad (8)$$

### 3 Results and Discussion

**Table 1.** Evaluation of debt indicators in LFA companies

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Total Debt	0.3638	0.3596	0.3527	0.3497	0.3522	0.3311	0.3390	0.3420	0.3497
Short-term debt	0.2153	0.2195	0.2160	0.2182	0.2229	0.2048	0.2149	0.2207	0.2239
Long-term debt	0.1485	0.1402	0.1367	0.1316	0.1293	0.1263	0.1241	0.1193	0.1258
Equity ratio	0.6295	0.6110	0.6045	0.6043	0.6044	0.6313	0.6146	0.6485	0.6023
Insolvency	2.4340	2.3243	2.4839	2.8754	2.9309	2.8176	2.3376	2.1985	2.3100
Interest coverage	1.1098	-2.8558	1.9154	1.8801	-6.6653	3.7463	-0.7566	0.4958	-0.1325
Credit carrying capacity	0.0487	0.0474	0.0579	0.0586	0.0588	0.0681	0.0904	0.0821	0.0911
Average interest rate	0.1207	0.1031	0.0747	0.1229	0.1082	0.0820	0.1997	0.1793	0.1842

Source: own calculation and Information sheets MA SR

In the table 1 there are results of chosen indicators of debt for companies situated in LFA. The results for followed period are weighted arithmetic averages of indicator values. Valuation of total indebtedness in companies situated in LFA reached the highest level in 2000 and it was 36,38%. This value was influenced by short-term debts (short-term indebtedness). The indicator of total debt decreased till 2004. In this year Slovak republic entered into the European Union and farmers did not get the direct payments in that amount as they expected. It IS characterized by increasing of total indebtedness on 35,22%. We can evaluate the indicator of total indebtedness positively because in whole monitored period this indicator was under the recommended value of 50%. The highest share on this indicator had short-term indebtedness what proofs, that companies financed their activities mainly from short-term capital. The indicator was in the range from 20,5% till 22,39%. The equity ratio double exceeded the value of total indebtedness for the period of monitored years. We can evaluate this as positive fact, because the agricultural companies used mainly equity for financing. The share of equity on total capital was more than 60%. Insolvency indicator reached results over 2 in whole followed period what means that the companies in LFA were in the primary insolvency. The value of short-term liabilities exceeded the value of short-term receivables. Interest coverage had unsteady trend. The development of this indicator influenced earnings before taxes. The companies used short-terms and long-terms credits too also their share on the total capital was not so high. It found in the range from 4% till 9%. Average interest rate composed of the share of interest on the debt. It is average rate which the companies should pay for borrowed capital.



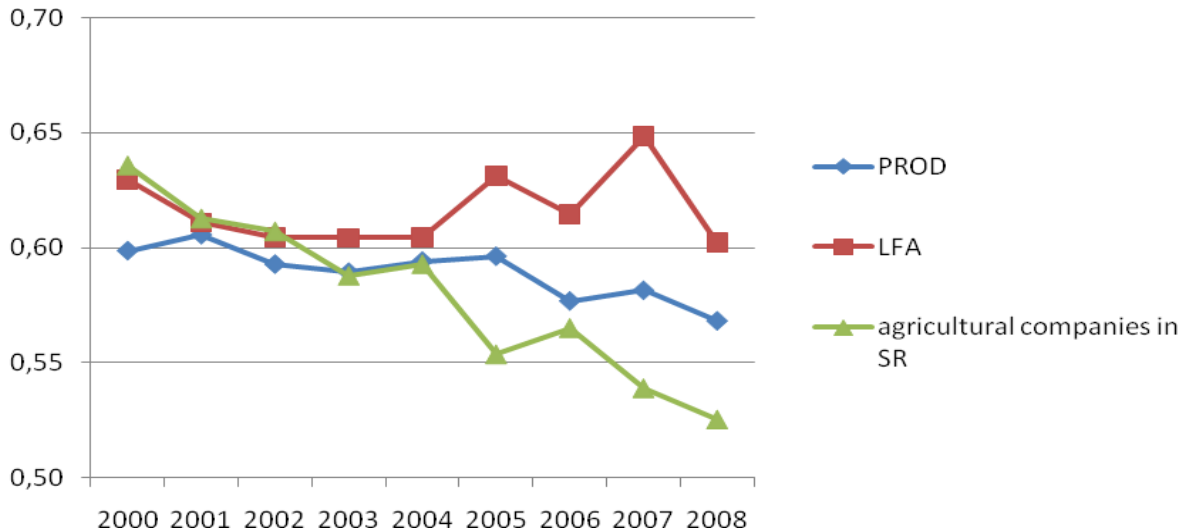
**Table 2.** Evaluation of debt indicators in PROD companies

Indicators/Years	2000	2001	2002	2003	2004	2005	2006	2007	2008
Total Debt	0.3854	0.3700	0.3677	0.3710	0.3728	0.3682	0.3715	0.3801	0.3945
Short-term debt	0.2270	0.2273	0.2387	0.2455	0.2477	0.2525	0.2549	0.2712	0.2587
Long-term debt	0.1585	0.1427	0.1290	0.1255	0.1251	0.1157	0.1166	0.1089	0.1358
Equity ratio	0.5986	0.6055	0.5928	0.5893	0.5941	0.5962	0.5769	0.5815	0.5683
Insolvency	1.3558	1.8994	2.0937	2.6197	2.4763	1.9401	2.2342	1.8462	1.7281
Interest coverage	7.8661	4.3886	8.8834	8.5576	-2.4531	6.1830	2.9595	3.4866	3.3627
Credit carrying capacity	0.0669	0.0532	0.0495	0.0615	0.0566	0.0596	0.0683	0.0871	0.0843
Average interest rate	0.1142	0.0895	0.0769	0.0828	0.1714	0.2494	0.2177	0.1992	0.0204

Source: own calculation and Informational Sheets of MA SR

The table 2 informs about development of debt indicators for companies situated in PROD areas. The results are represented by weighted arithmetic average of indicator values. Total indebtedness of companies situated in PROD was higher in the followed period in comparison with companies in LFA. The agricultural companies had easier access to credits. The value of the indicator got around from 37% till 39%. Alike by the LFA companies the value of total indebtedness was influenced by short-term indebtedness (23 – 25%). We can evaluate positively the development of the indicator. During 2000 – 2008 the indicator was under the recommended value. Calculation showed that equity dominated in financing of companies. On the structure of total capital was the share of equity from 58% till 61%. Insolvency of agricultural companies in PROD areas showed better values in comparison with companies in LFA. But the companies were in the primary insolvency because of value of the indicator more than 1. The indicator interest coverage reached better values of indicator for companies in PROD areas than in LFA. Most of companies operated with earnings. The year 2004 showed as adverse year which negative influenced the companies in PROD. According TO the calculation short-term and long-term indebtedness, we can see that the companies used mainly short-term credits. Again the total share of credits was not so high on the total capital. The share of interest on total credits was in the range from 8% till 25%.

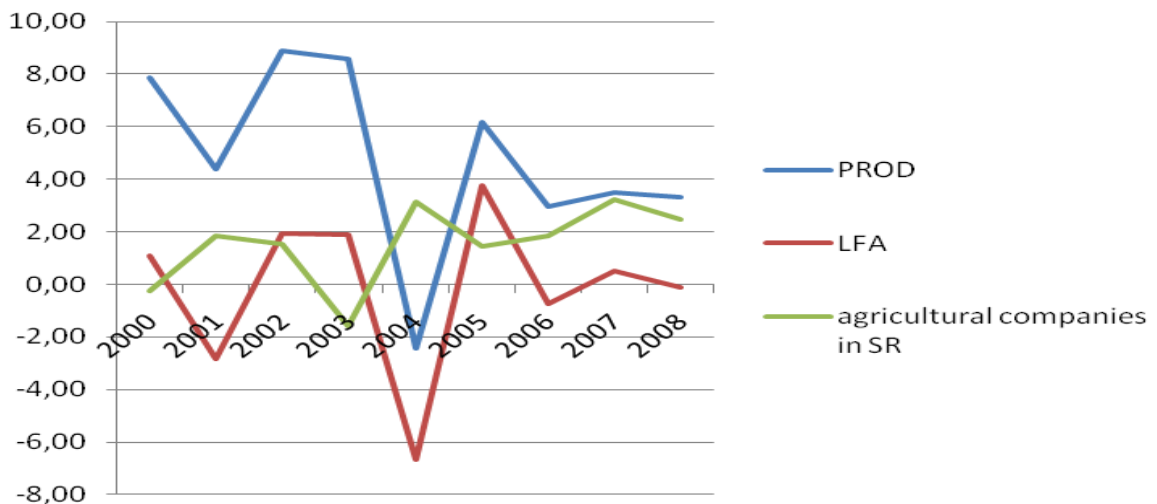
There are major differences between most of the monitored indicators for the economic results achieved per hectare of agricultural land in the productive and less favoured areas. The highest economic performance of agriculture measured in the terms of economic results was recorded in the regions in Western Slovakia, with a higher share of productive areas, i.e. better natural conditions and the lowest value was recorded in the regions of Central and Eastern Slovakia, with a higher share of less favoured areas – worse natural condition [5].



**Figure 1.** Development of indicator Equity ratio

In the figure 1 there are results of indicator equity ratio. Compared the development of the indicators for companies in LFA and PROD areas with total agricultural companies (juristic companies). The data for these companies prepares The Research Institute of Economics and Food in Bratislava. According the figure we can say that the development of the indicator equity ratio is quite similar in PROD and LFA. Data for agricultural companies in the Slovak republic we reached from Green Report of Ministry of Agricultural [9]. According these results had equity ratio of agricultural companies decreasing trend.

Results of indicator interest coverage shows figure 2. The negative value of this indicator was reached for companies in both natural condition only in 2004. It was influenced by reached loss. The trend of interest coverage is similar in LFA and PROD too.



**Figure 2.** Development of indicator interest coverage

## 4 Conclusions

The position of agrarian resort in the Slovak Republic is even more difficult because since Slovakia entered to the European Union till 2007, our country had not received (like other countries) maximal payments because, in 2004 – 2006 the state did not use the possibility of their financial national tools exploitation (30% usage only). This caused decrease of the competitiveness of agricultural companies. Without payments from public funds the majority of agricultural companies and agricultural production departments should be not profitable. The reason is not their un-effective production but LACK of support policy and unequal statement of agrarian producers to their commerce partners. The economical crisis these tendencies sharpened more and began to deepen the interfirm difference of agricultural companies.

Considerable financial source of operating activity of agricultural companies are credits from commercial banks which particularly from 2004 showed the interest about agricultural companies. This is connected with European subsidies. In the Slovak agriculture has been invested more than in average of the national economy. Inflow of financial sources from European funds caused increase of credits. These credits were used for development of investment activities. In the last years farmers bought from these financial sources: machinery, conveyor and less finance flowed to buildings and constructions. Decrease was remarked by breeding and draught animals.

The value of the total debt was till 40% in the companies in both natural conditions. Around 150 – 170 companies in LFA were over the reached average value of indicator total debt in the monitored period. And in the PROD areas there were 38% of companies over averaged value of total debt.

## References

1. Alexy, J.: Financial and economic analyze. IRIS, 2005, Bratislava. ISBN 80-89018-90-4.
2. Dudová, R., Janok, M., Lazar, J., Nejezchleba, M.: Financial analysis of company. MIKA-Consult, 1995, Bratislava. ISBN 80-967295-0-0.
3. Grünwald, R., Holečková, J.: Financial analyze and planning of the company. EKOPRESS, 2007, Praha. ISBN 978-80-86929-26-2.
4. Gurčík, Ľ.: Business analyze and controlling. SPU, 2004, Nitra. ISBN 80-8069-449-4.
5. Chrastinová, Z.: Economic differentiation in Slovak agriculture. In: Agricultural Economics – Czech, 54, 2008. p. 536 – 545 ISSN 0139-570X.
6. Růčková, P.: Financial analyze. 2. up-dated edition. Grada Publishing, 2008, Praha. ISBN 978-80-247-2481-2.
7. Střeleček, F., Lososová, J., Zdeněk, R.: Economic results of agricultural holdings in less favoured areas. In: Agricultural economics – Czech, 54, 2008. p. 510 – 520. ISSN 0139-570X.
8. Zalai, K. a kol.: Financial-economic analyze of the company. SPRINT vfra, 2008, Bratislava. ISBN 978-80-89085-99-6.
9. The Green Report of the Agriculture and Food in the Slovak Republic 2001 – 2009.



# The Experience of Poland in Implementing Performance Budgeting in Central Government Regional Administration

Jarosław Olejniczak<sup>1</sup>, Dorota Bednarska-Olejniczak<sup>1</sup>

<sup>1</sup>Wrocław University of Economics,  
ul. Komandorska 118/120, 53-345 Wrocław, Polska  
{jaroslaw.olejniczak, dorota.olejniczak}@ue.wroc.pl

**Annotation:** Performance budgeting is a concept which has been implemented in a variety of countries for the last thirty years. The experience of Poland in this respect dates back to 2006. On the level of regional government budget, the first attempts at performance budgeting were made in 2007, while preparing a budget bill for 2008.

A vast spectrum of government administration tasks implemented by voivodes, together with the evolution of the concept of shape and content involving performance budgeting led to subsequent years modifications in voivodships' performance budgeting. The years of 2009 and 2010 were the time for redefining the structure and scale of tasks, which was combined with the attempts to limit the range of voivodes' level of authority. There were also attempts towards integration of voivodes' tasks with those of other budget resources' administrators, introduced in 2009.

The analysis of the country budget from 2008 to 2010 proves that the structure of tasks implemented by voivodes has changed. It reflects a tendency to neglect too far-fetched minuteness, as suggested by voivodes in the earlier stages of budget forming. At the same time, there are certain functions of the national administration, for which voivodes' expenses are vital, and there are tasks requiring only a slight participation in this respect. It is also crucial that within the four years a system of indicators facilitating negotiations with local self governments responsible for the tasks was developed.

The last, but equally important issue discussed in this report is the problem of implementation of information policy concerning performance budgeting. This author's analysis indicates the need to develop activities aimed at informing both the parties (institutions and organizations) involved in budget expenditure, and the general public. The aim is to make both of these groups aware of the hierarchy of goals on national scale, as well as provide information on budget apportionment for individual tasks. words.

**Key words:** performance budgeting, state budget, government information policy, agriculture

**JEL classification:** H5, H6, H7

## 1 Introduction

The need for effective management of public resources is not a new issue. The first country to introduce methods of systemic implementation of performance measurements (effectiveness) of national administration tasks is the United States. According to oft-cited sources [see: 1; 6], this concept was implemented in the form of the 'first Hoover Commission'. Williams [10] in his analyses suggests, however, that the earliest attempts at new approach to formulation of public budget may be found as early as 1920-30, as well as in subsequent reforms of "New York Bureau of Municipal Research". The evolution of performance budgeting approach is typically associated with consecutive concepts implemented in The US administration over the last 60 years – from performance-based budget, through zero-base budgeting, up to the 'new' performance budgeting. It may be important to note here that during each of the above phases, certain deficiencies and problems were found, resulting in continuous changes and

improvements [5; 8]. At the same time, part of the academic community expressed their skepticism toward the novel approach to budget construction – eg. Wildavski [3].

The concept of performance budgeting is not easily and explicitly defined. This results from the fact that different authors adopt different – often widely disparate or overly generalized - definitions. The most widely accepted definition is the one postulated by OECD, expressing performance budgeting as a form of budgeting that relates funds allocated to measurable results [8, pp. 26]. Table 1 presents the most important categories of performance budgeting, in terms of their approach to the three fundamental criteria

**Table 1.** Performance budgeting categories

Type	Linkage between performance information and funding	Planned or actual performance	Main purpose in the budget process
Presentational	No link	Performance targets and performance results	Accountability
Performance-informed budgeting	Loose/indirect link	Performance and/or results	Planning targets and/or performance accountability
Direct/formula performance budgeting	Tight/direct link	Performance results	Resource allocation and accountability

Source: [8, pp. 21]

In Polish budgetary practice, the most widely accepted approach is task budgeting (based on the definition by S. Shick) – a method of budgeting, in which the expenditures are represented in the form of tasks, each with individually formulated goals and measures. This method is based on the assumption that each increase of planned expenses for a given task must result in a measurable increase of production or results [2, pp. 16]. Professor T. Lubińska, author of the initial budgetary reform in Poland, defines task budgeting as a method of managing public resources through appropriately defined and structured tasks, designed to reach predefined results, as measured by a predefined set of measures [4, pp. 41]. As such, this type of performance budgeting is designed to (firstly) identify the most important tasks required to reach a particular result, and (secondly) to verify the results using a predefined set of measures.

## 2 Data and Methodology

This paper aims to analyze the changes within performance budgeting construction in Poland, as related to part 85: voivodship budget. The study covers the period of 2008-2010 – i.e. between the introduction of performance budgeting on the level of national administration up to the present. Research was based on data published by Polish Ministry of Finance for the years 2008-2010, together with statutory instruments issued by the Minister of Finance, as applied to budget procedures for the period under study. Sixteen regional (voivodeship) Internet sites of the Public Information Bulletin were scrutinized for data on application of state performance budgeting structure on voivodship level. Changes were also analyzed within the area of state function definitions in the period under study – particularly for the years of 2008 and 2009. The research involved also the analysis of performance measures defined for the purpose of task evaluation in all areas and sub-areas of the state functions implemented on the level of individual voivodships.

### 3 Results

The voivode, as one of the regional administration functions responsible for implementing the tasks of local government representation under provisions of the Act on state administration in voivodships, acts in the capacity of Council of Ministers representative in the region, head of combined government administration, supervisor of territorial self-government units, organ of the higher order in relation to administrative law and regional State Treasury representative [7]. As such, the voivode is equipped with the power to use public resources allocated under budgetary provisions of part 85. – voivodship budget.

Polish experience in performance budgeting in state administration (state budget) reaches back to the year 2006. At the level of territorial government administration (voivodships), first attempts at introducing performance budgeting can be observed in the year 2007, and are contained in the draft of 2008 Budget Act. The wide scope of state administration tasks appointed to voivodes, as well as the evolution of the concept and form of performance budgeting on state level have resulted in significant changes and updates to the construction of voivodship budgets. These changes were reflected in the provisions of part 85. in the form of thirty four tasks formulated in the justification to the Budget Act of 2008. The structure of tasks reflected the distinctive areas of competence defined for combined government administration on voivodship level [Table 2].

The next step in the evolution of performance budgeting in state administration was taken in 2009 when the tasks of individual public bodies were aggregated into functions. Public bodies define sets of measures to gauge the accomplishment of each function's objectives. The task-oriented plan of expenses for the years 2009-2011 was structured into 22 basic functions of the state administration for the purpose of setting budget allocation figures[11]. This aggregation was designed to offer access to transparent and ordered information on the overall structure of funds allocated to individual functions of the basic set of state administration tasks. It was assumed that both the function itself and the particular task involved may be implemented on various levels and by different public bodies. In the period of 2009-2010, the voivodes were assigned 18 out of total 22 functions financed from the state budget. This structure is presented in columns III and IV of Table 2. Table 2 presents also the areas of performance budgeting as set for the year 2008, against the corresponding areas for the period 2009-2010.

**Table 2.** Voivode's budget in performance budgeting structure in 2008 and after 2009.

No. Structure of tasks in 2008		No. Corresponding functions after 2009	
I	II	III	IV
5	Civil defense;	2.	Public security and public order
6	Crisis management system;		
7	Development of rescue services and firefight units;		
22	Quality of education;	3.	National activities in education, care and welfare
23	Educational, child-care, prophylactic and social		
14	care activities; Medical education		
31	Supervision of territorial administration units;	4.	State finance management
32	Public budget revenues from fines and punitive measures		
17	Property management	5.	Protection of State Treasury rights and interests

27 Supervision of legal and diligent conduct of economic entities in production, trade and services; consumer right protection	6. Coordination of national economic policy
16 Geodesic and cartography services;	7. Spatial administration, support for construction and housing
19 Spatial administration and architectural-construction administration;	
21 Construction supervision activities	8. Physical culture and sports
33 Other activities	9. Culture and protection of national heritage
26 Culture and protection of national historic heritage	11. Military safety and protection of national borders
28 National defenses	12. Environmental protection and care
24 Environment protection	13. Social security and family policy
25 Protection of natural resources	14. Labor market
1 Social services and integration	
2 Family policy	16. Civic rights and duties
3 Labor market	17. Sustainable development of national economy
4 Social and labor market activation for disabled	19. Construction and maintenance of transportation infrastructure
29 Civic duties	20. Health care organization and health care policy
30 Regional development policy	
20 Road transport safety	21. Agricultural and fishing policy
12 Public health care organization and health care policies	
13 Health insurance and refinancing health care services	
15 Supervision of trade and quality of medicaments and medical equipment	
8 Support for agriculture and rural development;	
9 Protection of health and well-being of animals, public veterinary services;	
10 Protection of plants and seed;	
11 Supervision of quality of agricultural products and foods in production and trade, supervision of agricultural markets and mechanisms of Joint Agricultural Policy	
34 Formation and coordination of political activities	22. Strategic planning, administrative and technical support delegated to other functions
18 Transportation infrastructure activities	

Source: Own research

Budgets delegated to voivodes as territorial representatives of state administration participate in the task of implementing state administration functions only to a small degree. In the years 2009 and 2010, voivodes' budget expenses represented between 6 and 7% of the state budget expenses, overall. At the same time, one can observe a notable concentration of these expenses within four basic functions of state administration, namely: 2-Public security and public order, 13-Social services and integration, 20- Health care organization and health care policy, and 22- Strategic planning, administrative and technical support. The largest bulk of voivodship budget, amounting to over 60% of total expense at that level, is designated to tasks of function 13. In particular, resources are directed to support socially impaired and



families with financial problems. Another significant expense is the support for families devoid of legally awarded alimony (in those cases when such alimony cannot be collected by bailiff). It must be noted that this type of expenses constitutes over 3% of total state budget expenditure. Evaluating the role of voivodship expenses in respect to individual functions, it must also be noted that regional budget expenses play a crucial role in respect to functions 5 and 16. In the case of function 5, they represent more than 60% of total expenditure per function (in the year 2010), mainly as a consequence of State Treasury supervision tasks being delegated to regional administration, and in relation to their duties in respect to satisfaction of legal claims of citizens. As for the function 16, the expenses from voivodes' budget were directed to such civic duty tasks as maintenance of public records, document issuance, granting Polish citizenship, as well as supervision of subordinate units. Function 22 - Strategic planning, administrative and technical support – is a function shared between multiple recipients of local budget. This function involves various expenses related to cost of service of local administration units. At the level of voivodships, this part of expenses (and its large share in the total state budget expenditure) is determined mainly by the number of voivodships in Polish administrative structure (16).

**Table 3.** The most important relations of voivodship expenses in performance budgeting system (in %)

Function No. *	The share of function expenses in the voivodship expenses overall		The share of voivodship expenses per function		Share of function in total budget expenditures		Share of voivodship in total budget expenditures	
	II	III	IV	V	VI	VII	VIII	IX
I	2009	2010	2009	2010	2009	2010	2009	2010
2	11.94	9.75	14.76	15.11	4.89	4.54	0.72	0.69
3	1.65	0.77	2.43	1.25	4.11	4.36	0.10	0.05
4	0.39	0.10	0.06	0.02	38.41	39.77	0.02	0.01
5	0.40	0.57	54.32	64.11	0.04	0.06	0.02	0.04
6	0.56	0.45	4.10	4.36	0.83	0.72	0.03	0.03
7	1.42	1.37	19.05	24.77	0.45	0.39	0.09	0.10
8	0.00	0.00	0.05	0.16	0.24	0.16	0.00	0.00
9	0.45	0.41	5.76	6.97	0.47	0.41	0.03	0.03
11	0.26	0.18	0.28	0.19	5.73	6.48	0.02	0.01
12	1.03	0.74	19.70	16.73	0.32	0.31	0.06	0.05
13	63.47	60.70	15.52	15.13	24.75	28.22	3.84	4.27
14	0.08	0.07	1.06	1.46	0.46	0.34	0.00	0.01
16	2.17	1.95	36.34	40.96	0.36	0.34	0.13	0.14
17	3.30	0.18	12.50	1.85	1.60	0.67	0.20	0.01
19	2.35	2.05	3.19	5.79	4.45	2.50	0.14	0.14
20	3.73	8.93	16.60	29.22	1.36	2.15	0.23	0.63
21	4.39	2.45	4.93	10.25	5.38	1.68	0.27	0.17
22	2.39	9.33	16.60	38.02	0.87	1.73	0.14	0.66
Others	-	-	-	-	5.72	5.18	-	-
	100.00	100.00	6.05	7.04	100.0	100.00	6.05	7.04

\* function numbered as in Table 2

Within the framework of performance budgeting, each task and function is associated with a measure designed to reflect the performance of activities undertaken in relation to the task at hand. Voivodship budgets do not utilize aggregated target values of individual performance measures at state budget level. Only the basic formula for each measure is defined. It must be

noted here that the term of measure includes both actual measures and general indexes [for more on this, see 8]. In the case of voivodship budgets, the most frequently used measures are product measures and effectiveness measures. This is related to the formulation of activities, accentuating the supervisory functions of individual voivodes. For the tasks defined under 18 functions, 63 measures were defined, mostly of index type. Only four of these measures can be described as qualitative. The most typical construct is, on the one hand, a number of individual occurrences (measure of product – such as the number of inspections performed) and, on the other hand, index-type definition (measure of effectiveness) – the latter, for the most part, reflects the share of particular effect in the total number of related occurrences (such as the number of invalidated decisions in relation to the total number of decisions issued). Only in two cases, measures involve cost effectiveness – one reflecting the cost of office functioning (in Polish zlotys (PLN) per square meter), the other reflecting the cost of administering State Treasury properties in relation to earnings. This type of measure construct at present provides only informational value and, as such, is only supplementary in shaping future decisions on budget allocation.

One of the key issues of voivodes' budget is function 21. Basing on this function we can demonstrate the effects of 2008-2010 budget changes as well as the evolution of approach to the measures. As it was mentioned it was assumed that both the function itself and the particular task involved may be implemented on various levels and by different public bodies. Function 21 divides into 9 tasks – but only 7 of them consider voivodships' budgets (before 2009 it was only 4). Former tasks were splitted - new tasks appeared for example - relating the ecological economy or the realization of Common Agricultural Policy (CAP). The number of measures was limited. Their modification was conducted also from measure of product – such as the number of conferences, courses etc. - to the share of particular effect in the total number of related occurrences (such as the percentage of agricultural farms controlled on specific area). New measures are considered by the government to be more objective.

Despite the importance of performance budgeting in the informational policy of national government, detailed information on the solution being introduced is not easily accessible nor sufficiently propagated. All the information on performance budgeting is accessible directly from the Ministry of Finance and presented on ministerial web page. However, this data is not sufficiently aggregated to national level. As such, it does not reflect the performance of individual voivodships per function. More detailed picture can be produced by analyzing the budgets of individual voivodships. Basic financial data on voivodship budgets is obligatorily presented on the Internet Public Information Bulletins (PIB) of each voivodship. However, the analysis of individual PIBs shows that public access to information on performance budgeting per voivodship is not sufficiently detailed. Only one of the sixteen PIBs presents data on 2009 performance budgeting, and it is not updated for the year 2010. This lack of information is in striking contrast with clarity and transparency of public finances postulated by the government.

## **4 Conclusions**

Voivodship budgets are the most elaborate and complicated elements of the ongoing process of performance budgeting introduction, due mainly to the variety and complexity of tasks involved. This presents problems in respect to construction of limited number of measures that would help provide a complete picture of voivodes' activities. Many of these tasks are supervisory/coordination in nature, which presents additional problems in measuring their effectiveness and contributes, in effect, to widespread use of product measures. At the same time, relative insignificance of these tasks in the overall structure of state administration functions does not offer enough motivation for public administration to modify and update

these measures. In the light of data presented herein, one can safely assume that voivodship budget structure, as yet, has not reached the level referred to as performance-informed budgeting, which is mainly due to lack of actual correlation between measure-generated information and the process of planning future budget expenses. From the viewpoint of individual citizen, it seems advisable to postulate propagation of budget expenses per task at the level of individual voivodships, due to specificity of such tasks and varied intensity of task-related activities between regions. This may also prove useful for the purpose of comparing voivodes' activities in respect to implementation of tasks delegated to them by central government. It must be noted that, in the case of voivodships, there is considerable potential for diversification of objectives and measures related to particular activities (ie. at the lowest level of performance-based classification). Consequently, those objectives, together with their related measures at voivodship level may prove desirable as a source of information on actual performance of voivodes in respect to tasks delegated to them by central government.

Due to the short period of time, there is no evidence of positive effects of performance budgeting in Poland. But, as it was mentioned, this is just a beginning and we hope that performance budget will have a positive impact on public finance in Poland.

## References

1. Diamond J.: Performance Budgeting: Managing the Reform Process, International Monetary Fund, November 2001, [www.imf.org](http://www.imf.org) (access: 12.09.2009).
2. [http://www.mf.gov.pl/\\_files\\_/budzet\\_zadaniowy/e-szkolenia/e\\_-\\_szkolenia\\_strategiczna.pdf](http://www.mf.gov.pl/_files_/budzet_zadaniowy/e-szkolenia/e_-_szkolenia_strategiczna.pdf) (access 1.05.2010).
3. Jones L .R.: Wildavsky on budget reform, Policy Sciences, No. 29, Kluwer Academic Publishers, Netherlands 1996.
4. Lubińska T.: Nowe Zarządzanie Publiczne, Difin, Warszawa 2009, ISBN 978-83-7251-974-0.
5. Lu Y., Willoughby K. G.: Modeling Performance Budgeting in the States: What Matters to the Integration of Performance with Budgeting Paper presented at the 2009 ABFM Conference in Washington, D.C., September 24, 2009.
6. Nguyen H. P.: Performance budgeting: Its rise and fall, Maxwell Review, Maxwell, Maxwell School of Citizenship and public affairs, Syracuse University MPRA Paper No. 9345, November 2007.
7. Olejniczak J.: Modern Performance Budgeting in Field Central Government Administration in Poland Proceedings of the Agrarian Perspectives Conference 2007. Prague 2008. ISBN 978-80-213-1813-7.
8. Performance Budgeting In Oecd Countries, OECD 2007, ISBN 978-92-64-03403-7.
9. Robinson M., Brumby J.: Does Performance Budgeting Work? An Analytical Review of the Empirical Literature, Fiscal Affairs Department, IMF, 2005 [www.imf.org](http://www.imf.org) (access: 1.12.2008).
10. Williams D. W.: Performance Measurement and Performance budgeting in the United States in the 1950s and 1960s, , Conference of the European Group of Public Administration 1-4 September 2004 Ljubljana, Slovenia [http://webh01.ua.ac.be/pubsector/ljubljana/Williams\\_paper.pdf](http://webh01.ua.ac.be/pubsector/ljubljana/Williams_paper.pdf) (access:10.09.2009).
11. [www.mf.gov.pl/index.php?const=5&dzial=1803&wysw=4&sub=sub2](http://www.mf.gov.pl/index.php?const=5&dzial=1803&wysw=4&sub=sub2) (access:20.04.2010)



# Oligopoly competition on food market – theory and practice

Severová Lucie<sup>1</sup>, Šrédľ Karel<sup>1</sup>

<sup>1</sup>Department of Economic Theories, Faculty of Economics and Management,  
Czech University of Life Sciences Prague,  
Kamýcká 129, 165 21 Prague 6 Suchbát, Czech Republic  
{severova, sredl}@pef.czu.cz

**Annotation:** Oligopoly can be defined as a market model of imperfect competition type, assuming the existence of only a few companies in a sector or industry, from which at least some have a significant market share and can therefore influence the production prices on the market. When behaving oligopolistically, an offering company influences the market demand and offer of the entire sector and therefore, while choosing an offer on the market, it has to count – besides the demand – also with the reaction of its competitor to its choice; at the same time it itself reacts to the choice of its competitors. The text of this article deals with oligopolistic competition on the food market in terms of behaviour of grocery producers and with the impact of this competition upon market competition in the sector. First, it analyzes agreements on common cooperation and procedure, when cartel market structure originates, using an example of baking companies that agreed on rising the prices of bread, pastry and confectionery by their customers. It also analyzes similar examples of contracting (collusive) oligopoly on the market with products in agrarian sector. The goal of this paper is to find out whether collusive oligopolies arise in the food-products market. We also investigate in what scale the cartel agreements appear in this sector and whether they can significantly influence the price level of food products and therefore have an important impact on consumer demand in the Czech Republic. The main research methods used are: the method of description (a description of single cases of cartel agreements) and mathematical methods in economy (used for modelling of the maximum profit of a collusive oligopoly). We show that although a substantial part of agriculture production arises outside of the oligopolistic structures (in conditions of monopolistic competition among small agricultural producers), trade in these products mainly occurs within oligopolistic sectors.

**Key words:** Oligopoly competition, food market, cartel, baking companies, agro production.

**JEL classification:** D43

## 1 Introduction

Oligopoly can be defined as a market model of imperfect competition type, assuming the existence of only a few companies in a sector or industry, from which at least some have a significant market share and can therefore affect the production prices on the market.

The basic theoretic model of the oligopoly competition behaviour in the conditions of post-industrial society introduced by Samuelson [4] is a basis for firm's oligopoly behaviour investigation for most of the mainstream economists. The development of this theory of oligopoly into the concrete market sector conditions is determined especially by Varian's microeconomic analysis of an oligopoly sector; it is particularly focused on the definition of a product group. Both the neoclassic and the neokeynesian economic theories (Schiller) note not only a differently defined types of collusive oligopoly, oligopoly with a dominant firm or duopoly models, but they also underline the need of government control over the oligopoly's market behaviour, even if there are notable differences in the particular approaches. The price competition in oligopoly has other forms than a cartel. Janssen and Roy state the following: "As the prior probability of high quality converges to zero, the fully revealing outcomes converge to competitive marginal cost pricing (the Bertrand outcome). In contrast, when the prior probability of quality being high converges to one, market power of high quality firms

(sustained by out-of-equilibrium beliefs) may persist and the limiting outcome may not be the competitive Bertrand outcome (even though incomplete information vanishes in the limit). [3] Kahneman in his papers [7] a [8] deals with the question of subjects' behaviour on risky markets, that is under the conditions of risk and uncertainty; that is how he introduces the behaviourism in the economic thinking.

Many models of oligopoly are found while studying oligopolistic structures. These models differ from one another mostly in the nature of the competitive companies' behaviour. Despite of this (according to Samuelson, 2004), these different models agree in several assumptions:

- *The existence of a small number of companies in a sector*

It is usually about big companies with deciding part in the offer of a sector. Some models describe only behaviour of two companies on a monitored market (duopoly), others describe several companies of the same power (cartel), still others assume that one of the companies has a dominant position on the market, etc.

- *The nature of production*

In oligopolistic sectors, companies can make either homogeneous or heterogeneous (substitute) production. If the companies create goods close to the homogeneous type, we talk about homogeneous (or clean) oligopoly. In such a sector, competition creates a tendency towards united and balanced market price of goods, because there is an especially strong dependence of companies on one another, and therefore even the slightest change in price by one of them significantly affects the behaviour of other companies. Often mentioned example of homogeneous oligopoly is oligopolistic competition in production of agricultural crops (corn, bananas, coffee, etc.), where several large companies have almost identical production.

If companies in oligopoly create differentiated goods and services that are substitute to one another, we talk about heterogeneous oligopoly with differentiated market prices. Differences among products of individual oligopolistic companies are usually not significant, we talk about close substitutes. Sectors of production of meat and meat products, pastry, confectionery, etc. can be named as examples of producing differentiated products in grocery industry. At the same time, competition exists both in price and non-price forms, represented by product innovations and advertisement. In connection with analysis of heterogeneous oligopoly, where output is differentiated, a problem of delimiting market of a given product arises. Should we for example analyze „pastry market“ or individual markets based on the kind of pastry? Concept of product line helps solve this problem; or one can accept Varian definition of market, or sector, which considers sector as „an aggregate of companies making products that are regarded by consumers as close substitutes.“ [9]

- *The possibility of each company in a sector to make real estimates regarding the reactions and actions of competitors*

This possibility is given by the fact that - contrary to a monopolistic competition – there are only a few big companies in a sector, and it relates to the fact that each company is able to affect the change in overall offer of the sector by changes in its own offer. If a competitor is to react to a change in market price (market amount) of a company, this change must affect the change of his market price and market amount. This forces him into a retaliatory action.

- *Limitation (barriers) of entry of new companies into a sector*

It allows a longer-lasting existence of several big companies in a sector. Typical forms of barriers against entry of new companies into an oligopolistic sector are relatively high costs of capital needed to start a new company, patent limitations and preference of consumers in relation to existing companies and arrangements or agreements among existing companies. If economy of scale constitutes the barrier against entry into an oligopolistic sector, then each company attempting entry into the sector should reach similarly low average costs in

production as already existing companies in the sector. However, part of the barriers is not invincible; we can therefore assume a situation when after overcoming the mentioned difficulties, other companies enter an oligopolistic sector.

## 1.1 Literature overview

### Model of Collusive oligopoly

Collusive oligopoly is an oligopolistic market model with several companies producing the same or similar products (services) and acting on a market as a monopoly. Agreements are often made among oligopolistic companies with significant part on a market; these agreements on cooperation and common action then give rise to a market structure called **cartel**.

Cartel agreements can be made:

- about the same (monopolistic) prices of production,
- about size of production (quantity quota),
- about territorial division of a market.

During the formation cartels tend to raise prices and/or restrict quantities. Assuming fixed capacities in the short run, a low utilization rate of capacities of the cartel members is expected. [10] Cartels often originate especially among strong companies in some oligopolized sectors of national economies, but on the world market as well (for example OPEC – Organization of Petroleum Exporting Countries, which is an example of market situation, where national economies, not companies act oligopolistically). The purpose of cartel is the effort to maximize overall profit of a given sector.

Common profit of cartel can be expressed as the difference between overall profits of cartel ( $TR_k$ ) and the sum of overall costs of all its members:

$$\pi_k = TR_k - [TC_1(q_1) + TC_2(q_2) + TC_3(q_3) \dots + TC_n(q_n)] = \quad (1)$$

$$= P \cdot Q - [TC_1(q_1) + TC_2(q_2) + TC_3(q_3) \dots + TC_n(q_n)] \quad (2)$$

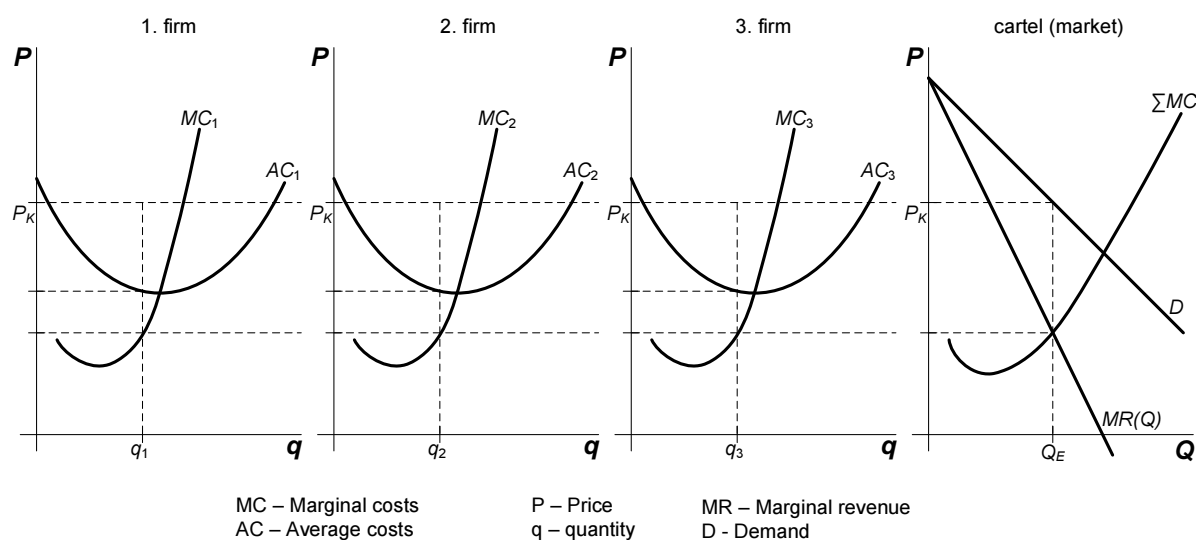
The condition of maximizing common profit of cartel is expressed by the equation:

$$\frac{\delta \pi_k}{\delta q_i} = MR(Q) - MC_i(q_i) = 0 \quad (3)$$

Then it holds:

$$MR(Q) = MC_i(q_i) \quad (4)$$

In our model of collusive oligopoly, we will assume that there are three companies in a sector and have the same cost curves and the same price strategy. Optimal output of a collusive oligopoly in a simplified example of only three companies in a sector is shown in this graph:



**Figure 1.** Optimal output of collusive oligopoly. [4]

Marginal revenue of the entire cartel  $MR(Q)$  is derived from market demand function for production in sector  $D$ . Curve  $\Sigma MC$  originates as horizontal sum of curves of long-term marginal costs of three companies in the cartel. At the point of intersection of curve  $MC$  and curve  $MR(Q)$ , this equality is true:

$$MR(Q) = MC_1(q_1) = MC_2(q_2) = MC_3(q_3) \quad (5)$$

and so the optimal output of cartel will be  $Q_E$ .

Profit of the cartel will be maximal when making such production ( $Q$ ), with which an increase in overall profit of the cartel [marginal revenue  $MR(Q)$ ] is of the same size as an increase in overall costs of each of the three companies in the cartel [marginal costs  $MC_i(q_i)$ ].

The level of price of production of the cartel will be  $P_k$  and its common level is respected by all three companies while doing their sales.

Certain problems can come up when organizing an oligopolistic sector by the form of cartel. If companies of the cartel act in agreement they create a market situation close to monopoly. Companies set high prices, do not raise their production and do not try to compete one another by lowering prices. In this situation, all companies of the cartel make clean economic profit at the expense of consumers.

However, sometimes one of the companies of the cartel decides to compete with others by lowering prices, for example in an effort to reallocate the market (due to its saturation) to the company's own benefit. This leads to a „**price war**“, when companies overtake one another in lowering prices, trying to lure consumers away from competitive companies. Most of all customers benefit from this increase in price competition, they can buy goods cheaper (in the past, for example a significant decrease in prices of personal computers happened in this manner). There are also situations when member companies of the cartel try to secretly increase the size of produced output (its quota); some countries from OPEC can serve as example with oil extraction. Considering the fact that cartel agreements are in most countries forbidden, it is not possible to enforce adherence to them by legal means.

According to our valid laws, the following are considered agreements distorting competition described in the Act Nr. 143/2001 Coll. on protection of economic competition:

- agreements between/among competitors,
- resolutions of association of entrepreneurs,



- acts of entrepreneurs in mutual agreement that lead or can lead to distortion of economic competition on goods market.

This is under the condition that the mentioned law or another law does not establish otherwise or ÚOHS – the Office for the Protection of Competition (further just ÚOHS or Office) does not allow an exception; otherwise, agreements are forbidden by law or are invalid. While judging cartel, it is not important whether its participants act with the intention to restrict competition, or whether restriction of economic competition arose unwillingly and unconsciously; the principle of fair-mindedness holds in these cases. According to the mentioned law, all conducts that fulfil the characters of cartel are considered as cartels. Listing of specific examples can therefore be only demonstrative.

## 2 Data and Methodology

The goal of the paper is to find out whether the collusive oligopolies happen to be created in the food-products market, in what range the cartel agreements appear in given sector and whether they can notably influence the price level of the food products and therefore have an important impact on consumer demand in the Czech Republic. A partial goal is to investigate, on concrete cases, how efficient are the current fines levied on firms by the antimonopoly bureau.

The main methods used for the scientific investigation are: the method of description (a description of single cases of cartel agreements), the economic-mathematic modelling method (used for modelling of the maximum profit of collusive oligopoly), further the historical method, the method of analysis and synthesis and partially other methods.

While elaborating the study, the source was a public data from the ÚOHS about the most significant detected and sanctioned cartel agreements in the years 1990 – 2008 in the food production sector. [11] Next source was a statistical study presented by the Incoma company about the firm's turnovers in the field of food production in the years 2008 and 2009. [2] For the theoretical part elaboration, the publications of famous American economists, dealing with the issues of oligopoly market structures and market risk, published in the *Agricultural Economics – Czech* [6], were used.

## 3 Results

### 3.1 Application of presented model into the agriculture sector conditions

For the analysis of the consequences of cartel behaviour of firms in the food production sector, first it is necessary to become acquainted with specific cases of notable cartel agreements, which were uncovered and sanctioned by ÚOHS in the years of 1999 – 2008 in the Czech Republic.

Especially, it was the case of:

- *Bakeries*

The Antimonopoly Office repeatedly decided to impose a fine of 52.8 million CZK for the cartel of baking companies Delta Bakery, Penam and Odkolek in the sector of baking products. Based on the verdict of the ÚOHS, Delta Bakery is supposed to pay 24.8 mil. CZK, Odkolek 14.8 mil. CZK and Penam 13.2 mil. CZK. The Antimonopoly Office proclaims that, at the latest since 2003, the baking companies were colluding on a raise in prices of pastry, bread and confectionery with their customers. Afterwards, they sent out an announcement about raise in prices of named products to their customers. This coordinated action allowed these competitors to reach better negotiating positions towards customers than if each of them acted on the market completely independently. Without the mentioned anti-competition

conduct, a raise in prices of baking products in such a short time-period, massively by all chain stores, would not have to happen. Not the rise in prices of pastry itself, but the common action of baking companies against customers when raising prices, was considered as the mentioned conduct. At the same time, the office forbade similar behaviour to all these companies for the future. [1]

- *Poultry*

Second example of cartel behaviour in an area of agro production can be a situation when competitors AGROCOOPERATION JEVIŠOVICE, Farmers' cooperation PETŘÍN, Farmers' cooperation „Roštýn“, ZEVA CHLÍSTOVICE, a.s., DRYING-PLANT POHOŘELICE, s.r.o., Karlov, a.s. and AGROPRODUCT, spol. s r.o. agreed on the 13th of December 2006 in Jevišovice on a common strategy of setting selling prices of slaughter chickens, valid from the 1st of January 2007. The aim was to gradually reach the price of at least 20,- CZK per 1 kg of live weight in the I. quality class, especially with their most significant common customer, Kostelecké uzeniny a.s. The mentioned companies at the same time agreed on a common action and on a participation in a negotiation about raising the selling prices of slaughter chickens with the mentioned customer on the 14th of December 2006, and consequently they successfully proceeded with this strategy. It is evident that in case of absence of mutual agreement, its participants would not be able to reach raise in selling prices of broilers in such a short period of time. Participants of the conduct must have been aware of the fact that their action is capable of affecting the price level of chickens, which also happened (consequently, also over-the-counter price of poultry for final consumers increased). ÚOHS confirmed fines to seven poultry producers for illegal cartel agreement. Sanction in its total amounts to 14.208 mil. CZK. When determining the amount of the fine, ÚOHS respected the sales of the companies; the highest sanctions were given to companies that played an initiatory role in the cartel (AGROCOOPERATION JEVIŠOVICE and DRYING-PLANT POHOŘELICE, s.r.o.). Owing to the fact that – with the exception of farmers' cooperation KARLOV – all participants of the affair reached economic profit in 2006, the set sanctions are not liquidating.

- *Other examples of cartel behaviour*

- ÚOHS did not deal with the behaviour of agricultural primary producers for the first time. An example may be a cartel of poultry companies from the year 1999. Poultry company Libuš, Integral Vrchovina, Moravia-Silesia poultry factory PROMT and South bohemian poultry acted in a mutual agreement while negotiating prices for supplies of cooled and frozen chickens to chain stores. In their proposals to increase prices of these goods, these companies identically, starting with the date of 19.4. 1999, implemented the intention not to sell these goods under a price level of 56,- CZK per 1 kg of cooled chicken and 54,- CZK per 1 kg of frozen chicken. The mentioned companies had to pay 20 000,- CZK each, based on the resolution of ÚOHS.
- AGROPORK – announcement of purchase price of pork. ÚOHS afflicted a cooperation of pork meat producers “Agropork – cooperation” with a fine of 150 000,- CZK for (forbidden) decision of the cooperative board to announce purchase prices for 1 kg of live meat weight of slaughter pigs to be 30,- CZK, with effect from 21.6.1999. This decision is part of a record from common meeting of the boards of Agropark Náchod and Federation of producers of pork meat, poultry meat and eggs, which took place on 16.6.1999 in OAK Havlíčkův Brod.
- BILLA AND JULIUS MEINL – cartel. Companies BILLA and Omega Retail (earlier JULIUS MEINL), which together coordinated and adjusted their purchase prices of goods and trading conditions towards their suppliers in years 2001 and 2002, were under obligation to pay 23.80 mil. CZK and 19.55 mil. CZK, respectively. These companies committed a price cartel when they were exchanging information about their purchase prices and bonus and discount systems. They compared this information

and from their suppliers, they demanded levelling of their up-to-date financial conditions for purchase of goods to the level of the other participant of the conduct (if he had them more convenient), moreover they also demanded financial compensations to balance incurred differences. The requirement of both companies for additional payment, so called alliance bonus, was illegal as well; it was basically only justified by the possibility to supply the same product line to both trade networks. In case of disagreement with the set conditions, suppliers exposed themselves to the threat of the participants of the conduct pulling out of a contract. In the opinion of ÚOHS, the fines are not liquidating, but at the same time they can be considered perceivable enough, and therefore capable of discouraging participants of a conduct from breaking competition law in the future.

- POTATOES – reducing prices in supermarkets. On December 8<sup>th</sup> 2003, ÚOHS started an administrative procedure with companies AHOLD Czech Republic, BILLA, Carrefour ČR, DELVITA, Globus ČR, JULIUS MEINL, Kaufland ČR, PLUS – DISCOUNT, SPAR Czech trading company and Tesco Stores ČR. Possible breach of the law for protection of economic competition was seen by the Office in an agreement or action in common accord of participants of the procedure when setting the level of selling prices of potatoes for final consumers. When checking the level of selling prices, the Office - among other facts - also found out that the selling price of 2 kg packaging of potatoes ranged between 29.50 CZK and 32,- even 34,- CZK, while in premises of seven participants of the procedure, the same level of selling price – 29.90 CZK per 2 kg packaging of potatoes was discovered. After evaluation of all facts and evidence gained during the course of the administrative procedure, it was not proven by ÚOHS that the setting of selling prices of potatoes by the participants of the conduct and their level were a consequence of breaking the law.
- CZECH FEDERATION OF MEAT MANUFACTURERS. In November 2003, the Office imposed a fine of 100 000 CZK to Czech federation of meat manufacturers (ČSZM) for violating the law on protection of economic competition. ČSZM recommended to its members in January 2002 to transfer the costs connected with mandatory check-up of slaughter cattle for BSE to suppliers. The costs were in the amount of 1 500 CZK per head in case of cows and in full amount in case of bulls and heifers older than thirty months. This behaviour could have disturbed economic competition on the market with supplies of slaughter cattle designed for processing. Violating the law was not intentional, it lies in the level of negligence. The amount of the fine is therefore in this case supposed to have a precautionary and educational function.
- BREEDERS – cartel. ÚOHS awarded in its resolution from autumn 2002 a fine of total amount of 2 570 000 CZK for closing a price cartel bargain regarding insemination doses of breeding bulls among eight breeding companies on the market of cultivation and breeding of cattle. This cartel bargain led to unification of prices of these products and had negative effects especially on cattle breeders, who had a limited possibility of choosing a product in light of price and quality. It cannot be ruled out that the price agreement led in its final consequence also to unnecessary raising prices with negative effects on the final consumer. The cartel bargain with its effects applied to the entire country and competitors in sum included a market exceeding 50 %. The company Holding Czech-Moravian breeding union had to pay the highest fine of 500 000 CZK, other sanctions are as follows: South bohemian breeder – 300 000 CZK, REPRO GEN – 300 000 CZK, PLEBO BRNO – 300 000 CZK, AGRO – Měříň – 300 000 CZK, Breeders Brno – 270 000 CZK, CHO VSER – VIS – 300 000 CZK, BREEDING SERVICES – 300 000 CZK. The mentioned

companies committed these anti-competitive actions in years 1998-2001; the existence of cartel including assigned fines was confirmed by regional court in Brno. [11]

Following table summarizes the amounts of fines levied by the antimonopoly bureau for single cartel agreements, demonstrably concluded within the food production sector in the period of 1999 – 2008.

### 3.2 Data and applied model evaluation in given market environment (sector)

**Table 1.** Fines levied in the food production sector [11]

<b>Cartel's business</b>	<b>Fine in thousands of CZK</b>	<b>Year</b>
Poultry	80	1999
Pork	150	1999
Food store - Billa	23800	2002
Food store – J. Meinl	19550	2002
Cattle (breeding work)	2570	2002
Bakery	52800	2003
Meat processing	100	2003
Poultry	14208	2007

As it is obvious from the precedent table, the sum of fines levied by the antimonopoly bureau for cartel agreements in the food sector in the observed period reached the amount of CZK 113 258 000.

In terms of the agri-food vertical, we can divide the fines into two large groups, the fines levied on food producers (69 908 000 CZK) and the fines levied on food traders (43 350 000 CZK). The fines levied on food producers constitute almost two thirds (62%) of the total sum, which is interesting regarding the reputation of the traders.

If we compare the summarized amount of fines for cartel agreement convicted firms in the observed period with the turnovers of particular food sellers, it is possible, from what was stated, to express the motivation character of levied sanctions. The ÚOHS itself admits in its study [11], the levied sanctions shall not have a liquidating character for the punished firms in the sector, but they should rather have an educational influence.

Hence, it has very much the sense to determine the ratio of the fine and the amount of annual turnover of particular firm.

- For a creation of collusive oligopoly in the years of 2001 -2002 in a form of price cartel, the firms Billa (REWE branch) and Omega Retail (former Julius Meinl) were sanctioned by the antimonopoly bureau with fines of 23.8 mil. and CZK 19.55 mil. respectively for a collective coordination and tuning of the goods prices and terms of trade.

For comparison, the turnover of Billa reached the total of CZK 18.5 billion in 2008 and even more in 2009, CZK 19 billion, although it was already the economic recession period. Basically, the sanction is approximately one thousandth of the annual turnover of a firm. The profit of Billa in this year 2008 amounted to 115.6 million CZK in 2009 it even reached the amount of 357.6 million CZK. In the investigated

case, it is possible to be identified with the antimonopoly bureau evaluation and with the statement on the impact of the fine for the firm's economy..... "the fines are not liquidating, but at the same time they can be considered perceivable enough, and therefore capable of discouraging participants of a conduct from breaking competition law in the future." [11]

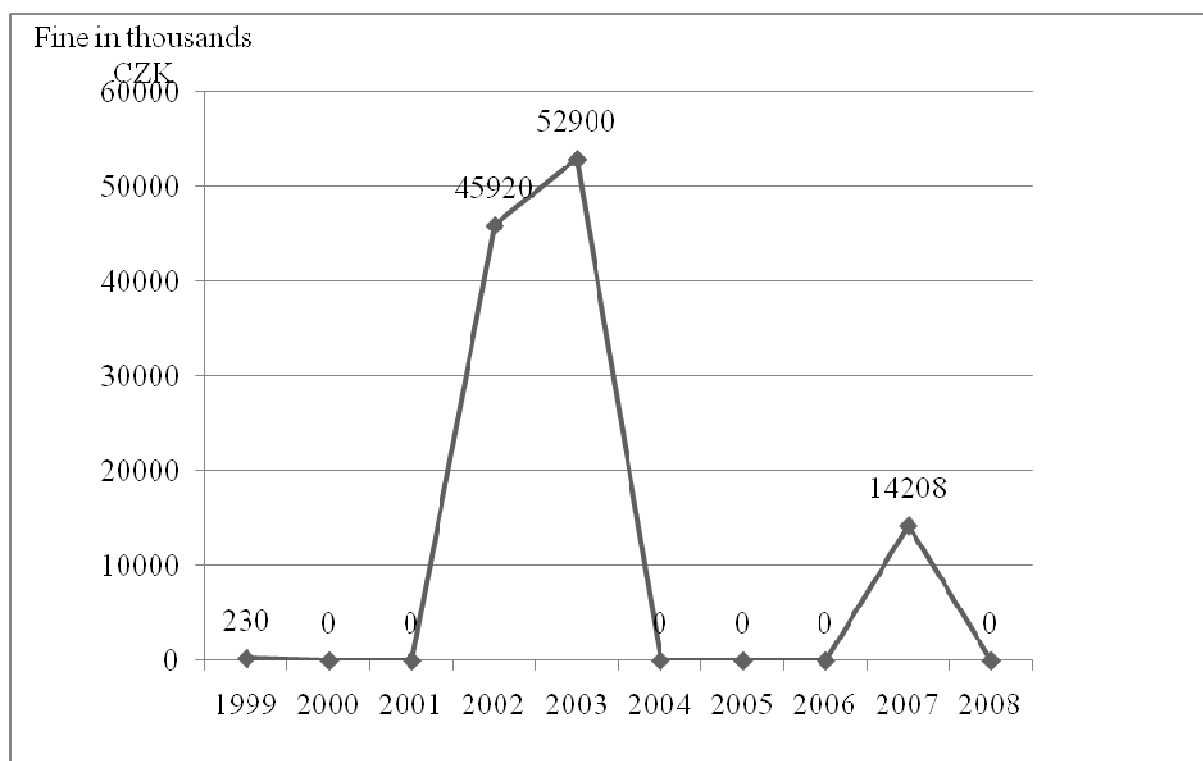
- If we make a presumption that three quarters of a whole food production (expressed by turnovers) gets to a final consumer through a supranational store chains, it is interesting to compare the sum of levied sanctions for cartel agreements in food production sector with the annual turnover of these supranational food chains. However, we have to consider that the food creates about 80% share of total turnovers. The total amount of levied fines by antimonopoly bureau reached CZK 113 million in the period 1999 – 2008. To compare, the turnover of the main food chain stores reached CZK 210 billion in 2008 and CZK 219 billion in 2009. That means, if the average annual fine in the food sector production in the given period was CZK 11.3 mil., this analysis supports the statement of the antimonopoly bureau.
- According to the legislation, the indicator of turnover of the company is crucial for determining the amount of the levied fine due to the cartel behaviour of firms in the EU; the fine for a cartel can be set up to 10% of the annual company turnover. The indicator of profit cannot be used for determining the fine, because firms reaching a long-term losses (Lidl) due to a high investment (and therefore depreciation) could not be penalized.
- The introductory model of collusive oligopoly with maximization of profit could be applied only if there were available data concerning the total cost of firms in each year, which would serve to expressing the total costs function and hence also the marginal costs function. The second problem in the calculation of the maximum profit is the diversity of goods, for the prices of which were firms fined, and unavailability of data concerning the quantity of goods.

### **3.3 Discussion**

#### **Final analysis evaluation**

From this point of view it can appear, while comparing the amounts of fines and turnovers, that the cartel agreements of the food production focused firms are not an often appearance, neither they have any fundamental significance for the food prices setting for the final consumer.

However, it is necessary to realize, that the collusive oligopolies, as a market situation in the given sector of food production, are surely more often and more significant phenomenon, than they could appear. There is mostly the problem of successful detection of these illegal practices of the firms and the earning capacity of the agreements is considerable. Also the probability of detection is not very high. Of course there is a certain risk of being found, but simply, we can say that the risk expresses a situation when the subject decides on the base of information about the probability distribution of possible outcomes, which are available. [6]



**Figure 2.** The fines in time. [11]

Also practices of some competitors who exchanged information on future raising prices of their products through media can be indicated as improper in terms of economic competition development. Representatives of the biggest bakeries, producers of milk and meat products in the Czech Republic and some others were doing so. Mutual exchange of information about intended changes in trading conditions – especially about adjustments of price – is typical for behaviour that breaks the ban to make cartel agreements about prices, eventually the ban to act in a common agreement in the area of price making. In such cases, the harmonization of trade practices is arranged and fulfilment of common strategy is checked by means of the press. Such behaviour is in violation of the competition law and can be sanctioned with high fines, as is illustrated in the given examples of cartel bargains.

## 4 Conclusions

Considerable attention of media and both expert and laic public is nowadays given to raising the prices of groceries and agricultural products, because this problem touches upon every citizen. For this reason, ÚOHS focused its activity in the last few years on the behaviour of farmers, food producers, their chambers and also of chain stores themselves.

In case of basic groceries we talk about demands for non-elastic goods that are necessary in terms of consumption. Therefore, in a monitored time-period, cartel bargains of companies happen more often than with other goods. Agreements can significantly harm the interests of consumers, but a specific grocery sector is so broken that the mentioned cartel behaviour – if intercepted by the Office in time – cannot dramatically influence market competition.

## References

1. Agroweb - Pokuty pro kartel pekáren potvrzeny [online]. [cit. 9.2. 2009]. URL: <[http://www.agroweb.cz/Pokuty-pro-kartel-pekaren-potvrzeny\\_\\_s43x32743.html](http://www.agroweb.cz/Pokuty-pro-kartel-pekaren-potvrzeny__s43x32743.html)>
2. Incoma research. [online]. [cit. 2009-12-05]. Available at: <<http://www.incoma.cz/cz/>>

3. Janssen M. C. W., Roy S.: Signaling quality through prices in an oligopoly. In: *Games and Economic Behaviour*, Elsevier, 2009 Atlanta, pp. 192-207.
4. Samuelson P. A., Nordhaus W. D.: *Economics*. McGraw Hill Higher Education, 2004 Columbus.
5. Schiller, B. R.: *The Micro Economy Today*. McGraw-Hill, Inc., 2010 Columbus.
6. Šrédli K.: Behaviour of Subjects in Risk Markets. In: *Agricultural Economics – Czech*, Institute of Agricultural Economics and Informations, 2010 Praha, vol. 56 (5), pp. 224 – 230.
7. Tversky A., Kahneman D.: „Advances in Prospect Theory: Cumulative Representation of Uncertainty“. *Journal of Risk and Uncertainty*, 5, pp. 297 – 323, 1992.
8. Tversky A., Kahneman D.: Prospect Theory: An Analysis of Decision Under Risk. *Econometrica*, 47, pp. 263 – 291, 1979.
9. Varian H. R.: *Microeconomic Analysis*. Norton, 1992 London.
10. von Blanckenburg K., Geist A.: Detecting illegal activities: the case of cartels In: *European Journal of Law and Economics*, Springer, June 2010 Berlin, pp. 57-76.
11. Zemědělství, informační list č. 1/2008, ÚOHS. 2008 Brno, pp. 18-19.





# Commodity structure competitiveness of the agrarian trade of the “old” and “new” EU member states

Luboš Smutka<sup>1</sup>, Ondřej Miffek<sup>1</sup>, Michal Steininger<sup>1</sup>, Ondřej Škubna<sup>1</sup>

<sup>1</sup>Department of Economics, Faculty of Economics and Management,  
Czech University of Life Sciences Prague,  
Kamýcká 129, 165 21 Prague 6 Suchbát, Czech Republic  
{smutka,miffek,steininger,skubna}@pef.czu.cz

**Annotation:** The article analyzes the commodity structure of the agrarian trade of the EU countries. Emphasis is placed on the comparative advantages of separate aggregations in terms of their use on the internal EU market (intrastate only), and on the world market (extrastat only). The analysis is based on the assessment of comparative advantages by means of the modified Ballas index. This is performed on two levels, for the internal EU market, and also for the world market, after which the results of the analysis are displayed graphically. The authors then implement an idea originating from the BCG matrix on the results of this graphical display. Considering mainly those from (SITC, rev. 3) aggregations, the goal is to show which are or have the potential to become the pillar of agrarian trade (i.e. cash cows and stars), and to show on the other hand those aggregations, which are not perspective in the long run or problematic (the “dogs” and question marks). Stars are considered those from the aggregation, which are characterised by the highest rate of growth and comparative advantage. The analysis is conducted on two levels, in order to view the differences in commodity structure of the agrarian trade in the case of the old (EU15), as well as in the case of the new member states EU12 (member states, which accessed the EU in 2004 and 2007). Changes are also visible from the results of the analysis if we compare the commodity structure of the trade in the EU15 and EU12 countries. The findings related to the development of comparative advantages and subsequent specialization of EU countries on trade with specific aggregations (the idea is to show the existing differences in the area of specialization in the agrarian trade, which exists between the EU15 and EU12 countries) is also implied.

**Key words:** BCG, competitiveness, revealed comparative advantage, agrarian foreign trade, European Union, old EU members, new EU members.

**JEL classification:** F10

## 1 Introduction

Foreign trade is historically the oldest, and still an important part of external economic relationships [4]. Agrarian foreign trade represents a significant part of the world economy, even if its share in world trade is decreasing - currently at the level of about 5% to 7%. For the EU countries, agrarian trade in both the form of intra-trade and extra-trade represents a very important part of the common Trade Policy and the Agrarian Policy. Presently, agrarian trade of the EU countries has become a very significant proportion of the world trade with agrarian production. The EU's share in world agrarian export and import value is very high.

There have been many changes in world and regional trade in recent years. Liberalization of the world market influenced agrarian trade in the EU countries, and was further influenced by the accession negotiations, between the EU and the twelve European countries which accessed the EU in 2004 and 2007 (EU12). The form of the trade of the mainly new EU countries has significantly influenced the process of removing trade barriers, which culminated at the moment, when all candidate countries accessed the EU. The agrarian trade of these countries was further influenced by the changes resulting from the common policies related to agriculture and trade within the EU, and their gradual reforms [7].

The commitment of the Common Agricultural Policy (CAP) led to unprecedented changes in the economic environment – in agriculture and in the processing industry. The new members were no longer able to regulate the original price level of agricultural products, supported by the national border protection and export subsidies [8].

In order to use the comparative advantage it is necessary to understand the structure of agrarian export of the individual countries, and the structure of the world market [6]. There are great differences between the old and new member states of the current EU, enabling the use of the advantages coming from the diversification and specialization processes in agrarian production and trade [3]. The differences between the new and old EU countries gradually dissipate. Structural changes in the EU12 are larger than in the old member states. Thus, the EU12 is catching up with the EU15, although it remains behind for farm income, GDP per capita, and agrarian foreign trade value and volume [2]. Strengthening of the competitive position of the new EU countries is the main point of the strategy to enforce the business-economic interests of the newly accessing countries in the EU. Among the basic calls for increasing the competitiveness of these countries are issues such as, the pressure to decrease the prices of imports, easier access to the markets of the third countries (EU non-member states), support of the WTO agrarian reform (also in the EU), liberalization of the world trade in services, and development of the pressure for a fair arrangement of the international market among all participants [1].

## **2 Data and Methodology**

This contribution analyzes the export structure of agrarian trade of the EU12 and EU15 countries respectively, in order to identify the existing differences between these groups of countries, and further to identify those from aggregation, which are the most important for the given group of countries and the most perspective in terms of their orientation in the international agrarian trade.

The article analyzes the commodity structure of the agrarian and food-processing trade of the EU countries. The current EU represents a group of 27 countries and it must be born in mind that this group of 27 countries is divided on historical consequences into two mutually heterogeneous groups. This analysis is therefore conducted in two parts. The first part is an analysis of the international agrarian trade of countries which have been EU members for a relatively long period – i.e. the EU 15 countries (countries accessing the EU before the year 2000). The second part is the same analysis for the former countries of the Eastern block, which accessed the EU together with Malta and Cyprus in 2004 and 2007 respectively – the so-called EU12 countries.

This agrarian trade analysis is based on an evaluation of the data on the development of the international agrarian trade over the period 2004-2009. The source of the data is the UN Comtrade database. The chosen nomenclature is SITC rev. 3 and the items are chosen on the second level.

For the purposes of this analysis, the values of the business flows are monitored in USD (in current prices without the use of the deflator). Based on the apparent errors in statistics on the side of the UN Comtrade database, 3 commodity subgroups were taken out (S3 001 – livestock, S3 111 – non-alcoholic beverages and S3 112 – alcoholic beverages) from the total of 44 commodity subgroups, which make up the international agrarian trade in terms of SITC 0, SITC 1 and SITC 4 aggregations.

**Table 1.** The list of individual SITC items selected for the analysis

S3-001	LIVE ANIMALS	S3-056	VEGETABLES,PRPD,PRSVD,NES
S3-011	BOVINE MEAT	S3-057	FRUIT,NUTS EXCL.OIL NUTS
S3-012	OTHER MEAT, MEAT OFFAL	S3-058	FRUIT,PRESERVED,PREPARED
S3-016	MEAT,ED.OFFL,DRY,SLT,SMK	S3-059	FRUIT, VEGETABLE JUICES
S3-017	MEAT,OFFL,PRPD,PRSVD,NES	S3-061	SUGARS,MOLASSES,HONEY
S3-022	MILK AND CREAM	S3-062	SUGAR CONFECTIONERY
S3-023	BUTTER,OTHER FAT OF MILK	S3-071	COFFEE,COFFEE SUBSTITUTE
S3-024	CHEESE AND CURD	S3-072	COCOA
S3-025	EGGS,BIRDS,YOLKS,ALBUMIN	S3-073	CHOCOLATE,OTH.COCOA PREP
S3-034	FISH,FRESH,CHILLED,FROZN	S3-074	TEA AND MATE
S3-035	FISH,DRIED,SALTED,SMOKED	S3-075	SPICES
S3-036	CRUSTACEANS,MOLLUSCS ETC	S3-081	ANIMAL FEED STUFF
S3-037	FISH ETC.PREPD,PRSVD,NES	S3-091	MARGARINE AND SHORTENING
S3-041	WHEAT, MESLIN, UNMILLED	S3-098	EDIBLE PROD.PREPRTNS,NES
S3-042	RICE	S3-111	NON-ALCOHOL.BEVERAGE,NES
S3-043	BARLEY, UNMILLED	S3-112	ALCOHOLIC BEVERAGES
S3-044	MAIZE UNMILLED	S3-121	TOBACCO, UNMANUFACTURED
S3-045	OTHER CEREALS, UNMILLED	S3-122	TOBACCO, MANUFACTURED
S3-046	MEAL,FLOUR OF WHEAT,MSLN	S3-411	ANIMAL OILS AND FATS
S3-047	OTHER CEREAL MEAL,FLOURS	S3-421	FIXED VEG.FAT,OILS, SOFT
S3-048	CEREAL PREPARATIONS	S3-422	FIXED VEG.FAT,OILS,OTHER
S3-054	VEGETABLES	S3-431	ANIMAL,VEG.FATS,OILS,NES

The purpose of the analysis is to determine the position of separate aggregations representing the agrarian trade of the EU12 and EU15, within the internal market of the EU27 and worldwide. The analysis is based on the calculation of the index of apparent comparative advantage (RCA1), which is for the purposes of the analysis on two levels. The competitiveness of the agrarian exports of the EU12 and EU15 respectively is only analyzed within the internal market EU27 in the first level. The same calculation, which assesses the competitiveness of the agrarian exports (exports outside EU) of the EU12 and EU15 countries is analysed from the point of view of the world market on the second level (the world market is for the purposes of the analysis cleared by the value of the internal market of the EU27 countries – extrastat). The mathematical description of the RCA1 index is [9] :

The Revealed comparative advantage index  $RCA1 = (X_{ij}/X_{nj})/(X_{it}/X_{nt})$

Where X - represents exports, i - represents the analyzed group of countries (EU15 or EU12), j - represents the analyzed group of products, n - represents the EU27 or world and t - represents the sum of all groups of products.

RCA1 measures a group of countries' exports of agrarian commodities relative to their total agricultural exports and to the corresponding exports of a set of EU 27, e.g. the world. A comparative advantage is "revealed" if  $RCA > 1$ . If RCA is less than "one", the group of countries is said to have a comparative disadvantage in the analyzed group of products or commodities. The results of the RCA1 index analysis are subsequently entered into a graph, where the x axis represents the values of RCA1 index for the world market and the y axis represents the value of RCA1 index for the internal market of the EU27 countries. The graph is constructed for the EU12 and EU15 countries separately. Based on the calculated values, separate aggregations of the agrarian trade are distributed into 4 quadrants. If aggregations have an apparent comparative advantage only on the world market, they are localized in the right lower quadrant (quadrant III). Aggregations with the apparent competitive advantage only on the market of the EU27 countries are located in the left upper quadrant (quadrant I). If an aggregation does not have any comparative advantage, it is displayed in the left lower quadrant (quadrant II). Finally, the most important group of aggregations with the apparent competitive advantage both on the market of the EU27 countries and on the world market is located in the right upper quadrant (quadrant IV).

The separate aggregations were assessed in the second phase based on their share in the total agrarian international trade of EU12 and EU15 respectively, and then based on the average growth rate of the export of separate aggregations in the years 2004-2009. The results are then

displayed in a graphical form, which is represented by the BCG matrix [5] – i.e. separate quadrants characterize so called cash cows (high share in the total agrarian export and low growth rate of the value of export), stars (high share in the total agrarian export and high growth rate of the value of export), dogs (low share in the total agrarian export and low growth rate of the value of export) and question marks (low share in the total agrarian export and high growth rate of the value of export). The description is adjusted to the characteristics of the examined problems.

From the results of this analysis, we can identify those aggregations based on the comparison of the results, which are the most perspective from the point of view of separate analyzed groups of countries, but also from the point of view of the competitive advantage and their share on the market and average growth rate. On the other hand, the results identify those aggregations which are not perspective, unsustainable or otherwise unsuitable for the agrarian international trade of the examined group of countries in the long run. The identification of the existing differences between the groups of countries in terms of their distribution of final values of RCA1 indices, and also the resulting values coming from the modified BCG matrix, are evaluated and described based on the graphical analysis and the subsequent synthesis of the acquired findings.

### 3 Results

The agrarian international trade of the European Union grew significantly in the observed period 2004-2009. Exports from the EU12 was 14.9 bill. USD in 2004 (without distinguishing whether this is internal or external trade), and it was 156% more in 2009 (38.1 bill. USD). The EU15 encountered a slightly smaller growth, where total exports only grew by 57% from 205.8 to 323.4 bill. USD. The exports dominate in both groups within the European Union. The dominant influence of the internal market within the European Union has slightly increased during the observed period. The share of exports to the EU 27 in EU12 was about 72% in 2004, and about 77% in 2009. The share of exports to the EU27 countries remained in EU15 at approximately the level of about 80%. The pro-growth character of the European Union agrarian export is clearly visible from these basic characteristics, and the difference in its volume and territorial structure between the new and old member countries balances slightly.

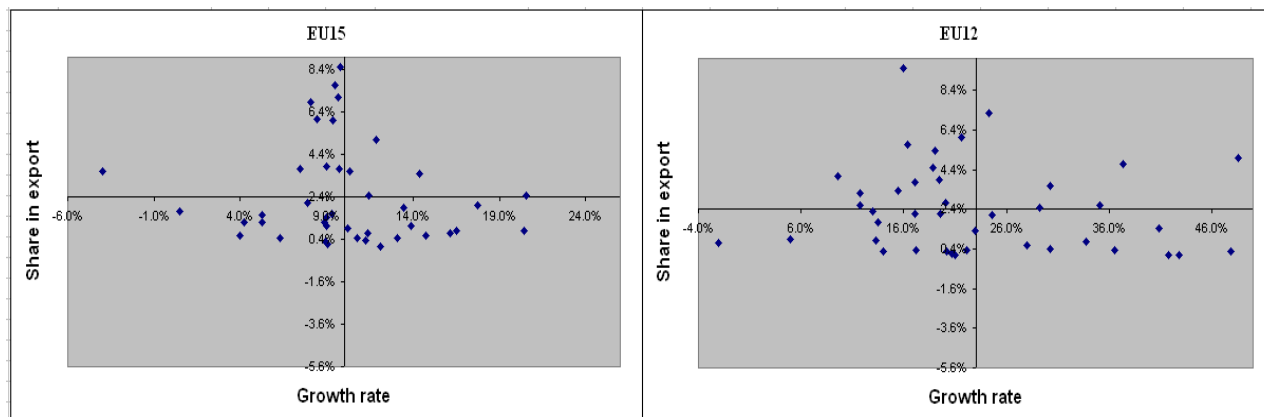
The following part of the analysis examines the structure of the agrarian exports of the EU15 and EU12 countries, in order to compare the differences in the composition of these exports. The main pillars of the agrarian and food-processing exports are, in the case of the EU15 countries, and from the point of view of the final value of the aggregation: S3-012, S3-057, S3-048, S3-054, S3-022, S3-024, S3-081, S3-056, S3-034, S3-073, S3-011, S3-122, S3-421, S3-017 and S3-041. These fifteen aggregations had a share of the value of agrarian exports of the EU15 countries in the period 2004-2009 of around 75% on average.

The main pillars of the agrarian and food-processing export, are in case of the EU12 countries, and from the point of view of the final value of the aggregation: S3-012, S3-022, S3-048, S3-054, S3-081, S3-041, S3-122, S3-024, S3-061, S3-057, S3-073, S3-044, S3-058, S3-056 and S3-017. These fifteen aggregations had a share of the value of agrarian exports of the EU12 countries in the period 2004-2009 of around 73% on average.

#### 3.1 BCG analysis

If we apply the methodology of the BCG matrix concept, we can state that the pillars of the agrarian export (i.e. cash cows – growth rate 4-10% and the share of export 2.5-9%) are in case of the EU15 countries aggregations: S3-012, S3-057, S3-48, S3-054, S3-022, S3-024, S3-073, S3-056, S3-034. Stars (share in export 2.5-9% and growth rate more than 10%) are

then S3-081, S3-011, S3-421, S3-017 and S3-041. Question marks (share in export below 2.4% and growth rate more than 10%) represent aggregations then S3-059, S3-071, S3-422, S3-043, S3-091, S3-411, S3-431, S3-042, S3-047, S3-074, S3-025, S3-046 and S3-044. The remaining aggregations, which are characterised by low, or negative growth rate and low share in export, can then be considered as “dogs” (S3-098, S3-023, S3-121, S3-122, S3-036, S3-062, S3-035, S3-061, S3-058, S3-037, S3-072, S3-016, S3-075 and S3-045).



**Figure 1.** Matrix BCG analyzing the composition of agri-export of the EU15 and EU12 countries

Source: UN Comtrade, own processing

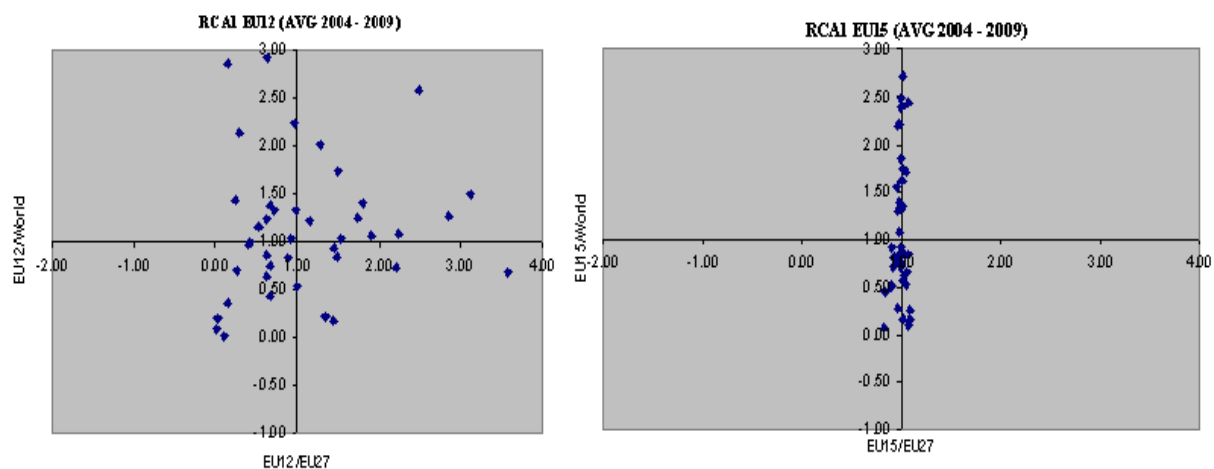
The pillars of the agrarian export (i.e. cash cows – growth rate 6-23% and the share in export of 2.5-9%) in the EU12 are the aggregations: S3-012, S3-057, S3-48, S3-054, S3-081, S3-057, S3-058, S3-061, S3-017, S3-024, S3-073, S3-056, S3-034. Stars (share in export 2.5-9% and growth rate more than 23%) are then S3-022, S3-044, S3-122, S3-011, S3-421 and S3-041. Question marks (share in export below 2.4% and growth rate more than 23%) are aggregations S3-071, S3-422, S3-043, S3-091, S3-045, S3-016, S3-042, S3-025 and S3-046. The remaining aggregations, which are characterised by low, or negative growth rate and low share in export, can then be marked as the “dogs” (S3-059, S3-431, S3-411, S3-047, S3-074, S3-098, S3-023, S3-121, S3-036, S3-062, S3-035, S3-037, S3-072 and S3-075).

This analysis implies that there are only a few minor differences between the EU12 and EU15 countries from the point of view of the importance of separate aggregations.

### 3.2 RCA1 analysis

The following part of the contribution analyzes the differences in the competitiveness of the commodity structure of the agrarian export of the EU12 and EU15 countries from the point of view of comparative advantage of the exported aggregations on the internal market of the EU27 as well as on the world market. The optimum combination is that of reaching the competitive advantage both on the internal market of the EU27 countries, and on the world market. This state is displayed in quadrant IV in case of EU12 countries (figure no. 2). This entails the following 11 aggregations in total: S3-012, S3-017, S3-022, S3-025, S3-041, S3-043, S3-058, S3-062, S3-073, S3-098 and S3-122. Their total share in the value of the agrarian export is 42.4%. On the other hand, there are such aggregations in quadrant no. II, which neither reaches the competitive advantage in the internal EU27 market, nor on the world market. These aggregations are displayed in quadrant II, and entail the following 12 aggregations: S3-011, S3-034, S3-036, S3-042, S3-046, S3-054, S3-057, S3-075, S3-411, S3-421, S3-422 and S3-431. Their share in the value of the agrarian export is 18.7%. The remaining 18 aggregations reach the competitive advantage only in the internal EU27 market, or in the world market. The following 12 aggregations reach this advantage in terms of the internal EU27 market: S3-035, S3-037, S3-044, S3-045, S3-047, S3-059, S3-061, S3-071, S3-

074, S3-081, S3-091 and S3-121. Their share in the value of the EU12 agrarian export is 23.1%. The competitive advantage on the world market is only exhibited by the following 6 aggregations: S3-016, S3-023, S3-024, S3-048, S3-056 and S3-072. Their share is 15.6%.



**Figure 2.** Competitiveness analysis of the agrarian export in the EU12 and EU15 countries on the markets of the EU27 countries and on the world market

Source : UN Comtrade + own calculation

The situation in the EU15 countries is as follows: There are 8 aggregations with the total market share amounting to 24.1% in terms of quadrant IV (mutual competitive advantage). This entails the following aggregations: S3-016, S3-023, S3-024, S3-048, S3-056, S3-091, S3-411 and S3-421. On the other hand, there are aggregations in quadrant no. II, which do not reach any competitive advantage. This entails a total of 13 aggregations, whose market share is only 21.7%. The following aggregations belong to this group: S3-017, S3-035, S3-037, S3-041, S3-044, S3-045, S3-058, S3-059, S3-061, S3-071, S3-074, S3-081 and S3-121. The remaining 20 aggregations only reach the competitive advantage in the internal EU27 market (10 aggregations with the market share of 27.3%), or on the world market (10 aggregations, share 26.9%) This entails the following 10 aggregations in the internal EU market: S3-011, S3-034, S3-036, S3-042, S3-054, S3-057, S3-072, S3-075, S3-422 and S3-431. These are the 10 aggregations in the world market: S3-012, S3-022, S3-025, S3-043, S3-046, S3-047, S3-062, S3-073, S3-098 and S3-122.

This analysis implies that there are significant differences between the EU12 and EU15 countries in terms of the comparative advantage. In the case of the EU15 countries, the processed products have mostly a comparative advantage, which are the subject of interventions resulting from the existing Common Agricultural Policy, which has had an effect in these countries for several decades. This is a group of apparently heterogeneous products in case of the EU12 countries which outweigh the products with the lowest share of the value added and further re-exports and other specifically processed products (e.g. tobacco and sweets).

**Table 2.** Values of RCA1 indices, shares in exports and the growth rate for the group of EU12 and EU15 countries in the years 2004 to 2009

		AVG RCA1 EU12		AVG RCA1 EU15		Share in export		Growth rate	
		EU27	World	EU27	World	EU12	EU15	EU12	EU15
S3-011	BOVINE MEAT	0.70	0.26	1.03	0.17	2.6%	3.6%	35.0%	10.3%
S3-012	OTHER MEAT, MEAT OFFAL	1.22	1.16	0.98	1.39	9.5%	8.5%	16.0%	9.8%
S3-016	MEAT,ED.OFFL.DRY.SLT.SMK	0.22	1.35	1.07	2.43	0.3%	1.1%	47.8%	9.0%
S3-017	MEAT,OFFL.PRPD,PRSV,NES	1.04	1.53	1.00	0.92	2.7%	2.5%	20.1%	11.4%
S3-022	MILK AND CREAM	1.26	1.74	0.97	2.21	7.3%	6.1%	24.3%	8.4%
S3-023	BUTTER,OTHER FAT OF MILK	0.84	1.48	1.02	2.71	0.9%	1.2%	5.0%	4.2%
S3-024	CHEESE AND CURD	0.69	3.58	1.03	3.34	4.5%	6.0%	18.9%	9.4%
S3-025	EGGS,BIRDS,YOLKS,ALBUMIN	1.06	1.91	0.99	2.38	0.8%	0.7%	33.7%	11.3%
S3-034	FISH,FRESH,CHILLED,FROZN	0.64	0.63	1.03	0.63	2.6%	3.8%	11.7%	7.4%
S3-035	FISH,DRIED,SALTED,SMOKED	2.86	0.14	0.84	0.44	1.3%	0.5%	22.9%	6.3%
S3-036	CRUSTACEANS,MOLLUSCS ETC	0.02	0.11	1.09	0.25	0.1%	1.5%	20.7%	5.3%
S3-037	FISH ETC.PRPD,PRSV,NES	1.38	0.68	0.97	0.27	2.2%	1.4%	17.1%	9.0%
S3-041	WHEAT, MESLIN, UNMILLED	1.73	1.51	0.93	0.81	5.0%	2.4%	48.5%	20.6%
S3-042	RICE	0.21	0.03	1.07	0.10	0.1%	0.5%	41.8%	13.1%
S3-043	BARLEY, UNMILLED	1.50	3.12	0.95	1.55	1.4%	0.8%	40.9%	16.5%
S3-044	MAIZE UNMILLED	2.91	0.64	0.82	0.07	3.6%	0.9%	30.3%	10.2%
S3-045	OTHER CEREALS, UNMILLED	2.13	0.29	0.90	0.50	0.4%	0.2%	30.3%	9.1%
S3-046	MEAL,FLOUR OF WHEAT,MSLN	0.97	0.40	1.00	1.84	0.3%	0.5%	36.5%	10.8%
S3-047	OTHER CEREAL MEAL,FLOURS	1.23	0.62	0.98	1.08	0.1%	0.1%	21.0%	12.1%
S3-048	CEREAL PREPARATIONS	0.93	1.46	1.01	2.41	6.0%	7.1%	21.6%	9.7%
S3-054	VEGETABLES	0.83	0.89	1.02	0.87	5.6%	6.9%	16.4%	8.1%
S3-056	VEGTABLES,PRPD,PRSV,NES	0.73	2.21	1.03	1.74	3.2%	3.8%	11.8%	9.0%
S3-057	FRUIT,NUTS EXCL.OIL NUTS	0.43	0.66	1.05	0.53	3.9%	7.7%	19.5%	9.5%
S3-058	FRUIT.PRESERVED,PREPARED	2.01	1.28	0.91	0.72	3.3%	1.6%	15.4%	9.3%
S3-059	FRUIT, VEGETABLE JUICES	1.33	0.71	0.97	0.80	2.3%	1.9%	13.0%	13.4%
S3-061	SUGARS,MOLASSES,HONEY	2.23	0.97	0.90	0.93	4.1%	2.1%	9.6%	7.9%
S3-062	SUGAR CONFECTIONERY	1.41	1.80	0.97	1.30	1.7%	1.2%	13.5%	5.2%
S3-071	COFFEE,COFFEE SUBSTITUTE	1.15	0.53	0.99	0.72	2.1%	2.0%	24.6%	17.7%
S3-072	COCOA	0.17	1.44	1.08	0.85	0.7%	1.2%	-2.1%	8.9%
S3-073	CHOCOLATE,OTH.COCOA PREP	1.07	2.25	1.00	2.48	3.8%	3.7%	17.1%	9.7%
S3-074	TEA AND MATE	1.44	0.25	0.96	0.76	0.3%	0.4%	22.1%	11.3%
S3-075	SPICES	0.87	0.62	1.01	0.58	0.3%	0.3%	14.0%	9.0%
S3-081	ANIMAL FEED STUFF	1.03	0.92	1.00	0.76	5.3%	5.1%	19.0%	11.8%
S3-091	MARGARINE AND SHORTENING	1.00	0.42	1.00	1.62	0.6%	0.7%	27.9%	16.2%
S3-098	EDIBLE PROD.PREPRTNS,NES	2.58	2.49	0.86	3.91	2.2%	1.7%	19.6%	0.5%
S3-121	TOBACCO, UNMANUFACTURED	1.34	0.98	0.97	0.83	0.8%	0.6%	13.3%	4.0%
S3-122	TOBACCO, MANUFACTURED	1.26	2.85	0.96	2.19	4.7%	3.6%	37.4%	-4.0%
S3-411	ANIMAL OILS AND FATS	0.53	1.00	1.04	1.71	0.3%	0.6%	20.2%	14.7%
S3-421	FIXED VEG.FAT,OILS, SOFT	0.75	0.68	1.02	1.35	2.5%	3.5%	29.2%	14.4%
S3-422	FIXED VEG.FAT,OILS,OTHER	0.09	0.01	1.08	0.16	0.1%	0.8%	42.8%	20.5%
S3-431	ANIMAL,VEG.FATS,OILS,NES	0.36	0.15	1.06	0.66	0.3%	1.0%	17.2%	13.9%

Source : UN Comtrade + own calculations

## 4 Conclusions

This analysis implies that there has been a significant increase in the value of agrarian exports both in the EU12 and EU15 countries in the period 2004-2009. It is true that there have been significant changes in the EU12 countries compared to the EU15 countries (where the changes are not that significant, and the situation is more stable in the long-term). The EU12 countries have undergone a sharp increase in both the volumes and the value of agrarian exports. There have been significant changes from the point of view of forming the commodity structure of the agri-business, and mainly from the point of view of export aggregations with a higher share of value-added. The new member states have adjusted to the conditions of the internal market in the course of the observed period, a fact which can be seen in several ways. The role of the internal EU market became much more dominant in the last ten years, there has been a restructuring of agri-complex, removal of trade barriers led to starting up the process of price convergence etc.

There have also been significant changes from the point of view of competitiveness of agrarian products on the world as well as the internal market of the EU countries. The analysis points to the reality in the case of the EU15 countries, that these countries have a stable export structure due to the long-term effect of the Common trade and Common Agricultural Policy of the EU, where there is almost perfect competition from their perspective - proved by a very low variance of the RCA1 indices for separate aggregations. The RCA1 index varies from the point of view of the internal market in the case of the EU15 countries in all the observed

aggregations in the range from 0.8 to 1.2. The situation is not so unambiguous in terms of the participation of EU15 countries in the world market, to which these countries export approximately one fifth of their agrarian exports. The variance of the RCA1 indices is in this case 0 to 4. The explanation of this state can be found again in the effects of the Common Agricultural Policy, which causes the deformations of the market, where as a consequence we can see some paradoxical situations, where some of the items form a pillar of the agrarian export, while its world competitiveness is almost infinitesimal (e.g. S3-041 wheat, S3-011 beef meat, S3-034 frozen and cooled fish). The analysis further confirmed that among the most important aggregations belonging to the natural pillar of the agrarian export of the EU15 countries (world competitiveness and high share in the value of export) are e.g. S3-012 meat, S3-022 milk, S3-073 chocolate, S3-048 cereal preparations, S3-024 cheese, S3-056 vegetable preparations or S3-421 vegetable fats and oils. These aggregations represent a total of about 40% of the value of EU15 agrarian exports.

In the case of the EU12, the analysis points to the reality that the EU Common Trade and Common Agricultural Policy has an effect on these countries for a relatively short period of time, however the changes in the commodity structure of the export are already visible. The export structure is not significantly stabilized, which corresponds to the findings resulting from figure no. 1. The main centre of the sales of their agrarian production is also in the internal EU market. However after entering the EU, the new member countries got under the strong competitive pressure of the existing EU members. This logically had an effect on the changes in the export structure. The fact is that the export structure of the new member countries is in the process of adjusting to the new conditions, which can be documented significantly by a larger variant of RCA1 indices values of separate aggregations. The RCA1 index varies from the point of view of the internal market in the case of the EU12 countries in all observed aggregations in the range from 0 to 3. The situation is relatively similar to that exhibited by the EU15 countries in terms of the participation of EU12 countries in the world market, where these countries export approximately one fifth to one quarter of their agrarian exports. The variance of the RCA1 indices is in this case 0 to 3.5. The analysis further confirmed that the most important aggregations are among the natural pillar of the agrarian export of the EU12 countries (world competitiveness and high share in the value of export) e.g. S3-012 meat, S3-058 processed fruits, S3-061 sugar, S3-017 chosen meat products, S3-022 milk, S3-073 chocolate, S3-048 cereal preparations, S3-024 cheese, S3-056 vegetable preparations, S3-122 tobacco products or S3-041 wheat. These aggregations represent a total of about 55% of the value of EU12 agrarian export. This implies that the competitiveness of the agrarian export of the EU12 is healthier from the economic point of view than in the case of the EU15 countries in the global perspective. However it is possible here to find new aggregations, which have a significant position in terms of the export structure, and whose competitiveness is however dubious (e.g. S3-034 fish, S3-054 vegetables or S3-057 fruits).

## **Acknowledgements**

This paper is a part of a research project which was carried out by the authors within the framework of the “Economics of resources of the Czech agriculture and their efficient use in the frame of multifunctional agri-food systems” grant No. 6046070906, funded by the Czech Ministry of Education, Youth and Sports of the Czech Republic.



## References

1. Businessinfo.cz, Trade, Investment and Business support, available at: <http://www.businessinfo.cz/cz/clanek/strategie-oez-cr-v-zahranici/vyzvy-k-posileni-konkurenceschopnosti/1001537/38519/>, retrieved 05/05/2010.
2. Eururalis, Main conclusions Eururalis 2.0 scenario study towards 2030, available at: <http://www.eururalis.nl/general6.htm>, retrieved 05/05/2010.
3. European Commission, Agricultural trade statistics, EUROSTAT database, [http://eabouteuropa.eu/agriculture/agrista/tradestats/index\\_en.htm](http://eabouteuropa.eu/agriculture/agrista/tradestats/index_en.htm).
4. Jeníček, V., Krepl, V.: The role of foreign trade and its effects, *Agric. Econ. – Czech*, 55, 2009 (5): 211–220.
5. Kotler, P.: *Principles of Marketing, Fourth European Edition*, Grada 2007, ISBN: 978-80-247-1545-2, EAN: 9788024715452.
6. Krugman, P. R., Obstfeld, M.: *International Economics – theory and policy*, Pearson Education, Inc., Boston, 2006, ISBN 0-321-31154-X.
7. Svatoš, M.: Selected trends forming European agriculture, *Agric.Econ.-Czech*, 54, 2008.
8. Tomšík, K., Rosochatecká, E.: Competitiveness of the Finnish Agriculture after ten years in the EU, *Agric. Econ. – Czech*, 53, 2007 (10).
9. Utkulu, U., Seymen, D.: Revealed Comparative Advantage and Competitiveness: Evidence for Turkey vis-à-vis the EU/15. Paper to be presented at the European Study Group 6th Conference, ETSG 2004.



# Knowledge and financial skills of rural youth in Poland

Monika Szafrńska<sup>1</sup>

<sup>1</sup>Department of Management and Marketing in Agribusiness,  
University of Agriculture in Krakow, Al. Mickiewicza 21, 31-120 Kraków, Poland  
mszafranska@ar.krakow.pl

**Annotation:** In conditions of globalisation professional and personal success of the citizens increasingly more depends on their financial knowledge and associated practical skills. High level of financial awareness allows consumers to select financial services most adequate to their financial capabilities and also affects the correct assessment of risk connected with a given product.

The paper aims to analyse the state of knowledge and financial skills of rural youth (18 to 29 years of age) in Poland. The investigated problem is particularly important because rural areas in Poland are characterized by a unequal access to educational and financial institutions and on average lower education level in comparison with the urbanized areas.

The source of data used for the analysis and deduction was primary information from Authors' own investigations (interview questionnaire). Field research was conducted in 2010 but the information gathered applies to the year 2009.

As has been demonstrated by the conducted analyses, Polish youth has a poor financial awareness. The level of knowledge and financial competences among rural youth depend on the education, the amount and source of income of respondents but also on the activity on financial services market. It results from different attitudes of consumers towards using loan and savings products, diversified motives which drive them at the choice of financial product and preferences concerning the sources of financial knowledge.

One of the ways to improve the situation is undertaking commonly accessible activities in the field of financial education (Poland has not yet developed a national strategy of financial education as is the case in the US, United Kingdom or Czech Republic, despite the appeals of OECD and the European Commission.) It will help future consumers to make rational decisions on using financial services and facilitate responsible management of household budget.

**Key words:** rural youth, financial knowledge, financial education

**JEL classification:** D14, I22

## 1 Introduction

Financial education involves activities aimed at dissemination of knowledge and creating positive habits among citizens leading them to make proper decisions concerning management of their personal finances [4].

For several years knowledge and financial education have been the subjects more and more often disputed in many countries including Poland. Solid knowledge about finances enables consumers to choose financial services best suiting their needs and financial possibilities. Moreover, it influences the right assessment of risk connected with individual products [8]. On the other hand, in the opinion of A. O'Connell, a high level of households' financial skills helps to limit their excessive consumption, indebtedness and unnecessary spending [5].

Beside individual benefits, also social advantages may be indicated. Among the advantages for the society one should point out the limiting of so called "financial exclusion". Persons who possess some definite knowledge about retail financial services generally do not use the services provided by the entities offering more expensive services or those burdened with a higher risk.

On the other hand among the economic benefits one may indicate: revitalization of transborder activities concerning financial services, increased stability of financial system by

diminishing the number of failures to meet financial obligations and improving diversity of financial products [9].

The level of citizens' financial knowledge depends on many factors. In the opinion of some authors, one of the determinants which significantly influences the level of knowledge and financial skills is citizens' age [3,7]. Inclination to take risk is associated with age. Younger persons are able to accept greater risk expecting better profits. Another determinant is the place of residence (rural area/city). It results from the fact that rural areas are characterized by a worse structure of financial institutions, unequal access to educational institutions but also on average lower level of education in comparison with urbanized areas.

The paper aims to evaluate the state of knowledge and financial skills of rural youths in Poland as the generation who in short perspective will decide about the rate, tendencies and quality of changes occurring in rural areas.

## 2 Data and Methodology

The main source of data used for the analysis and inference was primary information obtained through Author's own investigations. The studies were conducted in the framework of own project "Determinants of financial knowledge of rural inhabitants on an example of the Malopolska Region" (research project financed from the outlays on science in Poland in 2009-2011). Guided interview using interview questionnaire was applied. The studies were conducted in the first quarter of 2010 on a randomly selected population of 791 rural inhabitants. The main criteria of the population division were respondents' gender, age, education, the size of their household, net income per capita in the household and the main source of income of the analysed household. In the analysed category (18-29 years of age) were 285 respondents (36%). Part of the questions in the questionnaire were multiple choice questions, therefore in case of some features analysed in the paper the number of answers exceeds 285 indications.

Specific aims of the studies comprised identification of rural youth behaviours, indicating determinants of the level of financial knowledge of the young generation but also characteristics of the attitudes and preferences of rural youths connected with spending money, saving and crediting.

Statistical analysis comprised structure indicators and *non-parametric Chi Square test* ( $\chi^2$ ) allowing for an assessment of the significance of relationship between variables if at least one of them is non-measurable. All hypotheses were verified on the significance level  $\alpha = 0.05$ . In the case when the number of observations in the contingency table cells was lower than 8, no testing was conducted.

Formula 1. Value of ( $\chi^2$ )

$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^k \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

$O_{ij}$  – result of measurement in the  $i$ -th line and the  $j$ -th column

$E_{ij}$  – expected value in the  $i$ -th line of the  $j$ -th column

### 3 Financial behaviours of rural youth

The analysed respondent group consisted of 55% of women and 45% of men. The most numerous respondent group was composed of persons with secondary education (56%). Almost one third of the respondents were people possessing higher (tertiary) education. The least numerous group was made up of persons having only primary education (only 5%). Almost 30% of the surveyed households were composed of four persons, whereas 27% were households composed of 5 and more persons. The main source of income for the studied families was hired labour (63% of indications). Farmer households constituted 17%. A considerable part of the youth was receiving scholarships (9%). In case of nearly 40% of the respondents monthly net income per capita in the analysed households ranged from 501-1000 PLN. It was observed that the share of persons in individual income categories was decreasing with increasing income. A majority of the respondents estimated their material status as average (46% of the investigated population), whereas every third surveyed person considered financial situation of their family as good.

Surveyed youth highly evaluates the state of their financial knowledge. Almost 55% of the studied population declares an average level of financial knowledge, one third considers it as good whereas 4% as very good. Men, better educated and better earning persons feel more self-assured in the world of finances and more positive evaluate their financial situation. Apart from gathering subjective information about financial awareness of youth, a test was conducted allowing for an objective evaluation of the knowledge in this field. The test consisted of several questions concerning the theory of interest rate, mathematical skills and knowledge of basic financial products like savings accounts, bonds, investment funds and credit cards. As results from the investigations, on average every second representative of young generation from rural areas does not understand the meaning of basic economic terms referring to personal finances and is unable to properly estimate financial risk. Analysis conducted by means of *chi square test for independence* revealed that the level of objective financial knowledge of rural youth depends on the education (the level of financial knowledge is growing with the education), activity on the financial market (persons using a wide assortment of services possess a more extensive knowledge about finances) but also on the amount and source of income (persons who live on incomes from hired labour solved the test far better). Statistical analysis revealed also that gender has no influence on objective evaluation of the level of knowledge about finances (there is a difference in comparison with subjective evaluation). J. Tenant, J. Wright and J. Jackson obtained similar results [6].

Knowledge of the basic financial terms and mechanisms is very important since it allows citizens to better understand financial products and make rational decisions concerning their personal finances. Sharp competition on the financial services market causes that financial institutions apply a tactics of so called “hidden prices”, which makes consumers perceive the price of a service as lower, like e.g. credit interest paid in advance (discount) or perceive it as higher, like e.g. progressive interest on the deposits.

School was the main source of financial knowledge for youth (28%). In comparison with the elder respondent groups the obtained results were much higher. The reason may be the fact that the analysed youth are persons who have been already taught the course on “Essentials of entrepreneurship” which was introduced to Polish schools as obligatory in 2004. The programme of the course includes some issues of financial education. Owing to this fact young people on the level of secondary school have an opportunity to learn basic aspects of financial institution operation and mechanisms of financial services functioning. Moreover, many persons from the surveyed respondent group are studying or used to study economic and similar fields, therefore this answer was selected most frequently. Almost 20% of the respondents pointed to their own experiences and these were mainly better educated persons, working and using various bank products. Every tenth respondent learned the most about

finances from his parents or in work. Media, mainly the Internet were an important source of information, as well as friends and acquaintances. Respondents' knowledge of financial skills was the least influenced by financial counsellors or the surveyed life partners.

A great majority of young persons declare their willingness to possess knowledge of finances but much fewer answered positively to the question whether they were ready to upgrade their knowledge (43%). Almost one third is not interested at all in extending their knowledge in this area, whereas 27% of the population has no opinion. Persons with the lowest education feel the need for education on finances most (46%), the same applies to better educated people (50%). However, in these two groups the desire for knowledge is prompted by different impulses. The respondents possessing lower education have no knowledge whatsoever about basic financial mechanisms, unlike better educated respondents, who are aware of the usefulness of more extensive and far more advanced knowledge, which they could use in everyday life. Persons who already possess their personal account in a bank and are using many financial products dominate in the group declaring a willingness to learn.

The most felt need for education concerns problems of saving (41%), planning household budget (32%) and security for the retirement period (29%). Every fourth person is interested in taxes and insurance products. Among the respondents who wish to extend their knowledge on personal finances only 16% is interested in credit services. Every tenth respondent from the analysed group is unable to indicate the specific area of knowledge of finances with which they would like to get acquainted.

The source of knowledge about personal finances issues currently preferred by youth is radio (29%). Every fourth respondent would like to use the Internet for this purpose (educational services and e-Learning). In comparison with the youth from urbanized areas, the obtained values were lower. Urban youth places the Internet on the first place as the source of potential knowledge. An important factor restricting the rural youth willingness to use the internet is far worse Internet access in comparison with the urbanized areas. A considerable number of people who wish to upgrade their knowledge on various issues connected with personal finances prefer daily newspapers or weeklies and materials obtained from financial institutions. The respondents much less frequently pointed to other sources of information, such as books, specialist journals or television programmes. It should be also added that the latter form is much preferred by elder generation inhabiting rural areas.

Almost a half of young persons consults their decisions on personal finances with their families (most frequently with their parents) and friends. One in every five respondents makes decisions in this respect himself. These are already working people and respondents coming from one or two-person households. Bank employees were also very important experts in the area of personal finances for the respondents (14%).

Basic financial products available to young people in Poland generally do not differ from those offered to other clients. The greatest differences are noticeable in the prices of bank products, such as e.g. current account fees, debit and credit cards. Usually these services are cheaper for pupils and students. It is one of the ways in which financial institutions attract new client groups.

The most popular bank service among the surveyed youth was a current account (58%). It is a basic financial product because it provides a starting point to using other bank services, such as: transfer order, order to pay, pay card or credit card. In comparison with the indicator of the use of banking services by urban youth in Poland, the obtained values were lower. Despite a dynamic growth of the degree of banking services use by rural dwellers in Poland observed over the last five years, Polish rural areas still reveal the lowest indicator of the use of banking services. The statistical analysis showed that neither gender nor the number of persons per respondents' households have any effect upon possessing personal bank account by rural youth. On the other hand, another important factor diversifying consumer financial behaviours

was education. With growing level of education also the indicator of banking services use was increasing in the studied population. Only 23% of persons possessing primary education were bank account owners, whereas in the respondent group having tertiary education the indicator reached almost 70%. The other determinants are the amount and source of income. Account owners were most frequently people employed on the basis of the contract of employment (84%). In this case, the high indicator of banking services use was determined among others by the fact that many employers oblige their employees to open bank accounts so that the remuneration can be transferred into it. Almost two thirds of young people use banking accounts via the Internet. The analysis conducted using *Chi square test for independence* confirmed the fact that younger generation uses the Internet banking more often than older respondents. The obtained results suggest also that one in five young persons possessing an account does not use it actively for management of personal finances (money transfers, payment for invoices, control over expenditure). It mainly results from the Poles' attachment to cash payments. In this respect persons using Internet banking appear more favourably.

The analysed group is characterised by a high inclination for incurring credits and loans. Every fourth respondent was repaying some short-term credit in 2009. In comparison with the other age groups, a higher inclination of youth to make credit purchases was apparent. It is understandable because this is a group of people just starting their adult lives on their own account and starting a family, which makes necessary purchasing new goods crucial for the proper functioning of a new household. The results are convergent with the results obtained in research conducted by A. Atkinson A. E. Kempson [1]. Every tenth respondent was using credit card. Almost 5% of the surveyed applied for a mortgage-secured credit for a purchase, construction or renovation of a house.

As results from the research of many authors in Poland, younger persons are more eager to save [2,7]. Results of the analyses corroborate observed relationship for the rural youth. However, the differences in the willingness to save between the young and elder generation reach only several percent. Despite high inclination for saving, the respondents did not reveal a tendency for systematic saving. Only every third person declared that they save systematically. In case of the other persons it was irregular and short-term saving money. Considering the main socio-demographic features, women, persons possessing higher education and employed on the basis of employment contract, and families of up to three persons demonstrated a higher tendency for saving.

Saving persons may have some determined preferences concerning the form of saving (cash or cashless). Conducted studies reveal that almost one third of youth traditionally keep their whole savings or a major part of them at home. It results from Poles' attachment to cash (so called cash cult), lack of trust in financial institutions but also an inclination to keep some cash reserves to fulfil the unexpected needs. In comparison with the other age groups, except for the oldest group (over 65), young persons revealed the greatest "attachment" to cash. It should be remembered that financial means kept in cash do not generate any profit for their owner because of the changes of money value in time. Therefore, information and educational activities targeting youth are crucial in order to make them aware of the costs incurred by keeping cash.

Almost 30% of the surveyed youth indicated a bank deposit or savings account. In comparison with the elder people a stronger tendency to accumulate means in deposit account or savings account was apparent. Every fifth surveyed person spends saved money on various goods on the market. Over 15% of young persons from rural areas reveals a tendency to keep their savings in a current account. Current account is another, the least effective after cash, form of saving. Current interest rate of most accounts for physical persons in Poland is lower than the inflation level. The other forms of saving were purchases of investment fund shares (6%) or purchasing life insurance (4% each). For this age group investments in stocks and bonds were of marginal importance.

## 4 Conclusions

Competences in personal finances area are one of the skills crucial in the adult life of each citizen. As results form the conducted analysis, Polish rural youth possesses low financial awareness. The level of knowledge and financial competencies depend on the level of young people's education, the amount and source of income but also on the activity on financial services market. Better educated and better earning persons, those who work and use several financial products reveal a higher level of knowledge.

One of the ways to improve the situation is undertaking commonly accessible activities in the field of financial education (Poland has not yet developed a national strategy of financial education as is the case in the US, United Kingdom or Czech Republic, despite the appeals of OECD and the European Commission). Efficient financial education strategy should comprise the preferences and requirements of respective citizen groups.

The results of studies suggest that for the rural youth population school was the main source of knowledge about problems of personal finances. Therefore, educational programmes concerning the essential issues and financial mechanisms should be exceptionally thoroughly prepared. Attention should be also paid to appropriate skills and competences of the trainers.

Almost a half of rural youth declares their willingness to continue education about personal finances. The most important topics for rural youth in Poland are saving, household budget management and security for the retirement period.

A considerable part of the surveyed population did not use any financial services. Over 40% of young people did not even possess a personal account which is the basic financial product. These were poorer educated persons and living on non-employment income. Therefore it is crucial to undertake educational activities to increase the use of banking services by this group of rural youth.

Taking into consideration a great changeability of consumer behaviours on financial services market and susceptibility to the influence of various factors, it might be interesting to continue the endeavours in this respect in order to determine the dynamics and tendencies of occurring changes. It should be remembered that future social, economic and civilisation development of rural areas to a considerable degree depends on young generation.

## References

1. Atkinson A., Kempson E.: Young people, money management, borrowing and saving. A report to the Banking Code Standards Board, Personal Finance Research Centre. URL: [http://www.pfrc.bris.ac.uk/Reports/BCSB\\_young\\_people.pdf](http://www.pfrc.bris.ac.uk/Reports/BCSB_young_people.pdf).
2. Błędowski P., Iwonicz-Drozdowska M.: Financial Services Provision and Prevention of Financial Exclusion in Poland, National Survey. URL: <http://www.fininc.eu>.
3. Chen H., Volpe R. P.: An analysis of personal financial literacy among college students. *Financial Services Review*, 1998, 8. ISSN 1057-0810.
4. Hogarth J.: Federal Reserve Board U.S.A. Financial Education and Economic Development. URL: <http://oecd.org/dataoecd/20/50/37742200.pdf>.
5. O'Connell A.: Measuring the effectiveness of financial education. URL: <http://www.retirement.org.nz>.
6. Tennant J., Wright J., Jackson J.: Financial hardship and financial literacy: a case study from the Gippsland Region. *Jassa - The Finsia Journal of Applied Finance*, 2009, 2. ISSN 0313-5934.



7. The state of financial knowledge of Poles, URL: [http://www.citibank.com/poland/kronenberg/polish/files/fk\\_badania\\_01.pdf](http://www.citibank.com/poland/kronenberg/polish/files/fk_badania_01.pdf).
8. Samy M., Tawfik H., Huang R., Nagar A. K.: Financial Literacy of Youth. Sensitivity Analysis of the Determinants. *International Journal of Economic Science and Applied Research* 2008, Vol 1, Issue 1. ISSN 1791-5120.
9. Szafrńska M., Matysik-Pejas R.: Knowledge and financial skills of consumers in Poland against the background of selected countries in the world. *Delhi Business Review: An International Journal of Society for Human Transformation*, 2010, Vol 11, No 2. ISSN 0972-222x.



# Econometric Analysis of the Relationship between Wholesale Price and Consumer Price in the Pork Agri-food Chain in the Czech Republic

Lenka Šobrová<sup>1</sup>

<sup>1</sup>Department of Economics, Faculty of Economics and Management,  
Czech University of Life Sciences Prague,  
Kamýcká 129, 165 21 Prague 6 Suchbát, Czech Republic  
sobrova@pef.czu.cz

**Annotation:** This paper deals with an analysis of vertical price transmission in the pork agri-food chain in the Czech Republic. The paper is focused mainly on the position of consumers (as the final component of the pork agri-food chain) and their power to push the price level down against the efforts of retailers to push the price up. Imperfect competition and imperfect market structure of the pork agri-food chain might be assumed in this case. Price transmission in the pork agri-food chain is analysed based on the time series of pork wholesale price and pork consumer price that contain monthly data from January 1998 to May 2009. The price transmission is analysed in two periods - before and after EU accession. First of all, the nature of the time series is examined; then, the Vector Error Correction Model (VECM) (as a suitable econometric tool for examining price transmission) is employed to analyse both short-run and long-run relationships between the prices analysed. Furthermore, the market structure and position of wholesalers and consumers are examined and evaluated. Moreover, the role of retail is determined and its impact on price transmission is discussed. The role of supermarkets and hypermarkets, their position and potential pressure could be crucial for an analysed relationship, i.e. price transmission of the wholesale and consumer price of pork in the Czech Republic. Finally, conclusions and suggestions are presented, based on the results of the processed analysis. The analysis represents a consecutive step in the former price transmission analysis, which was focused on the relationship between farm-gate price and the wholesale price of pork. Subsequently, the whole pork agri-food chain will be covered and fully described.

**Key words:** Price transmission, agri-food chain, wholesale price, consumer price, VECM model, pork.

**JEL classification:** Q13

## 1 Introduction

Price transmission in the agri-food chain is a current topic with a relatively short history, especially in Central European countries. Nevertheless, the examination of price transmission is crucial, and its importance should be obvious. An analysis could be focused on vertical or horizontal price transmission - the relationship among prices at different levels of the agri-food chain. An econometric approach, usually based on the Vector Autoregressive Model, Vector Error Correction Model or Threshold Vector Error Correction Model, could answer questions concerning the nature of the selected agri-food chain, market structure, asymmetry of price transmission or, e.g., the law of one price.

This paper deals with vertical price transmission in the pork agri-food chain in the Czech Republic; therefore, the following literature review is focused on papers concerning an analysis of vertical price transmission. The first studies of vertical price transmission were introduced, e.g., by Heien [7], Boyd, Brorsen [3] and Kinucan, Forker [8]. Later, vertical price transmission in meat agri-food chains was analysed, e.g., by Azzam [1], Goodwin, Harper [6], Peltzman [11] and Bojnec [2]. Advanced techniques and new knowledge concerning the

relevant topic in the current period were introduced and presented, e.g., by Vavra, Goodwin [12], Bunte, Vavra [4] and Lechanová [9].

Vavra, Goodwin [12] analysed vertical price transmission in meat agri-food markets in the USA using cointegration analysis, the Vector Error Correction Model and Threshold Vector Error Correction Model. The analysis showed that price transmission in the pork agri-food chain is asymmetric. Bunte, Vavra [4] analysed vertical price transmission in meat agri-food chains in several countries using the Threshold Vector Error Correction Model. Analysis of price transmission in the pork agri-food chain in the Czech Republic showed that price transmission is asymmetric at all levels of the analysed agri-food chain. Lechanová [9] analysed vertical price transmission with an emphasis on supply and demand shocks in meat agri-food chains in the Czech Republic. The analysis showed inelastic and asymmetric reactions between pork prices.

## 2 Data and Methodology

### 2.1 Objective and Data

The *objective* of this paper is to examine and describe the nature of price transmission in the pork agri-food chain in the Czech Republic, as well as its market structure, using an econometric procedure, specifically multivariate time series analysis.

To fulfill this objective the following *hypotheses* were defined and subsequently verified:

*H<sub>1</sub>: The nature of wholesale price and consumer price time series before and after the Czech Republic EU accession differs.*

*H<sub>2</sub>: The pork agri-food chain is characterized by imperfect competition.*

*H<sub>3</sub>: If imperfect competition was proven, then retailers would abuse their market power relative to consumers.*

The analysis of price transmission is based on time series of the wholesale price and consumer price of pork (pork leg without bones) in the Czech Republic, which contains monthly data from the period of January 1998 to May 2009. *Data* are provided by the Ministry of Agriculture, Prague [13].

All calculations were done using the econometric software RATS 6.35 and CATS 2.0, produced by Estima.

### 2.2 Methodology

Price transmission between wholesale price and consumer price is analysed based on multivariate time series analysis. The analysis executed follows the following steps:

1. *Examination of time series:*

- Graphs of selected time series and their main statistical characteristics are examined to determine structural breaks in selected time series;
- Autocorrelation Function (ACF) and Partial Autocorrelation Function (PAFC) are examined to discover the time series' seasonality;
- Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests are employed to examine the time series' stationarity;

2. *Examination of lag length:*

- Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC) are employed to determine the significant lag length of the analysed variables;

### 3. Co-integration analysis:

- Eigenvalue and Trace tests are employed to verify the long-run relationship between selected variables and to determine the number of cointegrating vectors;

### 4. VAR/VECM model:

- Vector Error Correction Model (VECM) is employed to describe both the short-run and long-run relationships between selected variables in the case of nonstationary time series. VECM is derived in the following form:

$$\Delta X_t = \eta + \Pi X_{t-1} + \sum_{s=1}^p C_s \Delta X_{t-s} + U_t ; \quad (1)$$

where  $C_s = 0$  for  $s > p$ ,  $X_t$  is a  $k \times 1$  vector of variables which are supposed to be integrated of order 1,  $(I(1))$ ,  $u_1, \dots, u_t$  are  $\text{nid}(0, \Sigma)$  and  $\Pi$  is a matrix of the long-run relationships;

- if all time series are stationary, i.e. integrated of order 0,  $(I(0))$ , then the Vector Autoregressive Model (VAR) describing the short-run relationship between selected variables is employed.

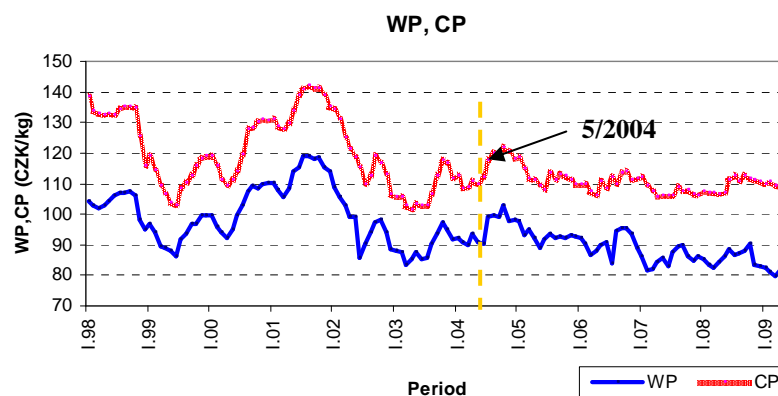
### 5. Additional tests, residual analysis:

- test of exclusion, test of stationarity and test of weak exogeneity are employed to verify the additional characteristics of selected variables and relationships of the model;
- residual analysis (calculation and interpretation of information criteria, multicollinearity, autocorrelation of residuals, normality of distribution and heteroskedasticity) is employed to verify statistical characteristics of the derived model.

## 3 Results

### 3.1 Time Series Examination

This paper is focused on price transmission analysis in the pork agri-food chain in the Czech Republic. An econometric approach which uses time series analysis is employed for this purpose. Therefore, an examination of the selected time series is crucial. Price transmission in the selected agri-food market is processed for the period from January 1998 to May 2009. In this period, seasonality was not proven. However, a structural break (the Czech Republic's accession to the European Union (EU)) that caused different behaviours of the wholesale price and consumer price time series is obvious (see Figure 1 and comments to Figure 2 and Figure 3), even if the time series variability started to decrease in 2002. Therefore, the price transmission is analysed in two periods – before EU accession and after EU accession.

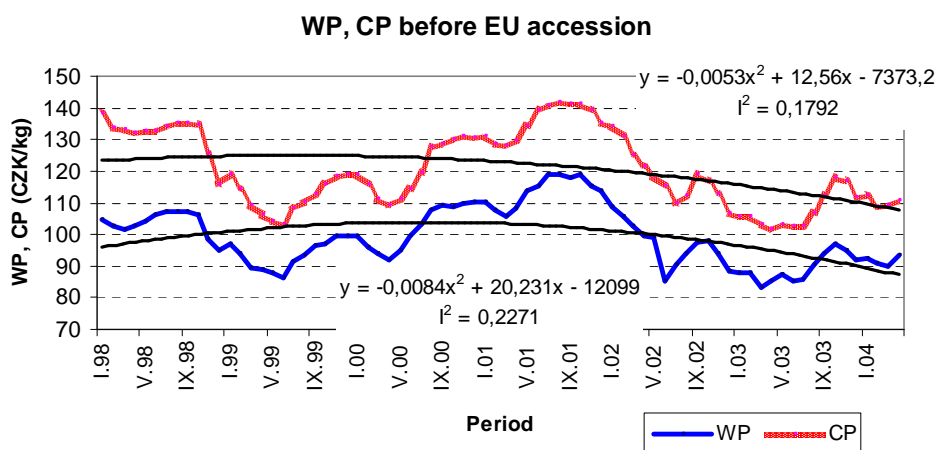


**Figure 1.** Wholesale price and consumer price of pork in the Czech Republic. Source: Ministry of Agriculture, own processing.

### 3.2 Price Transmission Analysis

#### Period before EU accession

In the period before EU accession, the time series of the consumer price of pork almost copies the time series of the wholesale price of pork (see Figure 2). The trend functions show the long-term tendency of each time series; however, values of the index of determination are very low. Thus, these trend functions can only be used for the first cursory notion of time series behaviour. The main statistical characteristics (mean, standard error, coefficient of variation, in this order) of individual time series are as follows: WP – 99.40 CZK/kg, 9.3563, 9.41 %; CP – 120.46 CZK/kg, 11.9227, 9.89 %. These characteristics show that the variation of wholesale price and consumer price time series is almost the same.



**Figure 2.** Wholesale price and consumer price of pork in the Czech Republic - period before EU accession. Source: Ministry of Agriculture, own calculation.

The Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC) suggested one period (month) as a significant lag length for both the wholesale price and consumer price of pork in the analysed period. Thus, one lag of both variables is employed to analyse their mutual relationship using the Vector Error Correction Model (VECM) or Vector Autoregressive Model (VAR), respectively.

The Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test found that both the wholesale price and consumer price of pork in the Czech Republic in the period before EU accession were nonstationary at a 1 % significance level, while their first differences are stationary (see Table 1). The time series of wholesale price and consumer price are

nonstationary and integrated of order one, i.e. I(1). Therefore, for the following analysis VECM is employed.

**Table 1.** ADF, PP test - period before EU accession.

Variable	ADF test			PP test		
	A	B	C	A	B	C
WP	-0.3781	-2.0351	-1.9459	x	-1.6713	-1.7537
difWP	<b>-4.9966</b>	<b>-4.9274</b>	<b>-4.9625</b>	x	<b>-6.5357</b>	<b>-6.5356</b>
CP	-0.5434	-2.2616	-2.1529	x	-1.8049	-1.7809
difCP	<b>-4.8566</b>	<b>-4.8231</b>	<b>-4.8514</b>	x	<b>-5.2973</b>	<b>-5.2971</b>

A = without intercept and trend; B = with intercept and without trend; C = with intercept and trend. Italics = significant at a significance level of 5 %; bold = significant at a significance level of 1 %. Lag length for ADF and PP test = 1.

Source: own calculation.

Cointegration analysis discovered one cointegrating vector in the analysed relationship, thereby verifying the long-run relationship between wholesale price and consumer price of pork in the analysed period (see Table 2).

**Table 2.** Cointegration analysis - period before EU accession.

H0:r	p-r	Eigenv.	Trace	Trace*	Frac95	P-value	P-value*
0	2	0.354	35.353	34.954	15.408	0.000	0.000
1	1	0.034	2.629	2.619	3.841	0.105	0.106

Source: own calculation.

Table 3 contains selected parameters of VECM. Alpha parameters show the speed of equilibrium setting up; the higher the value, the faster the reaction of the variable. Transposed Beta shows the nature of market structure. Value 0.781 expresses price transmission elasticity. The value shows that an imperfect market structure should be considered. Matrix PI describes the long-run relationship between wholesale price and consumer price. The results of additional tests (test of exclusion, stationarity, weak exogeneity) and residual analysis are sufficient.

**Table 3.** VECM model - period before EU accession.

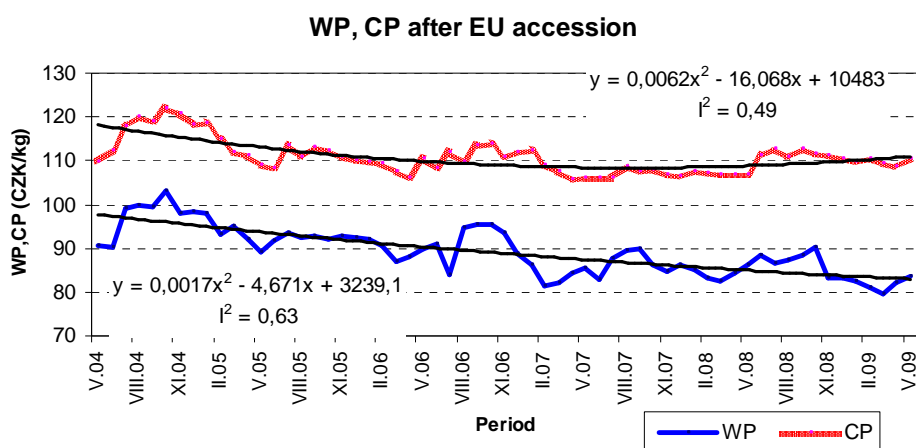
Beta (transposed)			Alpha	
logWP	logCP		logWP	0.076
1.000	-0.781		logCP	0.527
PI			t-values	
	logWP	logCP	logWP	logCP
	0.076	-0.059	0.612	-0.612
	0.527	-0.412	4.409	-4.409

Observations: 76; Degrees of freedom: 72

Source: own calculation.

### Period after EU accession

In the period after EU accession, the time series of consumer price follows the time series of wholesale price (see Figure 3). The trend functions show the long-term tendency of each time series; the values of indices of determination are sufficient. The main statistical characteristics of the analysed time series are as follows (mean, standard error, coefficient of variation, in this order): WP – 89.32 CZK/kg, 5.4394, 6.09 %; CP – 110.86 CZK/kg, 3.8429, 3.47 %. These characteristics show that the variation of wholesale price is higher than the variation of consumer price.



**Figure 3.** Wholesale price and consumer price of pork in the Czech Republic - period after EU accession.  
Source: Ministry of Agriculture, own calculation.

The AIC and SBC tests suggested one period (month) as a significant lag length for the wholesale price and consumer price of pork in the analysed period. Therefore, a lag of one period is employed in the following multivariate time series analysis to examine the price transmission in the selected agri-food chain.

The ADF and PP tests found that both the wholesale price and consumer price of pork in the analysed period are nonstationary at a 1 % significance level, while their first differences are stationary (see Table 4). The time series of wholesale price and consumer price are nonstationary and integrated of order one, i.e. I(1). Therefore, for the following price transmission analysis, VECM is employed.

**Table 4.** ADF, PP test - period after EU accession.

Variable	ADF test			PP test		
	A	B	C	A	B	C
WP	-0.4299	<i>-4.2904</i>	-1.8403	x	-2.0914	<b>-4.3141</b>
difWP	<b>-6.4946</b>	<b>-6.3956</b>	<b>-6.5171</b>	x	<b>-8.7629</b>	<b>-8.7848</b>
CP	-0.1683	-2.3919	-1.9751	x	-2.1822	-2.8103
difCP	<b>-5.6207</b>	<b>-5.5404</b>	<b>-5.5931</b>	x	<b>-8.5124</b>	<b>-8.5008</b>

A = without intercept and trend; B = with intercept and without trend; C = with intercept and trend. Italics = significant at a significance level of 5 %; bold = significant at a significance level of 1 %. Lag length for ADF and PP test = 1.

Source: own calculation.

Cointegration analysis demonstrated the long-run relationship between the wholesale price and consumer price of pork in the Czech Republic in the period after EU accession. The Trace test found one cointegrating vector in the analysed relationship (see Table 5).

**Table 5.** Cointegration analysis – period after EU accession.

H0:r	p-r	Eigenv.	Trace	Trace*	Frac95	P-value	P-value*
0	2	0.258	21.193	20.890	15.408	0.005	0.006
1	1	0.053	3.275	3.259	3.841	0.070	0.071

Source: own calculation.

Table 6 contains selected parameters of the VECM model describing the relationship between wholesale price and consumer price in the Czech Republic in the period after EU accession. Beta transposed describes the nature of market structure; the value 1.413 displays the price transmission elasticity. Alpha parameters show how fast each variable reaches equilibrium; the higher the value, the faster the reaction. Matrix PI describes the long-run mutual



relationship between selected variables. The results of additional tests (test of exclusion, stationarity and weak exogeneity) and the results of residual analysis are sufficient.

**Table 6.** VECM model - period after EU accession.

Beta (transposed)		Alpha		
logWP	logCP	logWP	-0.162	
1.000	-1.413	logCP	0.230	
PI		t-values		
	logWP	logCP	logWP	logCP
logWP	-0.162	0.228	-1.564	1.564
logCP	0.230	-0.324	3.485	-3.486
Observations: 61; Degrees of freedom: 57				

Source: own calculation.

### 3.3 Discussion

The first hypothesis, which states that *the nature of wholesale price and consumer price time series before and after the Czech Republic EU accession differs*, was accepted. Time series of wholesale price and consumer price are nonstationary and integrated of order one in both analysed periods; however, the variability of analysed variables is different before and after EU accession. The variability of the analysed time series before May 2004 is higher than the variability of the analysed time series after May 2004. It might then be said that the nature of the analysed time series before and after EU accession is different.

The second hypothesis, which states that *the pork agri-food chain is characterized by imperfect competition*, was accepted. Price transmission elasticity before EU accession reaches the value 0.781, whereas price transmission after EU accession reaches the value 1.413. Therefore, the market structure in the first period could be considered oligopsonic, while the market structure in the second period could be considered either oligopolistic, or both oligopolistic and oligopsonic (see the theoretical model specified, e.g., by Lloyd et al [10] or Čechura, Šobrová [5]). These days, both an oligopolistic and oligopsonic market structure is rather likely. Retailers can have oligopoly power with respect to consumers and oligopsonic power with respect to wholesalers. Moreover, the method of pork processing and distribution can also influence price transmission.

The third hypothesis, which states that *if imperfect competition was proven, then retailers would abuse their market power relative to consumers*, was not accepted. An imperfect market structure was proven; however, the stronger position of retailers was not proven (according to price transmission elasticity) for both analysed periods. The influence of retailers such as supermarkets and hypermarkets, as well as their role in the selected agri-food chain, can be considered the main reason. These days, the retailers which may stand between wholesalers and consumers have the strength to push them to accept their prices. This situation is also connected with, among other things, the possibilities of foreign trade and its liberalization. For instance, cheap imported pork (e.g. from Poland) influences the nature of price transmission in the pork agri-food chain in the Czech Republic.

## 4 Conclusions

The aim of this paper was to examine and describe the nature of price transmission in the pork agri-food chain in the Czech Republic, as well as its market structure, using an econometric procedure. VECM, as a suitable and appropriate tool, was employed for this purpose. Price transmission was analysed in two periods; the first period was from January 1998 to April 2004, and the second period was from May 2004 to May 2009, due to the different behaviours and properties of the analysed time series within these periods.

Price transmission analysis found a difference in the nature of price transmission in the analysed periods. Moreover, it showed an imperfect market structure in the pork agri-food chain, in the relationship between wholesale price and consumer price. Nevertheless, the assumption that retailers have a unique position was not confirmed. This result could be connected with the role and position of retailers such as supermarkets and hypermarkets, and the possibilities of foreign trade.

This analysis enriched the results of price transmission analysis of the pork agri-food chain in the Czech Republic, which was focused on the relationship between farm-gate price and wholesale price. The former research found that competition between farmers and wholesalers is imperfect; the market structure could be considered oligopsonic (see, e.g., Čechura, Šobrová [5]). Therefore, the market structure in the whole pork agri-food chain in the Czech Republic could be considered imperfect. Finally, an analysed agri-food chain could instead be regarded as demand-driven.

## Acknowledgements

Knowledge presented in this paper is the result of the grant solution MSM 6046070906 “Economics of Czech agriculture resources and their efficient usage within the framework of multifunctional agri-food systems”.

## References

1. Azzam, A. M.: Asymmetry and Rigidity in Farm-Retail Price Transmission. *American Journal of Agricultural economics*, Vol. 81, No. 3 (1999). ISSN 00029092.
2. Bojnec, S.: Price Transmission and Market Margins in the Slovenian Beef and Pork Markets during Transition. Xth EAAE Congress, 2002. (available on-line)
3. Boyd, M. S., Brorsen, B. W.: Dynamic Relationship of Weekly Prices in the United States Beef and Pork Marketing Channels. *Canadian Journal of Agricultural Economics*, 33(1985). ISSN 0008-3976.
4. Bunte, F., Vavra, P.: Supermarkets and the Meat Supply Chain – Economic Impact of Food Retail on Farmers, Processors and Consumers. OECD Publishing, 2006. ISBN 92-64-02887-0.
5. Čechura, L., Šobrová, L.: The Price Transmission in Pork Meat Agri-food Chain. *Agricultural Economics*, Vol. 54, 2008 (2). ISSN 0139-570X.
6. Goodwin, B.K., Harper, D. C.: Price Transmission, Threshold Behavior, and Asymmetric Adjustment in the U. S. Pork Sector. *Journal of Agricultural and Applied Economics*, 32, 3 (2000).
7. Heien, D. M.: Markup pricing in a dynamic model of the food industry. *American Journal of Agricultural Economics*, 62 (1980). ISSN 0002-9092.
8. Kinucan, H. W., Forker, O. D.: Asymmetry in Farm-Retail Price Transmission for Major Dairy Products. *American Journal of Agricultural Economics*, 69 (1987). ISSN 0002-9092.
9. Lechanová, I.: The transmission process of supply and demand shocks in Czech meat commodity chain. *Agricultural Economics*, Vol. 52, 2006 (9). ISSN 0139-570X.
10. Lloyd, T. et al.: Price Transmission in Imperfectly Competitive Vertical Markets. Discussion Papers in Economics No. 04/09, University of Nottingham, 2004. ISSN 1360-2438.

11. Peltzman, S.: Prices Raise Faster Than They Fall. *Journal of Political Economy*, Vol. 108, No. 3 (2000). ISSN 1537-534X.
12. Vavra, P., Goodwin, B. K.: Analysis of Price Transmission along the Food Chain. *OECD Agriculture and Fisheries Working Papers*, No. 3, OECD Publishing, 2005; doi:10.1787/752335872456. (available on-line)
13. Situační a výhledová zpráva – vepřové maso. MZe, Praha.



# Global trends in risk management support of agriculture

Jindřich Špička<sup>1</sup>

<sup>1</sup>University of Economics, Prague,  
W. Churchill Sq. 4, 130 67 Prague 3, Czech Republic  
<sup>1</sup>jindrich.spicka@vse.cz

**Annotation:** Agricultural production has always been exposed to many risks. The uncertainty of future incomes complicates both short-term production decisions and long-term planning which can adversely affect the provision of loans to farmers. The key drivers of farm profit or loss are production risks pertaining to the price and yield volatility of agricultural commodities. Because of the existence of heterogeneous agricultural policies over the world, which have recently changed due to the global economic crisis, it is highly topical to focus on the risk-related effects of the past and current public support of agriculture. The aim of this paper is to make an international comparison of risk management policies in OECD countries as well as in selected emerging economies. The results are based on the data from OECD PSE Database (Producer Support Estimates) and GSSE Database (General Services Support Estimates), a study of agricultural insurance schemes carried out by the European Commission (JRC-ISPRA) and an overview of risk-related policy measures formulated by the OECD. The results indicate that the maximum tariffs were fixed after the WTO Uruguay Round Agreement on agriculture in 1995, which banned countercyclical border measures (variable levies), but countries could react to world price fluctuations by modifying the applied tariffs and applying special safeguard measures within the WTO rules. All OECD countries have the price stabilizing support for at least some commodities. Although the share of market price support in the PSE has been decreasing for a long time, it still remains an important component in most countries around the world. The analysis also revealed the pilot experiences with index based insurance in developing countries whose economy is considerably dependent on agriculture.

**Key words:** Agriculture, agricultural policy, risk management, market price support, income stabilization.

**JEL classification:** Q18

## 1 Introduction

Omitting risk and uncertainty in decision has been criticized in the neoclassical theory of the firm since the 1960s. Over the last decades, better insight has been developed about risk assessment, risk preferences and value of information. Since the second half of the 90s of the 20<sup>th</sup> century, discussions on the topic of risk management in agriculture have been taking place at a global level. The literature on farmers' risk exposure usually covers price risk [5, 7, 14], yield risk [7, 13], both price and yield risk [3, 16] and the spectrum of the most frequently used risk management tools in agriculture [9, 10, 11, 12]. Most professional papers have been devoted to the issue of agricultural insurance as the most active and functional tool supporting stability in the field of agricultural business [1, 3, 11].

Many studies argued against the common definition of risk and uncertainty which considers risk as imperfect knowledge where the probabilities of the possible outcomes are known, whereas uncertainty exists when these probabilities are not known. Hardaker et al. [6] defined uncertainty as imperfect knowledge and risk as uncertain consequences, particularly exposure to unfavorable consequences. Risk is therefore not value-free, usually indicating an aversion for some of the possible consequences. Harwood et al. [7] offered more specific definition of risk. They defined risk as uncertainty that "matters" and may involve the probability of losing money, possible harm to human health, repercussions that affect resources (irrigation, credit),

and other types of events that affect a person's welfare. Uncertainty (a situation in which a person does not know for sure what will happen) is necessary for risk to occur, but uncertainty need not lead to a risky situation. Chavas [2] argued that the debate about distinction between risk and uncertainty ultimately boils down to an argument about the existence and interpretation of probability. He did not draw a sharp distinction between risk and uncertainty and uses the terms interchangeably. There has not been a clear consensus on definition of risk yet. However, this paper concentrates on pure risk which is considered as downside risk only, although the business risk usually incorporates both downside and upside risk.

The main groups of risk in agriculture result from the specific features of the agricultural sector and from the trends in agrarian policy. The OECD publications [11, 12] may be considered as significant and relatively comprehensive studies of income risk management in agriculture. The overview of the European agricultural risk management schemes was introduced in the common research project EC-JRC-ISPRA Italy with data contributed from European countries [1]. This study constituted the basis for analyzing strategies to integrate risk management tools within the Common Agricultural Policy (CAP). The strategic objective of the parallel research projects was to analyze the potential of different risk management tools for stabilizing farm household incomes in the EU [9]. The results of these surveys were used within the impact assessment of the CAP Health Check [4].

Some papers also examined the relationship between the farmers' operating risk and current subsidies. Based on the simulation at the commodity level the results revealed that partially or fully decoupled payments extend the farmers' decision-making possibilities. The current subsidies are a suitable complement to other commonly used risk management tools primarily designed to reduce the farmers' and farm income variability [15].

## 2 Data and Methodology

Risk management strategies can be grouped into three categories [8]: risk prevention, risk mitigation and risk coping strategies. Prevention and mitigation strategies focus on income smoothing, while coping strategies focus on consumption smoothing. *Prevention strategies* are intended for reducing the probability of a downside risk. They can also be called "*risk reduction strategies*". These are introduced before a risk occurs. Reducing the probability of an adverse event occurring increases the producers' expected income and reduces the income variance with a positive impact on wealth. These strategies primarily include [12] market price support measures (through price stabilization), market interventions such as private storage support (financing for producers to build or upgrade farm storage and handling facilities), non-marketing of agricultural products, support to production techniques such as water management (irrigation, drainage, flood control etc.), the purchase of certified seeds and animal breeds, pest and disease control, technical assistance and extension, and the inspection of agricultural products and food safety measures.

Whereas preventive strategies reduce the probability of the risk occurring, *mitigation strategies* reduce the potential impact if the risk were to occur. Risk mitigation strategies have an ex-ante effect. They can take several forms, for example, payments with a variable rate (or countercyclical payments) compensating for all or part of the income losses suffered according to a pre-established formula, subsidies for risk management tools (insurance systems, futures markets), income tax smoothing systems, income diversification support, support of vertical integration, contracting etc.

*Coping strategies* can relieve the impact of the risk once it has occurred. They include mainly ex-post measures. The main forms of coping consist of disaster relief payments, ad hoc assistance, individual dis-saving/borrowing, migration, selling labour or the reliance on public or private transfers. In this case, the important role of the government lies in providing

agricultural support programs such as calamity funds and other measures to manage sanitary or phytosanitary crises, safety nets, ad hoc state aid, social assistance etc.

The aim of this paper is to make an international comparison of risk management policies in OECD countries as well as in selected emerging economies. The analysis is based on the data from PSE database (Producer Support Estimates) and the GSSE database (General Services Support Estimate). A significant part of the PSE is market price support (MPS) which is defined as transfers from consumers and taxpayers to agricultural producers arising from policy measures that create a gap between domestic market prices and border prices of a specific agricultural commodity, measured at the farm gate level [12]. The individual measures have different labels describing their features. Any payment is defined as subject to a *variable rate* where the formula determining the level of payment is triggered by a change in price, yield, net revenue or income, or a change in production cost. If not, the payment has a *fixed rate*.

Because the European agriculture is very heterogeneous, the second part of the analysis is devoted to a closer view on a risk management schemes in the EU. There are various agricultural insurance systems in the EU which are defined as follows [1]. *Single-risk insurance* covers against one peril or risk, or even two but of a non-systemic nature (most often hail, or hail and fire). *Combined (peril) insurance* means a combination of several risks covered (two or more risks, mostly with hail as basic cover). In some countries (e.g. France) this type of insurance is also referred to as multi-risk insurance. *Yield insurance* guarantees the main risks affecting production. In the case of crops, the main risks affecting the yield (e.g. drought) are comprised. Premiums can be calculated from individual historic yield or from regional average yield. Losses (and premiums) can be calculated either by qualifying the losses due to each individual risk separately, either as the difference between the guaranteed yield and the insured yield. *Whole-farm insurance* consists of a combination of guarantees for the different agricultural products on a farm. Depending on the coverage of guarantees, it can be whole-farm yield insurance or whole-farm revenue insurance.

In some EU countries there are also the *stabilization accounts*, the individual bank accounts for self-insurance which are publicly regulated or promoted. The withdrawal can be based on yields, revenues or other indices.

### 3 Results

#### 3.1 Governmental support of risk management strategies in agriculture

As shown in tables 1 and 2, the share of risk related measures in the PSE has been decreasing for a long time. In the OECD area, it dropped to 66 % in the 2000s compared to more than 75 % in the 1990s (in emerging economies, the share reached 50 % in recent years). MPS takes the most substantial part of the risk related measures in the majority of OECD countries and the emerging economies as well. Hence risk reduction can be considered as the most supported risk management strategy over the world. Nevertheless, the share of MPS in the PSE has decreased - from ca 30 % in 1986 to ca 10 % in 2008. On the other hand, the significance of the fixed rate payments has increased. Fixed rate payments based on output, area, animal numbers, receipts or income were slightly less than the variable payments at the end of the 1980s, while they were close to six times higher in the 2000s. In the emerging economies, the MPS was negative in the 1990s and domestic prices were isolated from world prices. This changed in the 2000s.

Risk reduction measures other than MPS have become a more important part of the risk management support in OECD countries. The USA and EU pay more attention to technical assistance/extension, pest and disease control. Water management support has slightly

dropped, but it is expected to be more important in the future due to the greater weather volatility. Market risk management strategy - spreading sales - is a very widespread strategy in agriculture, but government assistance for private storage and non-marketing of agricultural products is rare.

Variable rate payments (VRP) and insurance subsidies are the essential components of the risk mitigation measures in PSE. VRP are implemented explicitly to stabilize farmers' receipts (ex ante). They only generate transfers when receipts are below a target level and include loan deficiency payments, marketing loan gains (allow contract crop producers to repay price support loans at the lower of the announced loan rate or the prevailing world market price) and storage payments providing producers interim funds to help them store rather than sell their products when market prices are low. Canada and the USA are two countries where VRP are most significant, reflecting the traditional higher exposure to climatic risk and recourse to insurance and stabilization payments. These systems are operated by the federal and/or provincial governments with contributions from farmers. As a consequence of decreasing MPS, VRP have increased in the USA and Australia.

**Table 1.** Structure of transfers from risk management policies in selected OECD countries (average of the periods)

		USA		Canada		EU		Australia		Japan	
		92-97	02-07	92-97	02-07	92-97	02-07	92-97	02-07	92-97	02-07
<i>Risk reduction</i> measures in PSE, of which	€ M	14 109	13 352	1 876	2 513	58 005	51 308	772	298	44 592	32 484
- Market Price Support (MPS)	%	81.3	69.2	98.7	98.9	97.9	96.4	82.0	49.0	99.2	99.2
- Other risk reduction measures <sup>*)</sup>	%	18.7	30.8	1.3	1.1	2.1	3.6	18.0	51.0	0.8	0.8
<i>Risk mitigation</i> measures in PSE, of which	€ M	2 948	5 879	930	1 191	359	465	70	319	1 790	1 263
- Variable rate payments	%	86.0	77.9	100.0	100.0	58.5	33.8	0.0	43.3	65.7	61.4
- Insurance subsidies	%	14.0	22.1	0.0	0.0	41.5	66.2	0.0	0.0	34.3	38.6
- Futures markets subsidies	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
- Income tax smoothing schemes	%	0.0	0.0	0.0	0.0	0.0	0.0	100.0	56.7	0.0	0.0
<i>Risk coping</i> measures in PSE, of which	€ M	553	856	11	1 012	418	1 131	97	181	40	23
- Disaster relief/ad hoc assistance	%	100.0	100.0	100.0	100.0	80.6	83.1	100.0	100.0	100.0	100.0
- Social assistance/debt rescheduling	%	0.0	0.0	0.0	0.0	19.4	16.9	0.0	0.0	0.0	0.0
Total PSE	€ M	24 089	31 860	3 337	5 255	91 397	104 094	1 246	1 256	48 736	36 644
Total risk related measures in PSE	€ M	17 610	20 087	2 817	4 717	58 782	52 904	939	797	46 422	33 770
Share of risk-related measures in PSE	%	73.1	63.0	84.4	89.8	64.3	50.8	75.4	63.5	95.3	92.2
Share of MPS in PSE	%	47.6	29.0	55.5	47.3	62.1	47.5	50.8	11.5	90.8	87.9
Share of MPS in risk-related measures	%	65.2	46.0	65.7	52.7	96.6	93.5	67.4	18.2	95.3	95.4
Risk related measures in GSSE	%	2.9	3.0	18.8	27.2	1.9	5.3	12.1	14.8	28.3	30.1

Notes: <sup>\*)</sup> Private storage/non marketing, water management, certified seeds/breeds, technical assistance/extension, pest and disease control

Source: Own calculations based on OECD (2009)



**Table 2.** Structure of transfers from risk management policies in selected emerging economies (average of the periods)

		Brazil		China		Russia		South Africa		Ukraine	
		95-97	02-05	93-97	02-05	92-97	02-05	94-97	02-05	92-97	02-05
<i>Risk reduction</i> measures in PSE, of which	€ M	-3 911	603	-2 702	12 488	-4 652	4 433	892	577	-3 021	-667
- Market Price Support (MPS)	%	x	87.2	x	89.3	x	97.7	99.9	100.0	x	x
- Other risk reduction measures <sup>*)</sup>	%	x	12.8	x	10.7	x	2.3	0.1	0.0	x	x
<i>Risk mitigation</i> measures in PSE, of which	€ M	93	117	0	0	7	44	0	0	623	204
- Variable rate payments	%	65.6	35.9	x	x	0.0	0.0	x	x	100.0	100.0
- Insurance subsidies	%	34.4	64.1	x	x	100.0	100.0	x	x	0.0	0.0
- Futures markets subsidies	%	0.0	0.0	x	x	0.0	0.0	x	x	0.0	0.0
- Income tax smoothing schemes	%	0.0	0.0	x	x	0.0	0.0	x	x	0.0	0.0
<i>Risk coping</i> measures in PSE, of which	€ M	926	635	772	2 559	1 660	139	15	26	186	12
- Disaster relief and ad hoc assistance	%	0.0	0.0	42.6	34.0	0.7	2.9	100.0	100.0	0.0	0.0
- Social assistance/debt rescheduling	%	100.0	100.0	57.4	66.0	99.3	97.1	0.0	0.0	100.0	100.0
Total PSE	€ M	-2 284	2 377	311	25 535	235	5 759	924	687	-1 435	178
Total risk related measures in PSE	€ M	-2 892	1 355	-1 930	15 047	-2 984	4 617	907	603	-2 212	-452
Share of risk-related measures in PSE	%	x	57.0	x	58.9	x	80.2	98.2	87.8	x	x
Share of MPS in PSE	%	x	22.1	x	43.7	x	75.2	96.4	84.0	x	x
Share of MPS in risk-related measures	%	x	38.8	x	74.1	x	93.8	98.2	95.7	x	x
Risk related measures in GSSE	%	23.9	12.5	3.5	3.3	9.3	40.7	6.2	17.7	9.7	41.6

Notes: <sup>\*)</sup> Private storage/non marketing, water management, certified seeds/breeds, technical assistance/extension, pest and disease control, "x" = not applicable

Source: Own calculations based on OECD (2009)

Subsidies to agricultural insurance systems are widespread. Insurance payments exist in most EU countries and 5 emerging economies (Brazil, Chile, Russia, Ukraine and Argentina). The USA has a long history of subsidized crop insurance systems. There is a special Federal Crop Insurance Program which offers more complex agricultural insurance aimed at covering losses in revenue, not only yields. As pointed out by JRC-ISPRA [1], the total support including funds for the administrative costs of the insurance companies and reinsurance amounts to 72 % of total premiums. The European subsidies to insurance premiums are around 32 %. On the other hand more complex insurance coverage is usually more expensive for farmers, so that the average premium rates in the USA (9 %) are much higher than in Europe (4 %). Agricultural insurance schemes in EU are heterogeneous (table 3). There are two extremes – countries with simple agricultural insurance schemes which have relatively low risk exposure to adverse weather fluctuations and where livestock production plays an important role (BE, DE, DK, UK, IE, NL), and countries with high weather risk exposure and sophisticated risk management systems (ES, FR, IT, GR, CY). In some south European countries there is also state supported reinsurance based on PPP (PT, ES and IT). Insurance payments can be put in all WTO boxes, depending on implementation criteria.

Income tax smoothing schemes has been of peripheral importance in PSE risk mitigation measures so far. According to the OECD definition, these consist of allowing taxable income

to be spread over a multi-year period, thereby smoothing disposable income. But its low share in the PSE could be misleading. In most countries, transfers within income tax smoothing schemes are not included in the PSE, either because the system is not specific to farmers (Netherlands) or because, while the option is only available to farmers, the value of the tax concession is not estimated. This risk management tool is still underestimated.

The ex post risk coping measures have increased in most OECD regions. They are frequently used in Australia, Canada, EU, USA and many emerging economies. While disaster relief payments and ad hoc assistance are common in most OECD countries, support for social assistance and debt management measures have prevailed in emerging economies (China is the only one with a significant level of disaster relief payments). Social assistance which helps farmers to alleviate poverty and emergency situations has been of great importance for Chinese farm households.

Some risk reduction measures have been provided through general services to agriculture. This includes water management (infrastructure assistance for water management off the farm), collective pest and disease control measures and inspection services. Support for these general services has increased in most OECD countries as well as in most emerging economies.

**Table 3.** Public support of agricultural risk management systems in EU

Public support/Insurance	Livestock insurance only	Single risk insurance	Combined insurance	Yield insurance
Non-subsidized private insurance	EE, FI <sup>1)</sup>	BE, BG, DK, FR, DE, GR, HU, IE, NL, SE, UK	BG, FR, HU, SL, SE	
Subsidized private insurance		AT, CZ, IT, LU, PT, RO, SK, SL, ES, LV, LT, PL	AT, CZ, IT, LU, PT, RO, SK, ES, PL	AT, FR <sup>2)</sup> , IT, LU, ES
Insurance administered by public sector		CY	CY, GR	
Ad hoc aids	AT, BG, CY, CZ, DK, FI, DE, GR, HU, IE, LU, PL, RO, SK, SL, ES, SE, UK, LV, LT			
Calamity fund	AT, BE*, BG, DK*, FR*, DE*, IT, NL*, PL, PT*, LT			
State-run reinsurance			PT, ES, IT	
Stabilization accounts <sup>**)</sup>			FI, ES, SE	

Notes: <sup>1)</sup> Single-risk insurance, combined insurance, <sup>2)</sup> Whole-farm yield insurance, <sup>\*</sup> Public calamity funds, partially subsidized, <sup>\*\*)</sup> Individual bank accounts for self-insurance which are publicly regulated or promoted.

Source: [1], own processing

### 3.2 New parametric risk management tools

Since the beginning of the 21<sup>st</sup> century new weather risk management tools have been developed – index insurance and weather derivatives. Concluding these contracts and their trading is called weather hedging (weather insurance or weather hedging). The aim of weather hedging is, above all, to decrease the volatility of profit or cash flow depending on weather fluctuations and thus to protect the company in cases of adverse weather development.

The index insurance and weather derivatives are based on an independent measurable quantity, the development of which correlates with the farm yields or revenues from agricultural production. This concept, as opposed to classical agricultural insurance (which uses loss adjusters for assessing damages on the farm), is based on an objective, transparent and easily measured specified external factor. Its correlation with the agricultural production and the spatial correlation is, on the contrary, an essential condition of using these products. The measurement of meteorological phenomena is relatively easily attainable and objective. Moreover, modern satellite technologies providing highly reliable measurements and a relatively dense network of ground meteorological stations are available at present. The principle of weather hedging based on the objectivity of the measured factors, eliminates the risk of asymmetric information and at the same time involves low monitoring and loss assessment costs, which makes the parametric products more attainable generally. On the other hand, the most often quoted disadvantage of these products is the contract basis risk relating to the potential discordance between the real damage and the financial benefit from an index-based contract.

Basis risk and strong insurance support schemes are the main reasons why weather hedging is not widespread enough. Mainly the micro-finance institutions have been involved in pilot programs in lower income countries with agriculture as a significant and vital part of national economy (Argentina, Colombia, Ethiopia, India, Malawi, Morocco, Nicaragua, Peru, Thailand, and Ukraine). Some pilot studies have also taken place in Europe and the USA. Well developed index insurance schemes currently run in Canada and Mexico.

## **4 Conclusions**

Market development, climate change, technological development, and company interests generate new kinds of risks and potential crises which it will be necessary to solve sensitively, efficiently and effectively. There are heterogeneous risk management support schemes in the world. While the emerging economies can be described as countries with a low level of risk management support, in the OECD area there are both countries with highly subsidized risk-related measures, which mainly rely on MPS (Japan), and countries with level of risk management support below OECD average, that rely heavily on VRP (USA, Canada). The share of MPS in the PSE has sharply decreased since the end of the 1980s, mainly as a consequence of the classification of the market distorting measures to the WTO Amber Box, such as MPS and most kinds of deficiency and stabilization payments based on current output or area. On the other hand, the WTO Green Box includes support for general services, water management, extension and advisory services, inspection services, training, and pest and disease control, the support of which will probably have higher priority.

The future development of governmental risk management support will depend on the frequency and consequences of the risks occurring as well as on the budgetary policy of countries and regions (the influence of the economic crisis will have an impact). Thanks to the progress in insurance and hedging and with the support of micro-finance institutions, the less developed countries that are considerably dependent on agriculture, can implement new risk management tools – index insurance and weather derivatives.

## **Acknowledgements**

Supported by the Internal Grant Agency of the University of Economics, Prague – project no. F3/01/2010: “Income risk management in agricultural enterprises using weather derivatives”.

## References

1. Bielza M. et al.: Agricultural Insurance Schemes. Final report of the administrative arrangement between DG Agri and the Joint Research Centre of the European Commission. Ispra: EC-JRC, 2008.
2. Chavas, J. P.: Risk Analysis in Theory and in Practice. San Diego, Elsevier Academic Press, 2004. ISBN 0-12-170621-4.
3. Coble, K. H., Heifner, R. G., Zuniga, M.: Implications of Crop Yield and Revenue Insurance for Producer Hedging. *Journal of Agricultural and Resource Economics*, vol. 25, 2000, no. 2, pp. 432 – 452.
4. European Commission. CAP Health Check – Impact Assessment Note N° 8. DG Agri, Brussels. D, 2008, NG-CF/15335.
5. Goodwin, B. K., Roberts, M. C., Coble, K. H.: Measurement of Price Risk in Revenue Insurance: Implications of Distributional Assumptions. *Journal of Agricultural and Resource Economics*, vol. 25, 2000, no. 1, pp. 195 – 214.
6. Hardaker, J. B., Huirne, R. B. M., Anderson, J.R., Lien, G.: *Coping with Risk in Agriculture*. Wallingford, 2<sup>nd</sup> ed., CABI Publishing, 2004. ISBN 0-85199-831-3.
7. Harwood, J. L., Heifner, R., Coble, K., Perry, J., Somwaru, A.: *Managing risk in farming: Concepts, research and analysis*. Agricultural Economic Report No. 774. Washington, DC, USDA – Economic Research Service, 1999.
8. Holzmann R., Jorgensen S.: Social Risk Management: A New Conceptual Framework for Social Protection, and Beyond. *International Tax and Public Finance*, vol. 8, 2001, no. 4, pp. 529 – 556.
9. Meuwissen M., Asseldonk M., Huirne, R.: *Income stabilization in European agriculture: design and economic impact of risk management tools*. Wageningen: Wageningen Academic Publishers, 2008. ISBN 978-90-8686-079-1.
10. Miranda M. J., Glauber J. W.: Systemic Risk, Reinsurance, and the Failure of Crop Insurance Markets. *American Journal of Agriculture Economics*, vol. 79, 1997, no. 1, pp. 206 – 215.
11. OECD. *Income Risk Management in Agriculture*. Paris: Organization for Economic Co-operation and Development, 2000. ISBN 92-64-18534-8.
12. OECD. *Managing Risk in Agriculture: a holistic approach*. Paris: Organization for Economic Co-operation and Development, 2009. ISBN 978-92-64-07530-6.
13. Ramirez, O. A.: Estimation and Use of a Multivariate Parametric Model for Simulating Heteroskedastic, Correlated, Nonnormal Random Variables: The Case of Corn Belt Corn, Soybean and Wheat Yields. *American Journal of Agricultural Economics*, vol. 79, 1997, no. 1, pp. 191 – 205.
14. Ray, E. R. et al.: Estimating Price Variability in Agriculture: Implications for Decision Makers. *Journal of Agricultural and Applied Economics*, vol. 30, 1998, no. 1, pp. 21 – 33.
15. Špička, J., Boudný, J., Janotová, B.: The role of subsidies in managing the operating risk of agricultural enterprises. *Agricultural Economics – Czech*, vol. 50, 2009, no. 4, pp. 169 – 179. ISSN 0139-570X.
16. Weisensel, W. P., Shoney, R. A.: An Analysis of the Yield-Price Risk Associated with Specialty Crops. *Western Journal of Agricultural Economics*, vol. 14, 1989, no. 2, pp. 293 – 299.

# The energy balance of agricultural production and its political impacts

Václav Vilhelm<sup>1</sup>

<sup>1</sup> Institute of Agricultural Economics and Information,  
Mánesova 1453/75, 120 56 Prague 2, Czech Republic  
<sup>1</sup>vilhelm.vaclav@uzei.cz

**Annotation:** This contribution deals with the problems of energy intensity in agriculture and with the possibilities of evaluating its energy balance. Based on the published data the position of agriculture as a consumer of various sources of energy is described and the evaluation of trends in energy consumption in agriculture is discussed.

The possibilities for the implementation of energy analyses of agricultural holdings are mentioned. On the other hand agricultural holdings are producers of renewable energy resources. In the process of plant production solar energy is bound into biomass which is traditionally consumed first as food, feed or green fertilizer. The utilization of biomass for the production of energy is an alternative use. It is connected with some aspects of technological and structural changes of the production. The economics of agricultural production is significantly influenced by subsidies and tax concessions as well as the production of renewal energy sources.

The aim is the evaluation of the economic and energy efficiencies of agricultural holdings and their reciprocal connection with the emphasis on corporate social responsibility and the role of agricultural policy. The upcoming utilization of the PLANETE programme in France is given as such example. The knowledge of the energy balance should be used as a criterion for the public subsidy of agricultural holdings. This means that a positive energy balance in agriculture should be considered as a public good similar to its function for landscape creation.

Based on the questionnaire survey the energy balance of winter wheat production in the various Czech agricultural holdings was carried out this year. The results should enable the evaluation of the differences between various holdings.

**Key words:** Energy efficiency – sustainable development – agricultural policy – energy balance of agriculture

**JEL classification:** Q10, Q01, Q40

## 1 Introduction

The regulation of the behaviour of agricultural holdings as the receivers of subventions from public sources is fully justified. It is given for reason of spending financial resources simultaneously. Energy efficiency is a general social requirement which is the consequence of knowledge that the energy sources necessary for the further development of human society are limited. It is a very important part of the concept for sustainable development. Energy saving behaviour is also an important part of environmental responsibility in the framework of the corporate social responsibility of holdings [10].

The role of agriculture as the steward of a healthy landscape is the most often mentioned reason nowadays. A similar approach could be taken in account in the case of the role of agriculture by improving the energy balance. Energy consumption in agricultural production is worth attention especially if the production means the production of a source of energy. It is likely that there are big differences in energy inputs and energy outputs in various agricultural holdings.

## 2 Data and Methodology

The energy balance of agriculture is based on published statistical data (Czech statistical office) about energy consumption in agriculture in the Czech Republic. Data about the share of agriculture of the total energy consumption of selected kinds of energy are used for comparison with Austria (published data of Statistik Austria) as well.

An important source of information for this article was the up to date knowledge acquired from our attendance at the French institute AgroSup in Dijon especially from Dr. B. Risaud of the department of economy and sociology. The official papers of the French ministry of agriculture and fishery were also an additional source.

The questionnaire survey was carried out for the estimation of the energy balance of winter wheat production in various Czech agricultural holdings from November 2009 to April 2010. From the territorial point of view there were asked holdings in favourable areas for winter wheat production in all regions of Czech Republic. The response rate was relatively low (approx. 20 %); the answers from more than one hundred holdings with the average area of winter wheat 340 ha per one holding will be investigated in order to evaluate the differences between various holdings.

## 3 Results

### 3.1 Energy balance of agriculture and the possibilities for its improvement

In connection with public finance the motivation for environmental friendly or energy-saving behaviour can be defined in two ways:

- The penalization of undesirable activities (e.g. pollutant emissions, high consumption of nonrenewal energy sources, ecologically unfavourable handling) with penalties or higher taxes,
- Support for desirable handling (e.g. energy-saving technologies, environmental friendly production) by lowering tax burdens or by providing subsidies.

In the sphere of energy saving the main aim is to minimize the energy consumption of energy from non-renewable sources. Subsidization of the energy production from renewable sources is justified on the assumption that its production and utilization leads to a verifiable absolute saving of energy from nonrenewal sources only. This means to observe the accurate energy intensity of the production of renewable energy sources. Due to the available subsidies and concessions mentioned the economic efficiency doesn't have to mean the energy efficiency at the same time.

Support for energy production from renewable source is provided by law Nr. 180/2005 Coll., about the support of utilization of renewable resources, in the Czech Republic. It is important to agriculture that according to this law the energy of biomass and biogas is considered such a renewable source of energy. Waste or side products (e.g. straw or farmyard manure) can be used for biogas production. On the other hand energy plants can be grown for this purpose as well. The first case doesn't demand changes in the traditional structure of agricultural production while the second case requires such changes.

Energy efficiency is one of the basic recommended requirements for the international standard of good agricultural practice (GLOBALGAP) which means monitoring the energy consumption on the farm [1].

Agriculture and forestry contrary to other economic branches, which are usually energy consumers predominantly, transform solar energy into biomass and in this way improves the energy balance. Modern agriculture is a massive consumer of energy from fossil resources,

especially fuel for agricultural vehicles and machinery and electricity used in animal production.

### 3.2 Energy intensity in the Czech agrarian sector and worldwide

Table 1 shows the energy consumption in Czech agriculture in the years 2000 and 2004 – 2008.

**Table 1.** Energy consumption in Czech agriculture

	MJ	2000	2004	2005	2006	2007	2008
black coal	tn	3 542	3 551	3 247	3 138	1 555	1 773
	GJ	74 316	70 534	65 906	71 370	37 065	40 526
brown coal	tn	54 285	43 290	40 038	39 031	29 250	30 092
	GJ	758 938	622 725	558 806	547 436	417 167	427 005
petrol	ths lit	9 096	8 167	7 056	6 829	6 068	6 176
	GJ	291 454	261 687	226 093	220 820	196 226	199 724
fuel oil	tn	216 619	211 134	216 055	232 047	199 419	203 423
	GJ	7 641 235	8 973 195	9 182 338	9 908 407	8 515 191	8 989 162
natural gas	ths m <sup>3</sup>	70 404	79 395	80 204	75 591	68 598	63 352
	GJ	2 393 736	2 699 430	2 726 922	2 570 101	2 332 330	2 153 979
electrical energy	MWh	1 107 210	993 961	971 799	963 826	879 326	925 269
	GJ	3 985 956	3 578 260	3 498 476	3 469 774	3 165 574	3 330 968
<b>TOTAL</b>	GJ	<b>15 145 635</b>	<b>16 205 831</b>	<b>16 258 541</b>	<b>16 787 908</b>	<b>14 663 553</b>	<b>15 141 364</b>

Source: Czech Statistical Office

In the period from the year 2000 coal consumption in agriculture has obviously decreased, while the consumption of petrol and natural gas has shown a slower decrease and the consumption of fuel oil has not changed.

Table 2 shows the trends in the share of agricultural consumption of fuel oil, electrical energy and natural gas in the total national energy consumption of the Czech Republic and in Austria in the time period 2000 to 2008.

**Table 2.** Development of the proportion of selected kinds of energy consumed in agriculture in the Czech Republic and in Austria 2000 - 2008

Indicator	Country	2000	2004	2005	2006	2007	2008
Proportion of agriculture in the total fuel oil consumption (%)	Czech Republic	14.56	14.63	13.43	13.52	11.69	9.95
	Austria	3.28	2.65	2.34	2.35	2.35	2.40
Proportion of agriculture in the total electrical energy consumption (%)	Czech Republic	2.92	2.28	2.20	2.17	1.95	2.04
	Austria	2.36	2.20	2.12	2.11	2.07	2.08
Proportion of agriculture in the total natural gas consumption (%)	Czech Republic	1.32	1.39	1.41	1.44	1.34	1.29
	Austria	0.34	0.30	0.31	0.31	0.31	0.30

Source: Czech Statistical Office, Statistik Austria

In both countries the decreasing share of agriculture in the total consumption of fuel oil and electrical energy was common. The big difference between Czech Republic and Austria in the share of fuel consumed in agriculture was connected with the much larger role of fuel in the total Austrian energy balance than in the Czech total energy balance.

Further important quantifiable energy outputs in the sphere of plant production are fertilizers, especially nitrogenous fertilizers, and plant protection agents. An important input is constitute of the farm machinery and equipment and the buildings used for storage and production, especially animal production. This energy input value takes into account the energy necessary for their production, transport or construction. For such an energy evaluation of inputs and output on the farm the programme PLANETE [3, 8] can be used, which applies the coefficients for such energy calculations.

GOMIERO et al. [2] have studied the issues of energy use in agriculture in the context of the shortage of fossil fuels, which will have dramatic effects on the performance of intensive agriculture. Organic agriculture, along with other low input agriculture practices, results in less energy demand compared to intensive agriculture and could represent the means to improve energy savings and CO<sub>2</sub> reduction if adopted on a large scale. Organic agriculture

produces many positive externalities. The implications of the reduced productivity in the case of organic agriculture should be considered and suitable agricultural policies worked out.

PAWLAK [6] calculated that the direct energy inputs in world agriculture amounted to between 0.02 TJ/100 ha in Sub-Saharan Africa and 2086 TJ/100 ha in Japan. Unitary energy inputs per 1000 USD of gross value added ranged from 2,6 TJ in Japan to 49.2 TJ in Russia.

Energy monitoring is the only possible approach for evaluating the energy balance of production. The price relationship of inputs and outputs significantly affects the economic and energy efficiency in the same processes. The first prerequisite for implementing support for energy saving measures in agrarian policy is the knowledge of the energy analysis for agricultural production in various holdings. The methodological approaches for energy calculation in agriculture were described by ŠPIČKA and JELÍNEK [11]. A further aspect of energy efficiency in agriculture was subsequently published by PICKOVÁ and VILHELM [7].

Against measures for encouraging to energy saving agricultural practice there are some special treatments of taxes on inputs that reduce the cost of agricultural production and benefit incomes, as the OECD reports [5]. Examples of these are concessions on fuel used for farming purposes. Lowering fuel taxes could, *ceteris paribus*, increase fuel usage and the production of agricultural goods and services, including not only market output but also non-market externalities as the environmental goods (e.g. landscape maintenance) and bads (e.g. greenhouse gases).

This tax concession on fuel used in agriculture is in force in many countries to increase the competitiveness of farmers in international comparison. The trend of the tax refund for fuel tax in agriculture in the Czech Republic is given in the table 3. The trend of the tax refund volume does not copy the trend in fuel consumption in agriculture. The growth is connected with the increasing of rate on the tax refund and with the number of holdings that take advantage of this measure.

**Table 3.** Fuel tax refund for agriculture in the Czech Republic for the period from 2000 till 2009

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Tax refund for agriculture on fuel tax (Mio CZK)	954	1287	1294	1272	1402	1495	1477	1504	1517	1559

Source: Ministry of agriculture of the Czech Republic

The utilization of biofuels in the Czech Republic is prescribed by the Act No. 86/2010 Coll., on the Protection of Air, which set the volume share of biofuels in the petrol for motor vehicles (4,1 % since June 2010) and diesel oil (6 % since June 2010). The state support of biofuels has the form of their exemption from taxation according § 49 of Act No. 353/2003 Coll., on Consumption Tax.

### 3.3 The French approach to improving of energy balance of farms

Energy savings and lowering emissions are an important part of the economic policy in the European Union. Nowadays there are some important measures taking place in this field in France. The direct energy consumption in agriculture represents 2 % of total energy consumption in France. The cost of energy makes 6% of total cost in agriculture on average. The energy balances of farms should become a part of agricultural policy. In 2009 the French Ministry of agriculture and fishing adopted the policy in the form of a Plan for the energy efficiency of agricultural holdings for the period 2009 - 2013 (Ministère de l'agriculture et de la pêche: Plan performance énergétique des exploitations agricoles 2009 – 2013 [4]). The plan is divided into two parts:

- The improvement of the energy efficiency of farm systems,



- The promotion of the production of energy from renewable sources, especially the utilisation of biomass and solar energy.

This energy efficiency plan introduced a system of monitoring energy balances on the farm. Three different programs are used for the so called energy diagnosis. The most used program is the tool called PLANETE (from the abbreviation of „Méthode **P**our **L**'Analyse **E**nergétique de l'Exploitation“ – Method for energy analysis of the farm)<sup>1</sup>. This tool allows the evaluation of the consumption of direct and indirect energy and the emissions of greenhouse gases. Primarily this system was developed for the agrarian consultant service for French farmers. The original aim was over reached and now the energy diagnosis should be used as one of the criteria for decision making on the field of supporting for agricultural holdings from public sources.

The calculated inputs in the PLANETE are divided into direct and indirect energy inputs. The direct energy inputs are electricity, fuel, heating oil, natural gas, propane etc. The indirect energy inputs are the feeding purchased, fertilizers, pesticides, veterinary preparations, seeds, bought young animals and energy inputs in farm machines (according their kind, power capacity, weight, age, annual utilization etc.) and farm buildings (depending on material, size, age etc.). Calculated outputs are the all market products from plant and animal production.

The system of energy diagnosis and further related investments in the framework of the Plan of the energy efficiency of agricultural holdings is connected with the Rural Development Programme and is paid from public sources. 100 000 energy diagnoses should be completed by the year 2012 and the energy dependence of farms should be lowered by 30 % by the year 2013.

The final evaluation of the energy diagnosis of each monitored farm will be presented as a report with a brief description of the analysed farm, its energy balance and emissions of greenhouse gases in a common year, as well as an overview of the main energy consuming plants on the farm. Further the report will include a project with suggestions for the increase of energy efficiency and the possibilities of renewable energy use.

The above mentioned energy diagnoses have been performed in the French departments since 2009 or 2010 respectively. The public finance sources are spent in accord with the Plan of energy efficiency of agricultural holdings in order to adapt French agriculture to the new realities of the continuous increase of fuel prices and the necessity to reduce the emissions of greenhouse gases.

### **3.4 The survey of energy balance of winter wheat production in selected Czech agricultural holdings – the basis for future evaluations**

The energy use balance for winter wheat production in various Czech agricultural holdings was carried out in the form of questionnaire survey this year. The results of two business years of winter wheat production (2007/2008 and 2008/2009) were evaluated. The questions were concerned with the inputs and output of this portion of production. On the input side these were seed, fertilizers, pesticides, fuel for vehicles and machinery, fuels for drying etc. All items were detailed formulated. Also the machinery equipment and buildings for storage were taken into account. It should be possible to calculate the energy content in the inputs, including in the machinery equipment and buildings.

The response was relatively low (less than half) which was connected with the complexity of the questionnaire. The evaluation will be made in the next months using mathematical and statistical methods and the values from the PLANETE system [8] or the values published by PREININGER [9] for the energy evaluation of the agricultural inputs and outputs.

---

<sup>1</sup> Beside the PLANETE system there are also the systems DIAPASON and AGRI – ENERGIE.

The results should help to discover the differences in energy intensity among various holdings. One of the aims is to give the agricultural holdings a tool for probing their energy use efficiency.

## **4 Conclusions**

Economic efficiency of production is the main aim for agricultural entrepreneurs and should be in accord with the aspects of energy efficiency. The agricultural economy is substantially affected by subsidies from public sources, which are understood as payments for public goods. Such an approach respects the role of agriculture in keeping the landscape and its environmental functioning well.

A similar approach could be applied in the area of energy policy in agriculture. Such a policy should motivate agricultural holdings to make energy savings and minimize the use of nonrenewal energy sources. Developing a methodology for the evaluation of the energy balance is a first precondition. In France the described system PLANETE is such an instrument.

Motivation for energy savings is connected with prices of energy sources. They are significantly affected by taxes on consumption or tax concessions. The consumption of fossil fuels is connected with negative externalities such emissions of CO<sub>2</sub> which should be minimized.

Because sustainable development is a general requirement in human society, the public sector must create such rules for business activities which will lead to the situation when an economic efficient activity will also be the energy efficient activity.

In France such an approach is being undertaken from 2009 onwards on the basis of the energy efficiency of farms plan, issued by the French ministry of agriculture and fishing as a result of negotiations about environmental questions and sustainable development in France in 2007.

Referenced development in France, where the results of energy balances of farms should become a criterion for the designation of the level of public subsidies for agriculture, should play a suggestive role for the implementation of such an approach in our conditions too. It is necessary to emphasize that the production structure and the legal structure of the Czech agricultural sector is much more variable and heterogeneous than the structure of family farm in France. It complicates the possibility for the implementation of the French system in Czech conditions. In connection with the energy safety and the potential role of agriculture in the production of renewable energy sources the implementation of such monitoring into agricultural practice is very desirable. Support for the production of renewable sources of energy makes it necessary to know the total energy balance in order to ensure that the policy is not counterproductive.

The use of energy monitoring in the Czech agricultural sector requires the adaptation of all tools used in the whole process from data collection to the energy evaluation of the various agricultural holdings for Czech conditions. The first step in this field was made with the survey on energy intensity of winter wheat production.

## **Acknowledgements**

Supported by the National Agency for Agriculture Research (NAAR) – project no. QH 71016 (2007 – 2010): “Economic system of farm efficiency evaluation respecting principles of sustainable natural resources management”.

## References

1. Berka, L., Šánová P.: Zavádíme Globalgap v rostlinné produkci. Česká společnost pro jakost, o.s. Praha 2009. ISBN: 978-80-02-02204-6.
2. Gomiero, T., Paoletti, M. G., Pimentel, D.: Energy and environmental issues in organic and conventional agriculture, *Critical reviews in plant science*. Abingdon 2008, 27: 4, 239 – 254. ISSN 0735-2689.
3. Risoud, B.: Analyse énergétique de l'exploitation agricole. Lecture, Prague – VÚZE, 2006.
4. Ministère de l'agriculture et de la pêche: Plan performance énergétique des exploitations agricoles 2009 – 2013. Circulaire DGPAAT/SDBE/C2009-2013 from 18.2.2009. Paris, 3.2. 2009.
5. OECD. Taxation and social security in agriculture. OECD Paris 2005, ISBN 92-64-013644.
6. Pawlak, J.: Inputs of energy in world, EU and Polish agriculture. *Nakłady energii w rolnictwie na świecie, w UE i w Polsce*. Inżynieria Rolnicza, Warsaw 2002, 6: 5, 189 - 196, ISSN 1429-7264.
7. Picková, A., Vilhelm, V.: Aspects of energy intensity of agriculture. *Aspekty energetické efektivity v zemědělství*. *Ekonomika a Management*. Prague 2009, 4. ISSN 1802-8934.
8. PLANETE. Référentiel pour l'analyse énergétique de l'exploitation agricole et son pouvoir de réchauffement global. ENESAD, CEIPAL, CEDEPAS, CETA, SOLAGRO 2006.
9. Preininger, M.: Energetické hodnocení výrobních procesů v rostlinné výrobě. *Metodiky pro zavádění výsledků výzkumu do zemědělské praxe 7/1987*. Praha ÚZPI, 1987
10. Srpová, J., Kunz, V.: CSR should not be abandoned even in time of economic crisis. *CSR bychom neměli opouštět v době ekonomické krize*. *Ekonomika a Management*, Prague 2009, 1, ISSN 1802-8934.
11. Špička, J., Jelínek, L.: Energy analysis of farms-methodical approach. *Energetická analýza zemědělských podniků – metodický přístup*. *Ekonomika a Management*. Prague 2008, 3. ISSN 1802-8934.



# **Management and Entrepreneurship**



# Investigating Performance Management Systems in Organizations of Public and Competitive Sphere in Hungary

Eva Gergely<sup>1</sup>

<sup>1</sup>University of Debrecen, Centre for Agricultural and Applied Economic Sciences  
Faculty of Applied Economics and Rural Development  
4032 Debrecen, Böszörményi Str. 138, Hungary  
gergelyeva@agr.unideb.hu

**Annotation:** This paper deals with an investigation in certain local-governments and profit-oriented organizations in the North Great Plain Region of Hungary. The objective of the research is to reveal the operations and characteristics of performance management systems. The survey based on questionnaires; the total number of elements was 83. Experiences proves the fact that it is worth developing and operating performance management systems, as besides it is a supporting tool for reaching enterprise aims, it may make the communications between managers and employees more effective. In this way my objective is to get to know the utilized evaluating techniques, the aims of the performance evaluation and the competences being evaluated in the examined organizations. The local-governments and profit-oriented organizations were separately examined, and finally these two spheres were compared to each other.

The following hypotheses was adopted:

- There are different performance evaluating techniques used in the profit-oriented organizations and in mayor's offices.
- In certain cases the objectives of performance evaluation are different in the two spheres, which is basically thanked to the different value system.
- Other competences being evaluated are preferred in local-governments and in organizations in market environment. Personal and social competences, behaviors and expected results are separately analyzed.

The research was carried out within the research programme "Functional Investigation of Enterprise Management" constructed by the Institute of Management and Organization in the University of Debrecen, Centre for Agricultural and Applied Economic Sciences, Faculty of Applied Economics and Rural Development.

**Keywords:** performance management, local-governments, competitive sphere, competence, result, behavior

**JEL classification codes:** O15

## 1 Introduction

Human performance technology is the study and ethical practice of improving productivity in organizations by designing and developing effective interventions that are results-oriented, comprehensive and systemic. Performance analysis focuses on factors that drive individual, group, and organizational performance. The factors may be causes of problems, road maps to improve quality, or ways to exploit opportunities. They are the why questions, and the

answers can be classified and analyzed in several ways. People in effective organizations are competent. They have the required skills, knowledge, aptitudes, and attitudes or beliefs to perform effectively whether individually or in groups. They know how to solve problems and work in teams [1].

But what is performance? Performance equals with activity plus result, activity, and using it to find your destination, result [2]. After International Society for Performance Improvement performance are results produced by people working within a system [3]. Performance technology is the technology that comprises all of the variables that affect human performance. It identifies the factors that enable workers to perform their jobs and to produce the desired results.

Most organizations have some form of performance appraisal of their employees. The appraisals are usually carried out once a year. The manager makes an evaluation of the performance of the subordinate. This involves filling out a form or writing a report on the person concerned. After this, there is a meeting at which the two parties discuss the appraisal. A performance appraisal is, then, a judgment on how well a person is doing his/her work. Appraisal can be a valuable process. At the interview, the manager should act as a guide to the subordinate, not as a judge. The purpose of the interview should be to discuss how the individual can “grow” in the organization, and make an effective contribution. The situation allows both parties to review the work of the individual, fix realistic, and plan that person’s career development [4].

An organization is a human system as well: it grows and changes; it can be healthy or sick. Measurement and evaluation at its best helps those that desire a healthy organization to notice when problems are brewing so interventions can take place, to educate as needed, and to reinforce good habits. So many companies fail to view their organizations as living systems, seeing them instead as money-producing “machines” [5]. Organizations that measure the right things, the right way, embed metrics in processes over time, and create a culture that values what is learned by using it have a better chance of making good decisions in this world of constant change [6]. To be adequate, observation does not need to be constant. Constant surveillance can be dysfunctional and counterproductive and can send the message to workers that they are not trusted [7]. Communication is seldom a matter of people not hearing each other well; it is more commonly a problem of not having a clear understanding of responsibilities, of what is expected from them in terms of both results and communication, and how their authority relates to that of others [8].

The performance management investigations were carried out in organizations of private and public spheres. The comparison of this field of the two spheres is worth fulfilling separately. The value system connected traditionally to the organizations of private and public sphere is basically different, which results in essential differences in the managing environment of organization, management and human resources [9]. Table 1 contains the most important differential features.

These basic differences greatly influence the selection of the performance evaluating system of the two spheres and even the management of the process. A review of managerial competencies by several national governments shows results orientation, leading people, communication skills, and problem solving as those most desired [10].

A vast literature provides numerous examples of performance in public and profit oriented organizations (e.g., [11, 12, 13, 14, 15, 16, 17, 18]).



**Table 1.** Traditional Features of Organizations in Private and Public Spheres

Features	Private sphere	Public sphere
Major motivations	Marketing individual selection Supply and prices Consumer approach Competition	Collective selection Requirement aspects Allowances on the basis of citizen rights Laws
Final objective	Maintaining in the competition	Realizing the social interest
Organizational characteristics	Flexible, decentralized organization concentrating on the reachable aims	Hierarchical, bureaucratic, centralized organization
Behavior expected from the employee	Realizing the aims Critical approach Creativity	Keeping the rules Carefulness Discipline
Controlling tools	Positive incentives connected to the reached results	Negative sanctions connected to breaking the rules
Management	Looking afore Forming future Autonomic	Following up the results Reactive Autonomic in a limited way
Role of planning among the management functions	Critical Basic Permanent Multi-dimensional	Marginal Mechanic Opportune

Source: [9]

## 2 Data and Methodology

I carry out my research within the research program “Functional Investigation of Enterprise Management” constructed by the Institute of Management and Organization in the University of Debrecen, Centre for Agricultural and Applied Economic Sciences, Faculty of Applied Economics and Rural Development. The research topic consists of three bigger subtopics, such as Investigation of Organization Management, Investigation of Human Resource Management and Investigation of Process Management. The research field of investigating performance management belongs to the Investigation of Human Resource Management.

I started from the following hypotheses:

- There are different performance evaluating techniques used in the profit-oriented organizations and in mayor’s offices.
- In certain cases the objectives of performance evaluation are different in the two spheres, which is basically thanked to the different value system.
- Other competences being evaluated are preferred in local-governments and in organizations in market environment. Personal and social competences, behaviors and expected results are separately analyzed.

I constructed a formal questionnaire for the structured data collection on the basis of the hypothesis above mentioned revealing the performance management system of organizations and local governments. The first part of the questionnaire relates to general data at organizational and individual levels, the second part contains the questions in connection with the performance management system. During constructing the questionnaire mainly closed questions were used, such as alternative and selective ones. The scaling questions measure the opinions of the target persons and the intensity and strength of their opinions. The results in this study reflect the data of 83 questionnaires.

The questionnaires were processed by the help of SPSS 13. software. For proving or neglecting the hypotheses set the Mann-Whitney test was utilized of the statistical tests. Using this method is reasonable because of the lack of the normality the examination cannot be

carried out by t-test, thus the appropriate nonparametric method, the Mann-Whitney test should be used.

The part of the questionnaire relating to organizational and individual data may be summarized as follows. The firms in the investigation operate in Hajdú-Bihar county (51%), in Szabolcs-Szatmár-Bereg county (35%) and Jász-Nagykun-Szolnok county (14%) according to their geographical location. On the basis of the operational form, 46% of the respondents work for Ltd, 7% for stock company and 47% for the local government. 28% of the answerers are employees, 2% are lower managers, 17% are medium managers and 53% are higher managers. Regarding their ages, the ratio of those who are between 40 and 49 is the biggest in the sample, but the ratio of respondents between 30 to 39 and 50 to 59 years of age is also significant, but the ratios of answerers under 29 years and above 60 years are low. 67% of the respondents have higher level qualification.

### 3 Results

I am going to introduce the results of my research by examining different hypotheses. My hypotheses are determined in connection with the performance management system of the competitive sphere and local governments. I assume that there are basic differences between the operations of performance management system of the two spheres. I investigate the method, aim and basis of the evaluation in this study.

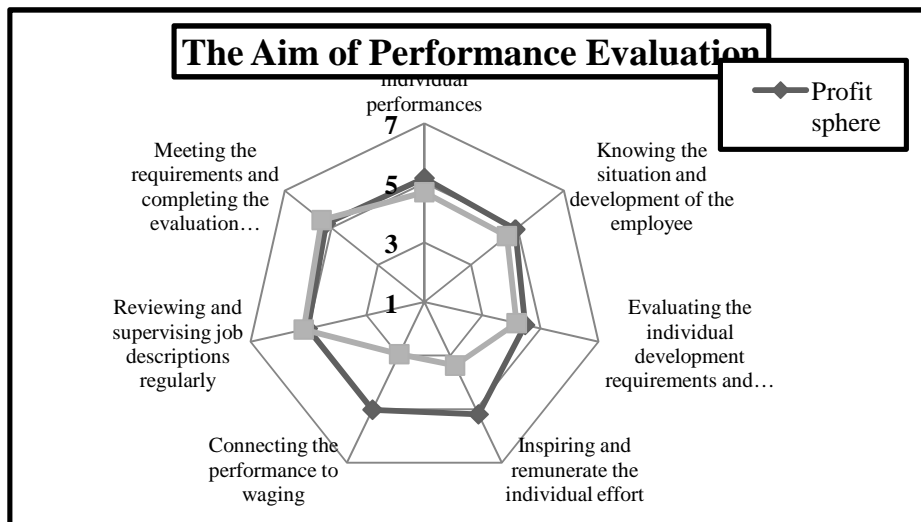
The *first hypothesis* is the following: There are different performance evaluating techniques used in the profit-oriented organizations and in mayor's offices.

During analyzing the questionnaires I revealed important differences between the two types of organizations regarding the content of the performance and the technique of the evaluation. In profit-oriented organizations the results are considered as the content of the performance. The most frequently used technique is the aim-centered management, as the employees work for reaching an aim set prior. Reaching the set aim is deterrent. When evaluating the workers in local governments the content of the performance is the behavior as the major part of their work can hardly be quantified. The classifying scale of the performance evaluating techniques is used characterized by behavior forms.

Relating to evaluators direct managers have key roles, while that of consumers and clients may be neglected, and the role of colleagues is even small. Neither the 360° investigation is spread in the examined organizations.

The *second hypothesis*: the objectives of performance evaluation are the same in the two spheres.

Figure 1 illustrates the investigated performance evaluating objectives, which were qualified in a scale from 1 to 7 by the answerers depending on the fact that how typical the given aims were in their working places (1 – not typical at all, 7 – very typical). The similarity and differences between profit-oriented organizations and local governments may be reviewed by the help of the spider chart. The null hypothesis cannot be rejected in five cases, I keep it, which means that there cannot be detected any differences statistically between the two spheres in case of getting to know individual performances, knowing the situation and development of the employee, the requirement for individual education/development, and evaluating its realization, regular reviewing and supervising the job descriptions and observing the rules and keeping the deadlines. Similar points were given by the employees of both local governments and profit-oriented organizations, the range of the points were between 4,5 and 5,5.



**Figure 1.** The Aim of Performance Evaluation  
Source: own research

Regarding two aims, the spider chart shows a huge difference. These are inspiring and remunerating individual effort and connecting performance to waging. In order to statistically prove the difference the Mann-Whitney test was utilized. The Asymp. Sig. is 0,00 in both of the cases, thus the null hypothesis is rejected. In this way it is proved that there is a difference between local governments and profit-oriented organizations with respect to certain performance evaluating objective. On the basis of the average of the ranges the following statements are made: the aims such as

- inspiring and remunerating individual effort
- connecting performance to waging

are more typical in profit-oriented organizations in the sample than in local governments. Thus the difference may be strengthened in a statistical way, which is illustrated in Figure 1.

The reason of the low realization of these examined aims in local governments is the fact that public spheres lack the motivating power increasing efficiency, which is the profit in enterprises. Without this remunerating individual efforts cannot be realized as the performances cannot be connected to waging. Besides financing limits, there is another reason of these results, which is the regulation determining the advancement, classification and emoluments.

*Third hypothesis:* Other competences are highlighted in local governments and in organizations operating under marketing conditions. The personal and social competences, behavior forms and expected results are separately analyzed.

The answerers also used a scale ranging from 1 to 7 to reflect the fact that how important the certain aspects were during their performance evaluation (1 – not important at all, 7 – very important).

The first question group refers to the personal competences which are the followings: reliability, conscientiousness, adaptability, loyalty, self-determination, ability to make decisions, general learning ability.

After reviewing Table 2, it may be concluded that the investigated personal competences are equally important in case of workers in both of the spheres during performance evaluation. The difference is not significant either between the spheres, or between the competences. The competences were evaluated between 5,6 and 6,7 in average in the seven-graded scale.

**Table 2.** Evaluating Personal Competences

	Reliability	Exactitude, stringency	Adaptability
Local government	6,67	6,50	6,18
Profit-oriented organization	6,45	6,36	5,70
Total	6,55	6,43	5,93
	Loyalty	Self-determination, ability to make decisions	General learning ability
Local government	6,18	6,44	6,00
Profit-oriented organization	5,95	6,27	5,61
Total	6,06	6,35	5,79

Source: own research

The second question group contains the social competences regarded during the performance evaluation, which are the followings: empathy, communication skills, handling conflicts, collaboration, teamwork, making compromises (Table 3).

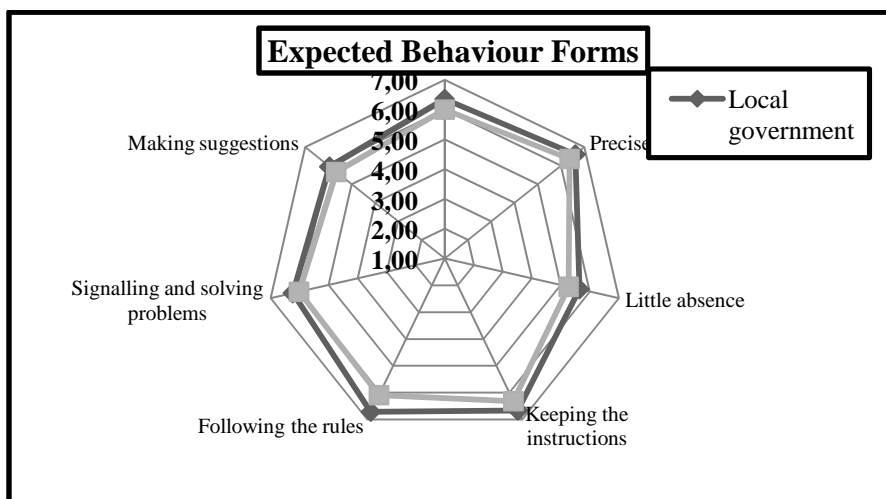
**Table 3.** Evaluating Social Competences

	Empathy	Communication skills	Handling conflicts
Local government	5,42	6,29	6,18
Profit-oriented organization	5,42	5,98	6,11
Total	5,42	6,12	6,15
	Collaboration	Teamwork	Making compromises
Local government	6,30	5,95	6,13
Profit-oriented organization	6,02	5,93	5,89
Total	6,15	5,94	6,00

Source: own research

Similarly to the previous results, there is not any big differences relating to the investigated social competences and there is not any significant difference between the two spheres. The values range from 5,4 to 6,3 in average.

The *expected behavior* forms are as follows: filling the tasks, preciseness of working, little absence, keeping the instructions, following the rules, signaling and solving problems, making suggestions (Figure 2).



**Figure 2.** Expected Behavior Forms

Source: own research

The null hypothesis is the following: there is not any difference when comparing the competitive sphere to local governments with respect to the expected behavior forms.

The null hypothesis is kept in five cases, as filling the tasks, the preciseness of working, little absence, signaling and solving problems and making suggestions are equally important aspects for working in both of the spheres during performance evaluation. The points are between 5,5 and 6,6.

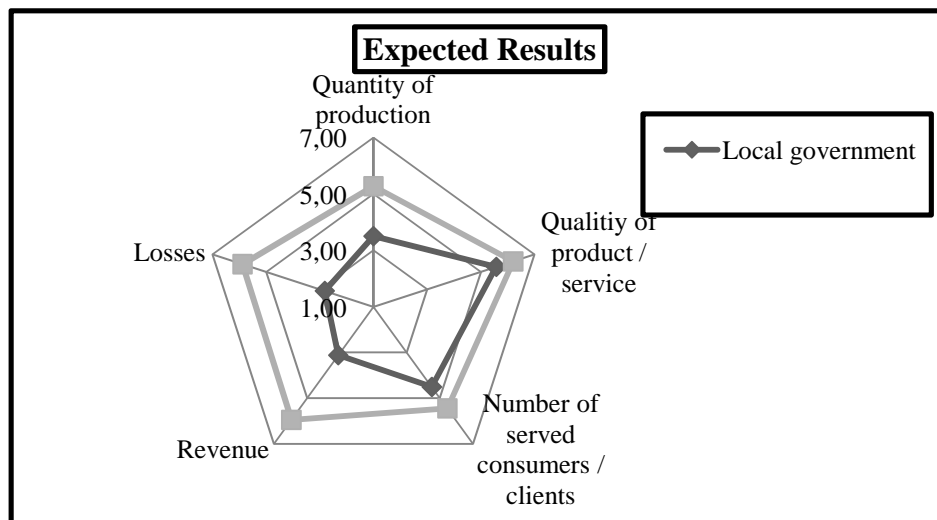
The null hypothesis is rejected in two cases as the significance level is below 0,05. These two expected behavior forms are:

- keeping the instructions
- following the rules.

On the basis of the average of ranges, both of the behaviour forms have more important roles for local government workers in the process of performance evaluation. It is verified again which could also be previously detected that how the strict law regulations and rules have an influence on the behavior forms being evaluated in local governments. Besides these, the role of these behaviour forms in performance evaluation is also relevant even in profit-oriented organizations, as it is illustrated in Figure 2, that both of the factors got high points (above 6).

Figure 3 illustrates the expected results relating to the two spheres. The biggest differences may be experienced in this case because the difference between the activities of the two spheres is the most obvious in this aspect.

The null hypothesis is the following: there is not any difference with respect to the results considered during evaluation in the case of the two spheres.



**Figure 3.** Expected Results  
Source: own research

Relating to the quality of product / service and the number of served consumers / clients are equally important both in local governments and in profit-oriented organizations during performance evaluation. The null hypothesis is kept in these two cases.

During the investigation of quantity of production, losses and revenue the alternative hypothesis is given place and these results are much more taken into consideration during performance evaluation by profit-oriented organizations. In case of local governments these results got points under the average for their roles in performance evaluation.

## 4 Conclusions, proposals

The investigation proved the fact that the basis of the evaluation is the reached result in case of profit-oriented organizations. During reflecting the expected results, it was clear that the listed categories (such as revenue, loss, quantity of production) are high requirements against the workers in this sphere. It may be a *suggestion* that although the importance of quality of product/service and the number of served costumers/clients in the performance evaluation got a score above the average, in today's costumer-oriented business world the profit-oriented organizations should strengthen in this field.

When examining the performance objectives it turned out that getting to know the individual performances and knowing the condition and development of the employee got similar score as the correspondence to orders and deadlines. *My suggestion* is that a well-operating performance management system operates well not because it prepares the evaluation precisely and according to schedule, but it is able to get to know the performance of the individuals, making suggestions for development, updating job descriptions, and operating the incitement and waging system on this basis.

Establishing the performance evaluation is not free from problems in case of local governments, as it is difficult to measure the performances. Moreover, performance is rather a complex concept in itself, thus *I suggest* that local governments should use appropriate well-prepared indicators during evaluating the performance.

In the majority of the local governments in the sample the fee diverting does not work at all, thus performance evaluation does not have any inspiring effect. Furthermore, fees in the public spheres are not competitive with that in the private sphere. The differences between the two spheres were based by even the examinations. *I suggest* that it would be practical for local governments to utilize other, non-financial incitements for workers. The performance evaluation otherwise contributes to huge administration burdens for local governments, which is considered as a problem. *I propose* that it would be useful to reduce observing these administrative burdens, strict rules and instructions, as it is the only way that the performance evaluating system could operate as a flexible operating management tool aiming at improving the performance.

In both of the spheres the following competences are taken into consideration as relevant criteria during the evaluation of the employees' performance: reliability, exactitude, self-determination, collaboration, handing conflicts. The empathy and teamwork got average scores, still *I would recommend* to consider these competences in a more relevant way during the evaluation as teamwork in profit-oriented organizations is becoming a more and more widespread and accepted method, employees in local governments deal with clients, where the presence of empathy is essential.

At the same time constraints coming from modernization have influences on the traditional performance evaluating solutions in the public sphere. It may be more and more detected that the interest of the public sphere has increased towards the methods successfully utilized in the private sphere.

## References

1. Pershing J. A.: Human Performance Technology Fundamentals. In: Handbook of Human Performance Technology. Editor: Pershing J. A. Published by Pfeiffer, 2006, CA. ISBN-13: 978-0-7879-6530-3, ISBN-10: 0-7879-6530-8.

2. Addison R. M., Haig C.: The Performance Architect's Essential Guide to the Performance Technology Landscape. In: Handbook of Human Performance Technology. Editor: Pershing J. A. Published by Pfeiffer, 2006, CA. ISBN-13: 978-0-7879-6530-3, ISBN-10: 0-7879-6530-8.
3. International Society for Performance Improvement. Standards for the certified performance technologist. 2002. Retrieved December 1, 2004, from [www.ispi.org](http://www.ispi.org).
4. Cotton D.: Keys to management. Addison Wesley Longman Ltd, 1999, Edinburgh, ISBN 0-17-555825-6.
5. Wheatley M.: Leadership and the new science: Discovering order in a chaotic world (3<sup>rd</sup> ed.) San Francisco: Berrett-Koehler. 2006.
6. Hammer M.: The seven deadly sins of performance measurement and how to avoid them. (Electronic version) MIT Sloan Management Review, 2007, Spring.
7. Ghoshal S., Moran P.: Bad for Practice: A Criticque of the Transaction Cost Theory. Academy of Management Review, 1996.
8. Garrett T. M.: Whither Challenger, Wither Columbia: Management Decision Making and the Knowledge Analytic. American Review of Public Administration 34 (4), 2004.
9. Poór J., Barta Zs., Karoliny M-né.: A közigazgatás hatékonyságát segítő HR menedzsment technikák és módszerek. Humánpolitikai Szemle, 2006. XVII. évfolyam, 9. Szám.
10. Bhatta G.: Enabling the Cream to Rise to the Top: A Cross-Jurisdictional Comparison of Competencies for Senior Managers in the Public Sector. Public Performance & Management Review 25 (2), 2001.
11. Light P. C.: Pathways to Nonprofit Excellence. Washington, DC: Brookings Institution Press, 2002.
12. White B., Newcomber K. E.: Getting Results: A Guide for Federal Leaders and Managers. Vienna, VA: Management Concepts, 2005.
13. Osborne S. P.: Public-Private Partnerships: Theory and Practice in International Perspective. Florence, KY: Routledge, 2000.
14. Nanus B.: Leaders Who Make a Difference: Essential Strategies for Meeting the Nonprofit Challenge. San Francisco: Jossey-Bass, 1999.
15. Lemberg P.: If You're Not Growing, You're Dying: Steps to Breakthrough Growth for Your Organization. Nonprofit World 22 (5), 2004.
16. Ott S. J.: The Nature of the Nonprofit Sector. Boulder, CO: Westview Press, 2000.
17. Salamon L. M.: The State of Nonprofit America. Washington, DC: Brookings Institution Press, 2003.
18. Riggio R. E., Orr S., Shakely J.: Improving Leadership in Nonprofit Organizations. San Francisco: Jossey-Bass, 2003.





# Stakeholder analysis applied to safety issues in food production: what are the issues in terms of trust and risks and their implications? A sample analysis.

Joan Harvey<sup>1</sup>

<sup>1</sup>School of Psychology, Newcastle University, United Kingdom  
joan.harvey@ncl.ac.uk

**Annotation:** The importance of understanding who stakeholders are, what their roles might be and their levels of influence and manageability is considered here. An approach for stakeholder analysis, derived and utilised in the waste management area is taken and re-applied in the domain of food safety for a fictitious company. The method involves using the identification of stakeholder roles and influences using the affect criterion, then by use of expert judgement, rating the power, legitimacy, urgency and importance of the stakeholders and the time-span of their influence. In particular, the importance of trust and risk perception are emphasised in this process. The data can be presented either in tabular or pictorial form. The resulting patterns of influence can then be used to create or modify organizational strategy and policy.

**Key words:** stakeholder, legitimacy, power, influence, importance, affect criterion, policy

**JEL classification:** JEL classification code(s)

## 1 Introduction

Stakeholder analysis is an important issue: there have been many examples of when stakeholders have been ignored, to the very great cost to the organization, most recently with very big 'names' suffering sales losses or share value drops as a consequence of misjudging stakeholder interest. Whilst the potential influence of stakeholders is huge, the balance of their influence can change, so their nature and influence needs to be understood. This paper takes a stakeholder analysis approach derived from a study in a different domain [waste management, see [6]] and applies it to a fictitious organization [Company X] involved in making food products at a time when food safety standards are proposed to change.

### 1.1 Stakeholder approach

The stakeholder approach has become very 'fashionable' in recent years and increasingly important politically as governments realise that decisions might be more acceptable if all stakeholders are consulted, for example in relation to nuclear power, smoking, alcohol and health. There is a history of stakeholder analysis running through the sustainable development ([13]; [16]), management ([2]; [9]), global environmental change ([10]; [22]) and waste management ([14]; [20]) literatures. Whilst, as a general principle, stakeholder analysis is akin to a 360-degree approach, there is still a debate about the identification, types and level of stakeholder (see for example [2]; [1]; [22]). The stakeholders themselves may be many and may represent a diversity of not necessarily common interests. There is evidence of organisations being forced to change their approach to such things as recycling and decommissioning by interested parties: one well documented example is Shell and the Brent Spar, where the UK government intervened as a result of pressure from consumer groups to prevent the dumping of the platform in the North Sea ([3]; [25]). This shows how government, non-governmental organisations (NGOs) and consumers can be important stakeholders. However, many more potential stakeholders exist.

## 1.2 Importance of food safety

Media coverage has shown frequently how much food safety is an issue; for example, large UK supermarkets have been obliged to remove a variety of items from sale, such as baby foods, wine, turkey and other meat products. For example, in Europe, food 'scares' have included hormones in beef, where for example estradiol, progesterone etc were banned by the EU when the USA believed them to be safe [21]. Which? Magazine in the UK have featured studies indicating levels of pesticides on fruit and vegetables (e.g. [23]) and there have also been 'scares' of food wrapping chemicals leaching into baby foods and 'ready-meals' (e.g. [12]); on a similar theme, a current food safety issue in 2010 is the WHO meeting in July that discussed setting a global limit on how much melamine is allowed in food and animal feed, since it has a history of contaminating milk products. Whilst the limit will not be legally binding, countries can refuse to allow the import of products deemed below minimum quality.

Two stakeholders are mentioned directly in this latter issue: national government with the powers to stop imports and the WHO with the power to influence their decisions, and there are many more such as the manufacturers of animal feed, the public, insurance companies etc. However, in the food production domain there are many more stakeholders, and they now include not only the supermarkets and shops themselves, suppliers, customers, the media, the Government etc., in addition to the more conventional stakeholders that are investors, insurers and shareholders. It is therefore important to be aware of relevant stakeholders and how, indeed if, they might be managed appropriately and by whom.

## 1.3 Who are the stakeholders?

Clarkson (1995) used the 'affect criterion' in order to identify primary stakeholders for companies as: shareholders and investors, employees, customers, suppliers, governments and communities. But who might the stakeholders be in relation to food safety in an agrarian system? In relation to common land, for example, Short and Winter [17] identify five groups of stakeholder: the landowners, commoners, non-agricultural interests [recreational, conservation, landscape, historic/archaeological], other rights holders [e.g. shooting, mineral, public 'right to roam', rights of way] and public interest [represented by the relevant Government Departments DEFRA- management and food production, DETR- conservation and recreation, DCMS Dept Culture media Sports history/archaeology, Local Authorities]. This classification perhaps bundles too many stakeholders into the groups of non-agricultural interests and public interest.

## 1.4 Trust, altruism and risk in relation to standards

Henson and Jaffee [7] use Hirschman's [8] Exit-voice-loyalty model to explain how developing countries can be reactive or proactive in terms of waiting for, anticipating, or even participation in setting standards and whether they participate, negotiate or simply comply with new measures; they suggest that food safety standards can act as both a barrier to trade and the basis for competitive positioning for developing countries in international markets, thereby making broad conclusions problematic as the impacts can be at the product, country, standard or even firm level. Yach and Bettcher [24] refer to transnational actions built on national foundations but requiring new forms of transnational collaboration to minimise risks and build on opportunities. Therefore it is necessary for countries and communities to look beyond their narrow self-interests in defining and confronting the shared problems that are emerging and Yach and Bettcher make a case for enlightened self-interest and altruism; however this is difficult, as they recognise, for developing countries where narrow self-interests of other countries may prevail.

In stakeholder analysis, there has been a tendency to avoid 'soft' issues such as trust, risk perception and attitudes in favour of economic concepts such as valuations based on

'willingness to pay'. An interesting study has shown in one particular area that a variety of stakeholders, if these are properly engaged, can make for better conclusions about how to handle an agrarian problem in forestry. Kijazi [11] investigated forest goods, suggesting that techniques such as 'willingness to pay' reduce natural systems to commodity bundles, and omit critical information about people; further, he suggests that evaluations focused on biotic attributes forfeit the important role of human institutions in mediating human-ecosystem interactions. By using societal evaluations, the social choice approach, stakeholder attitudes and institutional dynamics, Kijazi found 'preference drift' such that aspirations changed with the amenity level attained, non-use forest and indirect use values were preferred and both individual conscience and social conscience evaluations were evident. He used these to explain how the 'Economic Man' view [of forest stakeholders] should be refuted and why a collaborative approach would be more socially acceptable. Further, a chaos theory model of interactions of different stakeholders demonstrated the roles of educational and occupational institutions in moderating stakeholders' behaviours; these might include informal pro-environment and pro-development advocacy coalitions each with representatives from the various occupations. Kijazi shows how different approaches and differing stakeholders can challenge those conventional policy analyses that rely on formal sectors alone.

## 2 Data and Methodology

Whilst splitting stakeholders into internal and external is reasonably self-evident, a simple binary split into primary and secondary is much more problematic because stakeholders cannot be placed consistently, resulting in a lack of consensus across the literature. In response to these traditional binary approaches to identifying and classifying stakeholders, Heidrich, Harvey and Tollin [6] proposed a multi-dimensional scoring mechanism that allows the different roles of stakeholders to be considered, and then subsequently rated on power, legitimacy, urgency and importance, along with their time-span of influence. However in this case, unlike the Heidrich et al. study, the emphasis in the roles, effects and affects is placed on risk and trust as the issue involves food safety.

The method employed here adopts the Heidrich et al. [6] approach. It uses expert judgement and operates in three stages. The first stage is to assemble a complete list of stakeholders. The second stage is to build the roles and affects table, and the third stage is to rate the stakeholders on the dimensions, in this case power, legitimacy, urgency and importance, plus the time-span of influence. To go through these stages effectively requires a lot of collection of information and data: initially, semi-structured interviews with employees and managers would be used. Stakeholders would be identified and their major roles analysed using information collected from whatever sources are available. From all that, their effects on the organization are determined and whether there are reciprocal effects of the organization on the stakeholders; this may require more of a 360-degree approach as perceptions of effect and affect may differ quite considerably between the stakeholders and the organization, and these need to be described in the most representative way possible.

In terms of dimensions for the third stage of the analysis, Mitchell et al. [15] suggest that stakeholders can be identified using Freeman's [2] 'affect criterion' based on power, legitimacy and urgency. Power, which can be gained as well as lost by a stakeholder, may be coercive, utilitarian, or normative. Legitimacy has been defined as something that is "socially accepted and expected structures or behaviours" ([15], p. 866). Since neither power nor legitimacy considers the dynamics of the stakeholder-company interactions, Mitchell et al. [15] suggests adding urgency as a criterion. Heidrich et al [6] have added time-span as a fourth affect criterion.

The analysis utilises the expert judgements of the investigator(s), based on their observations, the information that has been given to them during the interviews, and by what is known of the various stakeholders through research and other information sources. This may even involve checking with some of the stakeholders themselves. For example, reports will be available from relevant regulatory inspectors, relevant legislation may be summarised on websites, competitor's annual reports may be available. The task, of bringing together all this disparate information and assessing the influence that is apparent within it, is best done by an independent agent rather than some in-company management because of the difficulties in making unbiased assessments or perceiving influence as bi-directional. It is suggested that ratings are scored out of 10 [as similar to a standardised measure]. The ratings, standardised as appropriate, can then be assembled, as either a table or in diagrammatic form.

Heidrich et al. [6] reported a real stakeholder analysis in the waste management domain. However, whether the approach advocated can work in other domains needs to be tested and so food safety is taken as an exemplar using a fictitious example [Company X] based loosely on a real organization, known to the author, that produces mainly frozen food products for retail sale.

### **3 Results**

The first stage of the stakeholder analysis generates the list of stakeholders, which are shown in the first column of Table 1 as based on Company X. The second stage involves ascertaining the roles, effects and affects, shown in the second, third and fourth columns of Table 1. Also built into the table are aspects of trust and perceived risk, usually as stakeholder effects. In reality for companies in this domain [production of foods for retail] the stakeholders, their roles, effects and affects should look very similar to what is presented here.

Table 1 can be treated as a template, and so Company X could collect similar results for its environmental operations, waste, or any aspect where stakeholders might be involved. In each case, a template would start by listing the stakeholders.

The completion of the roles and affects table allows the analysis to begin for stage three. In this case for Company X, ratings out of 10 are shown for the three criteria from Mitchell et al. [15] of power, legitimacy and urgency, plus the addition of importance and time span from Heidrich et al. [6]. The ratings are assembled in Table 2, or in diagrammatic form in Figure 1 which represents one of the four dimensions of the affect criterion', power. Table 2 and Figure 1 are not intended to be accurate here, only as exemplars, as their power, urgency etc can vary considerably from company to company even within the food production domain. Table 2 and Figure 1 demonstrate how the relative strengths and weaknesses, vulnerabilities etc. can be seen.

**Table 1.** Stakeholders roles and effects and who is affected: Company X

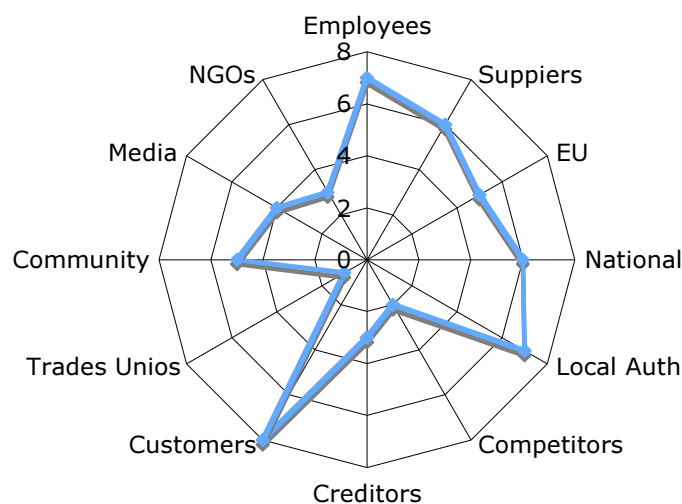
<b>Stakeholders</b>	<b>Roles</b>	<b>S/H effect on X</b>	<b>X affects S/H</b>
Employees	Execute production and food safety activities	Direct effect by following or not following instructions. Little influence on quality or cost other than through suggestion schemes or quality meetings	Are affected directly through working procedures.
Suppliers and contractors	Deliver materials and services that might determine some practices.	Failure to provide on time critical. May have no effect in determining selling prices to X. Implied trust in the contractual relationship. Poor quality of product may cause X serious problems.	X's specifications may cause direct problems for suppliers. Quality control by X. Developing Countries' dependence may have less effect on X than X does on them.
Government / governance: EU; National; Local authority.	EU & national: strategy development and legislation. Regulatory authorities and Inspectorates. LAs have regulatory power and may provide services.	Direct effects on standards via legislation, regulation and compliance. Regulatory authorities can close X down. Local government affects X directly via planning and through provision of inspection services.	Potentially as part of a lobby group. Local government affected as may be involved in monitoring of X.
Competitors	Shared customer interest. May establish best practices	Adoption of leading practices may force X to follow. May choose a different price-quality trade-off or a similar one to be more directly competitive	X changing product specification or leading practices may force rest to change.
Creditors, insurers and shareholders	Provision of funds Insure companies	Indirect through investigation of X's records; withdrawal of funding or support if X perceived to be acting irresponsibly.	Can lose money invested if X underperforms. Are directly affected if any liability arises
Customers: Traders	Purchase of products or services.	Lack of trust can mean reduced sales. Pressure can force recalls. Claims against X increase perceived risk of product.	Direct effects on jobs, Environment locally
Customers: individuals	Product purchase Dissemination of opinion e.g. internet	Lack of trust can mean reduced sales. Pressure can force recalls. Claims against X increase perceived risk of product.	Local area sponsorships of clubs or societies.
Trade Unions	To support the well-being of employees	Only direct effects if X is unionised. Future indirect effects with increasing interest in safety.	Direct challenges by X.
Associations & professional institutions	Establish and share best practice	Affect the system indirectly through provision of guides; interest in the standing of this sector.	No major influence unless advice is needed for other members
Local communities	Both as consumers and neighbours. May have campaigning role if X wishes to change its operation	Affect X indirectly through product choices and directly if localised concerns exist	X could be identified as a good example within its community
Wider public	As purchasers of products. Loyalty may be an issue	Withdrawal of custom can damage X. 'Bad-mouthing' can damage reputation	By offering rewards for loyalty.
Media	Highlighting food safety issues or influence popularity of products	Potentially very high if any problems with products or unsafe practices arise.	No influence
Educational institutions	Provide knowledge and information and some best practices	Indirect via media, direct through knowledge transfer activities	May provide students or placements or exemplars
Consumer groups	Reporting of good and bad practices of X; product comparisons	Can have serious effects on sales and X's activities. May force price reductions. Can affect trust in X.	Little or no influence
NGOs	Non-elected representation of sectors of the public	Indirect effects via lobbying on legal, safety or environmental issues. Increased importance if urgent issues occur.	No influence other than as example of good practice

**Table 2.** Ratings of stakeholders influence on Company X [adapted form [6]]

Stakeholders	Power	Urgency	Legitimacy	Importance	Time of influence
Employees	7	6	8	7	Mostly when jobs threatened
Suppliers & contractors	6	4	6	5	Dependent on international market influences
Government					
EU	5	4	6	7	All
National	6	6	9	7	All
Local authority	7	8	9	6	All
Competitors	2	1	1	4	When markets change
Creditors, shareholders & insurers	3	2	2	2	Possible future
Customers	8	7	8	8	All
Trade Unions & professional institutions	1	1	1	1	Short periods e.g. the 'pay round'
Local communities	5	4	8	5	Potentially increasing in future
Media	4	6	2	4	Current and future
NGOs	3	1	3	2	Likely higher in future

Note: All ratings are scored from 0 [very low or zero] to 10 [very high]

Some of the figures in Table 2 require comment and explanation: it is assumed that the majority of employees are not members of Trades Unions, hence the higher employee than Trades Union ratings. It may also be that new competitors could appear, so their power and influence could rise. Incoming EU legislation could have greater urgency if not anticipated or planned for. Failures of particular supplies due to climatic problems could raise the urgency of suppliers. The local community score is as high as it is to reflect more that these are also customers or potential employees. Patterns of influence of creditors and bankers may also change, as borrowing may be more difficult if Company X were smaller and requiring more capital for new projects. These show the need to update the ratings at least biennially.



**Figure 1.** Diagrammatic representation of stakeholder power for Company X

In summary, it can be seen that the stakeholder analysis can be used in a typical food production company, and can be applied to the food safety domain in addition to other domains.

## 4 Discussion

Identifying stakeholders is less of an issue than it used to be in the literature, as useful lists of most of them now exist ([13]; [16]; [9]; [14]; [20]). Furthermore, classifying them along binary lines no longer seems to have any merit ([2]; [1]; [22]). Instead, multi-dimensional assessments may be deployed, and the 'affect criterion' dimensions were used in this way very effectively in a real case in assessing a waste management system [6]. It is important to see how well this approach might work in other domains, hence this study.

The role of the analyst-investigator is important, as expert judgements are required in this technique; in a large operation, it may be necessary to run an exercise where several analysts each rate the various stakeholders on the three or four dimensions, and then these are standardised to score out of 10, in a form of multi-attribute decision making [4]. In this case, unlike Heidrich et al. [6], which focussed on the waste management system within the company, trust and risk elements have been more clearly incorporated into the roles, affect and effects in Table 1. The reason for this is that customers and the public have now a strong history of being major influences on companies; a very recent example is BP in the Gulf of Mexico, where although the share price is recovering, it had dropped to a low which was a major cause for concern; during the Brent Spar crisis, NGOs and consumer organisations encouraged the public to boycott Shell petrol to such an extent that it can be argued that this alone caused the company to cave in to pressure ([3]; [25]). Public perception of risk may be less relevant to a waste management system in a company, but has high media coverage in relation to food products (e.g. [21]; [23]; [12]) and must be taken into account in any stakeholder analysis in this domain.

This stakeholder analysis has demonstrated the importance of the softer, harder to measure, issues. Hirschman's exit-voice-loyalty model [8] provides an early example of how the public can respond to unsatisfactory products or services, and indeed technology now has made this issue even more relevant as how good or bad products and services can be are extensively addressed on the internet; it is only recently that many organizations seem to realise the capacity for this and now encourage reviews, and 'bad-mouthing' is an example of how thousands, even millions, of people can access good and bad reviews and therefore consider changing their choices of products, affecting a whole chain of stakeholders as a consequence. Risk perception can become a major issue, for example in the spate of product recalls in 2010 [Toyota, BMW, McLaren, etc.] Further, this stakeholder analysis shows that trust is an important component of several stakeholders' effects on the company; consumer trust in government, retailers and food producers has been shifting a lot in the last decade, for example in relation to genetic modification of foods (e.g. [5]), and trust once lost is difficult and time-consuming to rebuild (e.g. [19]).

In addition to the importance of the customer and media in providing feedback in ways that were nearly impossible two decades ago, a whole host of NGOs etc. are appearing with sustainability agendas (e.g. [18]), so it can be proposed that these stakeholder influences do change and that needs to be taken into account using the time-span criterion suggested by Heidrich et al. [6], implying that the ratings in demonstrated in Table 2 can and will change. So the stakeholder analysis should be updated and appropriately modified, probably on a biennial basis.

## 5 Conclusions

This paper has demonstrated that the approach advocated by Heidrich et al. [6] for stakeholder analysis can be used in other domains. It also demonstrates a need for organizations to consider who the stakeholders are in relation to their various operations, and then to consider how these stakeholders can affect what the organization does, so that

by anticipation of influence, some attempt to manage proactively can be made, instead of reaction-based management. In this case, the public, especially their trust and risk perception may well be the strongest 'players' amongst the stakeholders.

Once the stakeholder analysis is complete, it will not remain static; it may apply for one to two years, and will require reconsideration [not necessarily a full re-analysis] at least biennially.

## References

1. Carroll, A. B., Buchholtz A. K.: Ethics and Stakeholder Management 4<sup>th</sup> Edition. Cincinnati, USA: South-Western College, 2000.
2. Freeman, R. E.: Strategic Management: A Stakeholder Approach. Marshfield, Massachusetts, USA: Pittman, 1984.
3. Grolin, J.: Corporate legitimacy in risk society: The case of Brent Spar. *Business Strategy and the Environment*. 7 (2), 1998, pp. 213–222.
4. Harvey, J., Norman, P., Joyce, S.: Multi-attribute decision making and public perceptions of risk in relation to large scale environmental projects. *Risk, Decision and Policy* 9 (4), 2004, pp. 391-400.
5. Harvey J., Erdos G., Holme J., Raven T., Staunton G. D. L., Walton A.: An empirical study of protein consumption and attitudes to genetically modified food. *Risk Decision and Policy* 7, 2002, pp. 81-94.
6. Heidrich O., Harvey J., Tollin N.: Stakeholder analysis for industrial waste management systems. *Waste Management Journal* Vol 29, No 2, 2009, pp. 965-973, online from Sept 2008.
7. Henson S., Jaffee S.: Understanding Developing Country Strategic Responses to the Enhancements of Food Safety Standards. *World Economy* Vol 31 (4), 2008, pp. 548-568 doi: 10.1111..j.1467-9701.2007.01034.x.
8. Hirschman A. O.: Exit, Voice and Loyalty: Responses to Decline in Firms, Organizations and States. Cambridge, MA: Harvard University Press, 1970.
9. Jansson, E.: The stakeholder model: The influence of the ownership and governance structures. *Journal of Business Ethics*. 56 (1), 2005, pp. 1-13.
10. Kasemir, B., Dahinden, U., Swartling, A. G., Schule, R., Tabara, D., Jaeger, C.C.: 'Citizens' perspectives on climate change and energy use. *Global Environmental Change*, 10 (3), 2000, pp. 169-184.
11. Kijazi, M. H.: Stakeholder-centered evaluations of needs, priorities and well-being of forest beneficiaries, Kilimanjaro, Tanzania. *Dissertation Abstracts International*. Vol. 69, no. 6, 2007.
12. Knopper, M.: The perils of plastic: your cling wrap could be leaching chemicals – Your Health. *The Environmental Magazine* Sept-Oct, 2003.
13. Macnaghten, P., Jacobs M.: Public identification with sustainable development - Investigating cultural barriers to participation. *Global Environmental Change-Human and Policy Dimensions*, 7, (1), 1997, pp. 5-24.
14. Mbuligwe, S. E.: Assessment of performance of solid waste management contractors: a simple techno-social model and its application. *Waste Management*. 24 (7), 2004, pp. 739-749.



15. Mitchell, R. K., Agle, B. R., Wood, D. J.: Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. *Academy of Management Review*. 22 (4), 1997, pp. 853-886.
16. Myllyla, S., Kuvaja, K.: Societal premises for sustainable development in large southern cities. *Global Environmental Change Part A*, 15 (3), 2005, pp. 224-237.
17. Short C., Winter M.: The Problem of Common Land: Towards a Stakeholder Governance. *Journal of Environmental Planning and Management* Vol 42 (5), 1999, pp. 613-630.
18. Short T. D., Harvey J.: Lightbulbs and Nappies: Sustainable Development and Customer Perceptions. *International Journal of Sustainable Design*. Vol 1 No 1, 2008, pp. 13-28.
19. Slovic P.: Trust, Emotion, Sex, Politics and Science: Surveying the Risk-assessment battlefield. In P Slovic [ed] *Perception of Risk*. London: Earthscan, 2000.
20. Srivastava, P. K., Kulshreshtha, K., Mohanty, C. S., Pushpangadan, P., Singh, A.: Stakeholder-based SWOT analysis for successful municipal solid waste management in Lucknow, India. *Waste Management*. 25 (5), 2005, pp. 531-537.
21. Van Oudenaren, J.: *Uniting Europe: European Integration and the Post-Cold War World*. Rowman & Littlefield, 2000, pp. 251.
22. Welp, M., de la Vega-Leinert, A., Stoll-Kleemann, S., Jaeger, C.: Science-based stakeholder dialogues: Theories and tools. *Global Environmental Change-Human and Policy Dimensions*, 16 (2), 2006, pp. 170-181.
23. Which?: Pesticide traces found in a third of food. *Which? Magazine* September 12th, 2007, online access: [www.which.co.uk/news/2007/09/pesticide-traces-found-in-a-third-of-food-121423](http://www.which.co.uk/news/2007/09/pesticide-traces-found-in-a-third-of-food-121423).
24. Yach, Bettcher: The globalisation of public health, II: The convergence of self-interest and altruism. *American Journal of Public Health*: Vol 88 (5), 1998, 738-744.
25. Zyglidopoulos, S. C.: The social and environmental responsibilities of multinationals: Evidence from the Brent Spar case. *Journal of Business Ethics*. 36 (2), 2002, pp. 141-151.



# Tuning of Production Management

Jan Hron<sup>1</sup>, Tomáš Macák<sup>1</sup>

<sup>1</sup>Department of Management, Faculty of Economics and Management,  
Czech University of Life Sciences Prague,  
Kamýcká 129, 165 21 Prague 6 Suchbát, Czech Republic  
{hron, macak}@pef.czu.cz

**Annotation:** Modern production management has evolved from general control/management theory. The body of knowledge in this area is extensive. There are two basic approaches to present production management: (1) Automatic Process Control (APC), (2) Statistical Process Control (SPC). The analytical nature of APC is quite different from SPC. In APC is used to see a related, but different, vocabulary as well as a more extensive focus on process modeling in a quantitative sense. Whereas we see primarily output data analysis in SPC, focused on both location and dispersion, we see input-output process modeling in APC, focused mainly on location.

In contemporary management, in whatever system is employed, we must also consider the possibility that the required output may not always be reliably obtained. In general, we can formalize the uncertainty of the output system to be like the probability of a failure of the system element during its activity time. If we know the probability of any components failure-free working during its lifetime, then we can determine a value of the components unreliability, by way of simple subtraction from the expected reliability. Generally is possible to represent a methodology for reducing unreliability in the following ways: (1) Couplers safety optimization, (2) Adding duplicate or standby components. The number of standby units must continue to respect the requirement that the implementation and maintenance costs demand minimum resources, namely to achieve the result of what was the cheapest. It is based on a combination of two strategies - from optimization of the reliability of the serial link, as well as the involvement of additional parallel links generating standby elements. Usually, according to cost criteria, we prefer to optimize the reliability of the elements.

This paper aims to present the design of production concept, which combines two approaches that are: automatic process control and improve the reliability of production management. This concept will be presented on the example of Heinz Fit ketchup production system.

**Key words:** Production Management, Automatic Process Control, Statistical Process Control, System Reliability.

**JEL classification:** C6 - Mathematical Methods and Programming - C67 - Input-Output Models

## 1 Introduction

All control actions of production/operation management can be classified as one of two types: discontinuous/discrete or continuous [2]. Discontinuous/discrete control action is implemented through and electronic triggers. It represents a relatively crude but economical means for controlling simple processes, i.e., relatively few inputs and outputs, with well-understood control actions [1]. Continuous controls afford more control fidelity than discontinuous control, but require more sophisticated process models and technology. Both options see widespread applications. In discontinuous control, produced by a discrete controller, the control action is one of two or more discrete value. Two-position control and multi-position control constitute discontinuous control. In contrast continuous control, e.g., that provided by an analog controller, gives (theoretically) an infinite number of action choices within a given range [4]. Two-position control, also known as an/off control is the most widely used type of control for both industrial and domestic productions/services. The obvious advantage of on/off control is its simplicity and low cost [3].

## 2 Data and Methodology

At the time  $t$ , let the controller output be  $v(t)$  and the error be  $e(t)$ . In an on/off control schema, the signal  $v(t)$  remains at a maximum or minimum value, depending on whether the error signal is positive or negative. In this case of example of Heinz Fit ketchup production system, the error  $e(t)$  is defined as a difference between the target value and its actual response:

$$e(t) = \text{setpoint}(t) - \text{response}(t) \quad (1)$$

Then,

$$v(t) = m_1 \quad \text{for} \quad v(t) > 0$$
$$v(t) = m_2 \quad \text{for} \quad v(t) < 0$$

Where  $m_1$  and  $m_2$  are constants. For two position control, we can define  $m_1$  and  $m_2$  above as 0 and 1, respectively in our process control model.

Generally in model building, we define appropriate output variable responses for all possible cases of input variable values [3]. In our case, which do not involve timers and counters, we use truth tables and Boolean logic expression to model our control logic. Typically, we produce ladder logic diagram, which is compatible with logic controllers, see Asfahl [1] for more detailed of two-position APC/

## 3 Results

Revising our ketchup container filling subprocess, we have several options: (1) develop setpoint for operator, (2) use discontinuous control, (3) use continuous control. The temperature sensor displays more than 85 °C we should turn off steam valve  $V_2$  and instruct our operator in this meaning. Likewise, we can set a 4.2 meter salsa tank height as a target. Then, we can instruct our operator to regulate  $V_1$  accordingly.

Now, we describe a simplified APC subprocess for ketchup tank temperature and head/height control requirements of 85 °C and 4.2 meters. Figure 1 provides us a basic physical depiction of the ketchup tank in terms of on/off APC. First, we will design a system control (APC) for automatic temperature control and high levels of ketchup, using a binary control (Heinz also uses the next logical discrete and analog control). For this purpose we will create a verbal description of the basic physical description of the temperature control and high levels of ketchup in a tank under a binary (on/off) the methodological approach. For the verbal formulation of the role here will introduce a total of six binary variables, four variables represent inputs into the management process and two variables representing the outputs of the binary control. We can introduce the verbal description for each entry into management:

### Theorem 1

*Programmable controller regulates the production operation: A: (0 = Off, 1 = On positions).*

### Theorem 2

*Technological process of production operations (heating performance and ketchup) P: (0= does not working, 1 = is working).*

### Theorem 3

Ketchup temperature  $T$ : (1=below the required level 0=above the required level)

#### Theorem 4

Level of the ketchup inside the tank heater  $H$ : (1=below the required level 0=above the required level)

Furthermore (on the output side), we have two valves,  $V_1$  controlling ketchup inlet and  $V_2$  controlling the steam at 85 °C temperature level. This case, the valves have only two positions, completely closed, denote by 0, and wide open, denote by 1. The controller is responsible for sensing inputs and providing counteractions as outputs to the valves.

According to table 1 we distribute our 0's and 1's to the output variables depends on how we want them to respond to the input states. Essentially we want our valves open only in a few cases, when the level is below 4.2 meter and/or the temperature is below 85 °C. We do not our valves open when the technological process is off or when our operations switch is off. We next convert our truth table to Boolean logic equations.

We develop one equation for each output. We express our logic in terms of valve open activity. Our equations are shown below along logical manipulations that simplify our expressions:

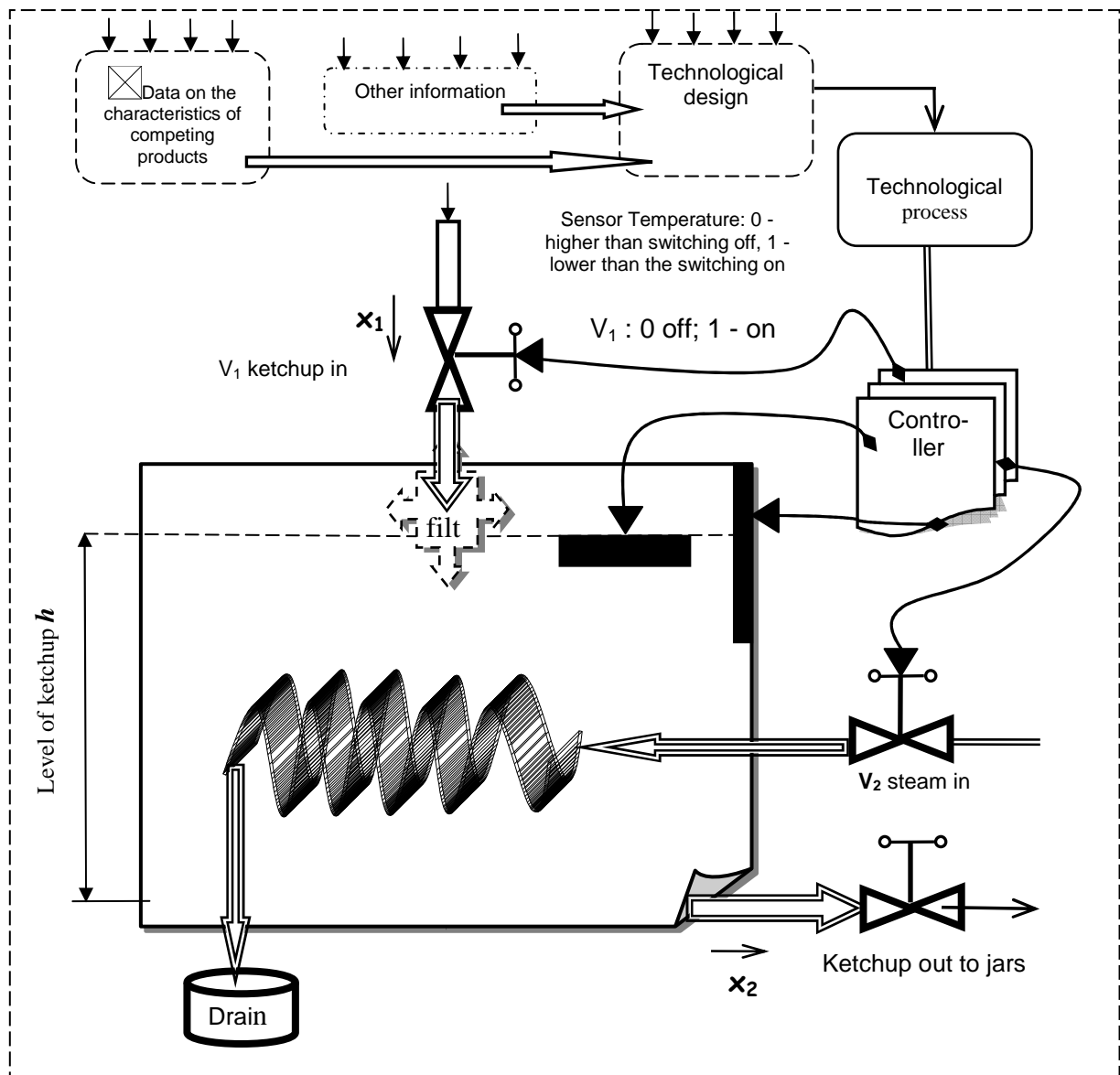
$$V_1 = A \times P \times \bar{T} \times H + A \times P \times T \times H = A \times P \times H \times (\bar{T} + T) = A \times P \times H \quad (2)$$

$$V_2 = A \times P \times T \times \bar{H} + A \times P \times T \times H = A \times P \times T \times (\bar{H} + H) = A \times P \times T \quad (3)$$

Further we can create a formula for the general result of the determination of any system composed of interconnected elements in both parallel and serial links. There is a need to know only the reliability of the individual elements:

$$P = \prod_{j=1}^n \left[ 1 - \prod_{i=1}^m (1 - p_{ij}) \right] \quad (4)$$

where  $\mathbf{m}$  is a variable number of elements connected in parallel (in our example it is the number of elements in 2 blocks), and  $\mathbf{n}$  is the number of elements connected in series (in our example the number of blocks).



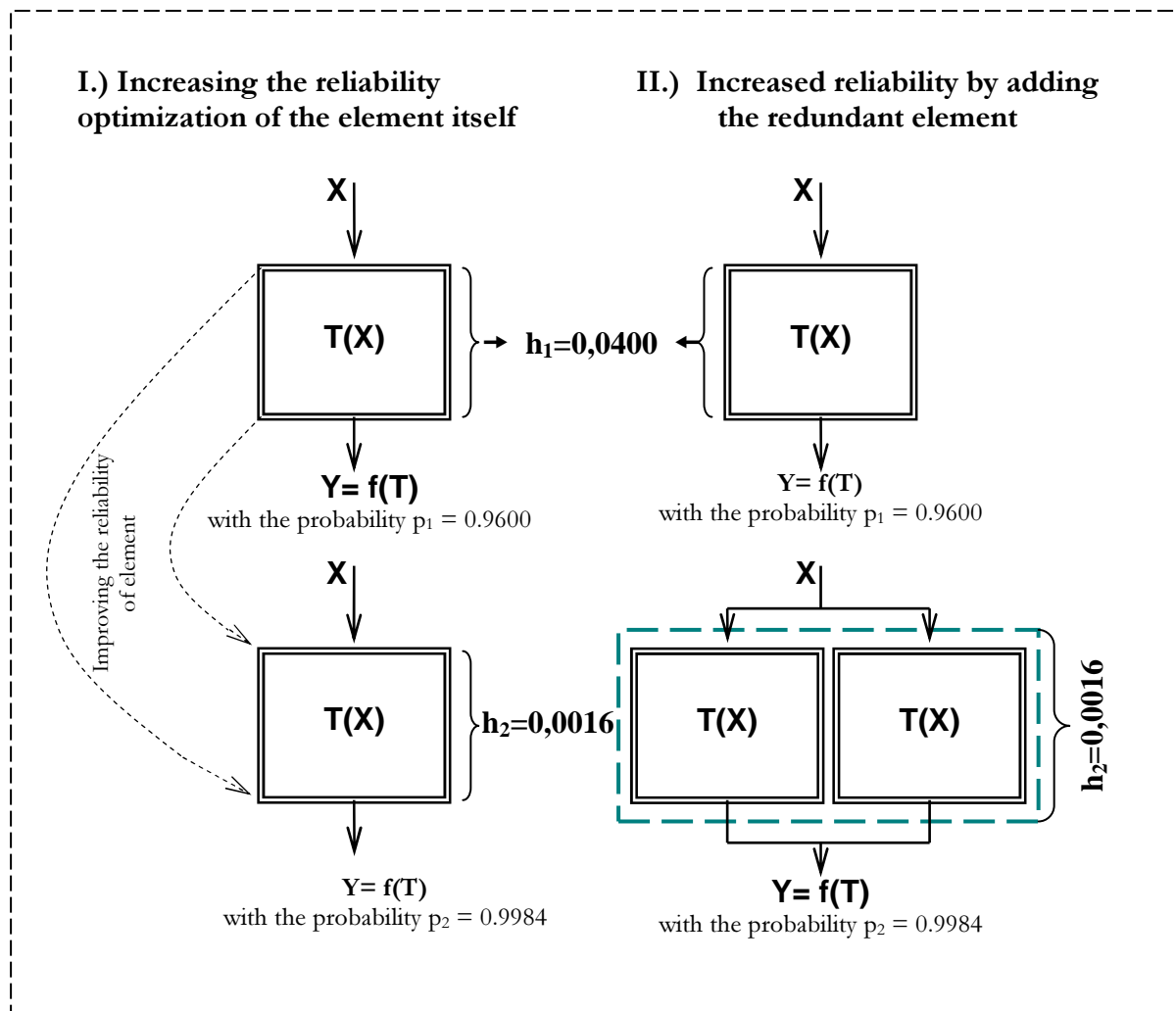
**Figure 1.** A schema of the ketchup production system with APC controller

Shown diagrammatically, it is possible to represent a methodology for reducing unreliability in the following way:

- I. Couplers' safety optimization,
- II. Adding duplicate or standby components.

**Table 1.** Input/output variables and relationships for ketchup tank controller

Input variables				Output variables	
Controller (A)	Technological process (P)	Temperature (T)	Level of ketchup (H)	Ketchup inlet (V <sub>1</sub> )	Steam inlet(V <sub>2</sub> )
0	0	0	0	0	0
0	0	0	1	0	0
0	0	1	0	0	0
0	0	1	1	0	0
0	1	0	0	0	0
0	1	0	1	0	0
0	1	1	0	0	0
0	1	1	1	0	0
1	0	0	0	0	0
1	0	0	1	0	0
1	0	1	0	0	0
1	0	1	1	0	0
1	1	0	0	0	0
1	1	0	1	1	0
1	1	1	0	0	1
1	1	1	1	1	1



**Figure 2.** Two methods of increasing system reliability from the structure point of view

The number of standby units must continue to respect the requirement that the implementation and maintenance costs demand minimum resources, namely to achieve the result of what was the cheapest. It is based on a combination of two strategies mentioned above - from optimization of the reliability of the serial link, as well as the involvement of additional parallel links generating standby elements. Usually, according to cost criteria, we prefer to optimize the reliability of the elements. If, however, we require that the system is extremely reliable, for example, because of threats to the safety of staff or potential of a large loss (not only a financial matter, but also large environmental impacts), we usually must go through a combination of both basic strategies of increasing reliability. The combination of using both of these strategies is typical for a complex management system. A complex system is, characterized by a large number of functional elements, among which there are many links. The characteristics of a large system lie not just in a large number of its constituting elements and the complexity of their ties, but in particular those that unite in single complex, heterogeneous subsystems whose individual behavior is described by different rules.

For the purpose of decision making about a degree of automation / production mechanization is suitable for a production; we can define the Total Economic Criteria (TEC), which include the both requirements for productivity and the reliability / lifetime of a manufacturing equipment or human reliability. For getting an idea about the expected profitability of the chosen option (automatic versus manual control), it is necessary to deduce the criterion of "Total Economic Criteria" includes investment costs (fixed) and operating costs (variable). The following formula defines Total economic criterion:



$$TEC = P \times \frac{PD}{\text{per hour}} - \frac{IC}{\Sigma \text{ hour of production}} - \frac{OC}{\text{per hour}} \quad (5)$$

Where is:

*PD* - Reliability of productivity (liters per hour Ketchup time of production),

*IC* - Investment costs (total investments into manufacturing facilities converted to one hour of production time),

*OC*- Operating costs *OC* (variable cost per hour of production).

## 4 Conclusions

In order to choose between and automated technologies, we assess the benefits and burdens of each technology, i.e. physical, timeliness, safety, and customer service performance. In this case, choosing between manual and on/off automatic alternatives, it is likely that we would opt for the automated on/off control system. From the safety point of view of the system is advantageous to have an automated system complete with manual mode (see formula 4). The economics would be the deciding factor – replacing an unreliable operator with relative inexpensive and reliable electromechanical devices.

IF we were deciding whether we should investing into an automated ketchup production system or leave mechanized operation, we could use the previous formula to calculate the total economic criteria.

$$\text{IF} \quad TEC_{AC} > TEC_{MC}, \quad (6)$$

then it worth to investing in automated production of ketchup

Where:

$TEC_{AC}$  is calculated value for Total economic criterion of automated production method

$TEC_{MC}$  is calculated value for Total economic criterion of for manual / mechanical methods of production

## **Acknowledgements**

Supported by the Ministry of Education, Youth and Sports of the Czech Republic (Project No. MSM 6046070904) and the Czech Science Foundation (Grant No. 11140 /1411/114105).

## **References**

1. Asfahl, C. R.: Robots and Manufacturing Automation, 2nd ed. New York Wiley, 1992.
2. Ellis, G.: control System design Guide – Using Your Computer to Develop and Diagnose Feedback controllers, New York: Academic Press, 1991.
3. Narendra, K. S.: Identification and Control of Dynamical Systems Using Neural Networks. IEEE Transactions on Neural Networks, vol. 1, No. 1, pp-4-27, 2000.
4. Ogata, K.: Modern control Engineering, 3rd ed. Upper Saddle river, NJ: Prentice Hall, 1997.

# The Role of Fairness and Interdependence in International Business-to-Business Marketing Relationships

Lisa Scheer<sup>1</sup>, Donald Lund<sup>1</sup>, Irina Kozlenkova<sup>1</sup>

<sup>1</sup>University of Missouri, Robert J. Trulaske, Sr. College of Business,  
433 Cornell Hall, Columbia, MO, 65211, USA  
irinakozlenkova@mizzou.edu

**Annotation:** With the growth in international business-to-business commerce linking marketers with markets in all corners of the globe, a better understanding of what promotes stability in cross-border marketing relationships is needed. This study focuses on determining the nature of fairness and dependence in marketing relationships—two important factors that have been found to promote stability. This research explores whether religious tradition, national factors, cultural dimensions, industry norms, or relationship-specific elements determine the standards that firms use to assess fairness in their B2B relationships. Potential differences in the nature or impact of fairness and dependence in *domestic* business relationships versus relationships among firms *from different countries* are examined. By also examining the *nature* of partners' dependence in greater depth (exploring both benefit-based vs. cost-based dependence), greater insights are gained as to which types of dependence are associated with greater relationship stability and if the effects of perceived fairness are moderated by the benefit-based vs. cost-based nature of the partners' dependence.

**Key words:** Relationship marketing, fairness, dependence, stability, business-to-business relationships

**JEL classification:** M

## 1 Introduction

Common sense and prior research suggest that fairness is an important component to the development of effective channel relationships (e.g. [2]; [10]; [12]). However, even the meaning of the word “fairness” is unclear: “Despite the growing literature on fairness...one is still left with the following question: What exactly does fairness mean?” [18]. Not only have academic researchers had difficulty in defining fairness, it appears that lawyers have not been able to clearly define fairness: in the thousands of pages of official complaints to the US government about unfair actions by trading partners, a meaningful definition of neither fairness nor unfairness has been found [1].

Given the lack of convergence on the definition of fairness, it is not surprising that many questions remain about the role of fairness in business relationships. For instance, is fairness always important for developing effective relationship within all marketing channels, or, are there circumstances when other factors are much more important? Additionally, evidence suggests that unfairness erodes loyalty and undermines stability within business-to-business relationships [7], but, is this always the case, or are there long-term relationships where perceived unfairness exists? Have we considered the possibility of positive external ramifications of a relationship even if there is unfairness within the relationship? Previous research in marketing distinguishes between two types of fairness: distributive and procedural. However, are both types important in business-to-business relationships? What factors external to the relationship might impact fairness perceptions? Could cultural differences impact fairness assessments? When we judge the fairness of the treatment we receive by a partner, what referent do we compare it to? The inconsistent definitions and conceptualizations of fairness suggest that many questions remain unanswered.

## 2 Data and Methodology

As has been suggested in the past [5], both academics and practitioners would benefit from research attempting to answer some of these remaining questions. Our research is a preliminary attempt to address some of these issues by collecting survey data from retailers in over 10 different countries, including the US, Croatia, Hungary, Brazil, Russia, Malaysia, Poland, etc. Such a large sample of different cultures should allow statistical analyses of exactly which cultural dimensions impact the role of fairness in business relationships. In this paper we will focus on the role that cultural dimensions play and the role of a referent in the assessment of fairness.

## 3 Theoretical Background

Previous research from a variety of disciplines shows that fairness perceptions do vary between cultures [17] and culture shapes our interpretations of fairness [14]. In some cultures, for instance, in the Japanese culture, there is not a word for “fair”. Whereas Americans learn early in life to assess fairness in terms of the relative size of the rewards they receive, the Japanese deemphasize this, instead adopting an elaborate social system that emphasizes respect, politeness, and social harmony. Greenberg notes that people from various cultures favor different distributions (equity, equality, and need) when allocating rewards [5]. Therefore, “...caution must be exercised regarding the universality of concerns about justice. Although interest in justice seems to be universal, expressions of that interest are strongly related to cultural differences” [5].

There is an implicit presumption in much research that equitable business-to-business relationships are *de facto* fair. Scheer, Kumar and Steenkamp [15], however, suggest that this assumption may not always hold. That research revealed distinct differences in how U.S. and Dutch managers assessed fairness in business-to-business marketing relationships. If differences were found across two cultures that are fairly similar, what differences may exist across highly dissimilar cultures? It is important from a theory perspective to understand what gives rise to different fairness standards in business-to-business relationships [5].

This multi-national study explores whether religious tradition, national factors, cultural dimensions, industry norms, or relationship-specific elements determine the standards firms use to assess fairness in business relationships. Greenberg (2001), in the *International Journal of Conflict Management*, recommends “analyses aimed at determining precisely what constitutes justice in various cultures, including systematic field interviews.” Research regarding international relations, justice, management-employee relations, and interpersonal fairness will inform this project (e.g., [4], [6]), but generalization to the business-to-business context is suspect because of the unique characteristics of that context which may alter the role of fairness.

## 4 Results

Another important element which will be investigated is the role of the referent. A distributive fairness referent is defined as a benchmark or frame of reference against which a distribution of outcomes and/or contribution of inputs is compared [3]. Previous research has mentioned that an individual may have multiple potential points of comparison to help formulate a baseline for distributive fairness judgments, but only a few will become actual points of comparison [16]. However, it is essential that we understand what factors make certain referents salient. Could we also establish the patterns that predict the comparison?

Potential differences in the nature or impact of fairness and dependence in *domestic* business relationships versus relationships among firms *from different countries* will be examined. Are different fairness standards applied with a business partner from the same nation/culture

versus one from a foreign nation/culture? Individualism/collectivism, masculinity/femininity and power distance are among the culture dimensions identified by Hofstede and will be investigated in this research [8]. Selected research hypotheses are as follows:

Kim, Park and Suzuki, in a comparison of the U.S., Japan and Korea, found that adherence to the equity principle was more pronounced in the more individualistic of these countries (the United States) than it was in the more collectivistic (Korea) [11].

- H1: As individualism values increase (collectivism values decrease),
- a. Inequity favoring the firm will be evaluated as more fair.
  - b. Equality of outcomes will be evaluated as more unfair.

In previous organizational research it has been found that feminine societies put more importance on equality and solidarity rather than equity, whereas in masculine societies equity and mutual competition is stressed more [9].

- H2: As values associated with femininity increase (values associated with masculinity decrease),
- a. Inequity favoring the firm will be evaluated as more fair.
  - b. Equality of outcomes will be evaluated as more fair.

“Individual differences in ...power-distance orientation [19] have been found to influence the importance that people accord to the fairness of procedures when evaluating authorities and organizations” [13]. In the organizational literature it has been found that in societies with low power-distance there is less deference to power and greater negative reaction at unfair treatment. In cultures with high power-distance, interactions are more role-constrained [13].

- H3: As cultural acceptance of power distance increases,
- a. Inequity favoring the firm will be evaluated as more fair.
  - b. Equality of outcomes will be evaluated as more unfair.

Equally important is whether the same standards are applied to domestic partners assumed to be culturally similar, as are to relationships among business partners from culturally-distant countries. We will also examine how fairness interacts with a firm's interdependence with its business partner. We expect that fairness will have greater impact on relationship stability under certain dependence conditions. A better understanding of these issues has obvious implications both for theory development and for managerial practice in international trade and cross-border relationships.

Currently, data collection is underway. We have received data from about four countries and are in process of collecting data from six other countries. Some results may be available by the time of the conference.

## **5 Conclusions**

In conclusion, much has been written on fairness; however, many of the important elements and boundary conditions have not been empirically examined. This research will attempt to shed some light on the role of culture on perceptions of fairness and unfairness in real channel relationships. We expect this multi-national study will provide a more comprehensive understanding of fairness in business-to-business relationships.

## References

1. Abbot, Kenneth W.: Defensive Unfairness: The Normative Structure of Section 301. Jagdish Bhagwati and Robert Hudec (eds), *Fair Trade and Harmonization: Prerequisites for Free Trade*, 2. Legal Analysis, MIT Press, Cambridge MA. 1996.
2. Anderson, E., Weitz, B.: The Use of Pledges to Build and Sustain Commitment in Distribution Channels. *Journal of Marketing Research*, 1992, 29 (1), 18-34.
3. Folger, Robert, Russell Cropanzano: *Organizational Justice and Human Resource Management*. Thousand Oaks, London, New Dehli: Sage Publications. 1998.
4. Greenberg, Jerald: *Language in the Americas*. Stanford University Press, Stanford. 1987.
5. Greenberg, Jerald: Studying Organization Justice Cross-Culturally: Fundamental Challenges. *International Journal of Conflict Management*, 2001,12 (4).
6. Greenberg, Jerald: Organizational Justice: Yesterday, Today, and Tomorrow. *Journal of Management*, 1990, 16 (2), pp. 399 – 432.
7. Hansen, H., Samuelsen, B., Silseth, P.: Customer Perceived Value in B-t-B Service Relationships. Investigating the Importance of Corporate Reputation. *Industrial Marketing Management*, 2008, 32, pp. 206-217
8. Hofstede, G.: Dimensions of National Cultures in Fifty Countries and Three Regions. Deregowski J. B., Dziurawiec S., Annis R. C. (Eds.): *Explications in Cross-Cultural Psychology*, 1983.. Lisse, Netherlands: Swets & Zeitlinger, pp. 335-355.
9. Hofstede, G.: Masculinity/Femininity as a Dimension of Culture. G. Hofstede, ed., *Masculinity and Femininity: The Taboo Dimension of National Cultures*, 1998. Thousand Oaks, CA: Sage, pp. 3-28.
10. Kaufmann, P. J., Stern, L.: Relational Exchange Norms, Perceptions of Unfairness, and Retained Hostility in Commercial Litigation. *Journal of Conflict Resolution*, 1988, 32 (3), pp. 534-552.
11. Kim, K. I., Park, H., Suzuki: Reward Allocation in the United States, Japan, and Korea: Comparison of Individualistic and Collectivistic Cultures. *Academy of Management Journal*, 1990, 33, pp. 188-198.
12. Kumar, Nirmalya, Scheer Lisa K., Steenkamp Jan-Benedict: The Effects of Supplier Fairness on Vulnerable Resellers. *Journal of Marketing Research*, 1995, 32 (3), pp. 348 – 356.
13. Lee, Cynthia, Madan Pillutla, Kenneth S.: Law. Power-Distance, Gender & Organizational Justice. *Journal of Management*, 2000, 26 (4), pp. 685-704.
14. Patterson, P. G., Cowley Elizabeth, Kriengsin Prasongsukarn: Service Failure Recovery: The Moderating Impact of Individual-level Cultural Value Orientation on Perceptions of Justice. *International Journal of Research in Marketing*, 2006, 23, pp. 263-277.
15. Scheer, Lisa K., Nirmalya Kumar, Steenkamp Jan-Benedict E. M.: Reactions to Perceived Inequity in U.S. and Dutch Interorganizational Relationships. *Academy of Management Journal*, 2003, 46 (3), pp. 303-316.
16. Sheppard, Blair H., Lewicki Roy J., Minton John W.: *Organizational Justice: The Search for Fairness in the Workplace*, 1992. New York, NY: Lexington Books.
17. Steiner, D. D., Gilliland, S. W.: Fairness Reactions to Personnel Selection Techniques in France and the United States. *Journal of Applied Psychology*, 1996, 81, pp. 134-141.

18. Suranovic, S. M.: A Positive Analysis of Fairness with Applications to International Trade. *World Economy*, 2000, 23 (3), pp. 283-307.
19. Tyler, T. R., Lind E. Allan, Yuen J. Huo: The Relational Model of Authority: Social Categorization and Social Orientation Effects on the Psychology of Legitimacy. American Bar Foundation Working Paper Series 9504, 1995





# Dairy farm development plans in the EU

Jiří Mach<sup>1</sup>, Pavla Hošková<sup>2</sup>, Richard Selby<sup>3</sup>, Helena Řezbová<sup>1</sup>

<sup>1</sup>Dept. of Economics, <sup>2</sup>Dept. of Statistics, <sup>3</sup>Dept. of Management,  
Faculty of Economics and Management,  
Czech University of Life Sciences Prague,  
Kamýcká 129, 165 21 Prague 6 Suchbát, Czech Republic  
mach@pef.czu.cz

**Annotation.** More than 2000 dairy farmers from 16 countries participated in a “Snapshot” survey, organised by the European Dairy Farmers association (EDF) in spring of 2010. At the time of questioning the average farm had 148 cows and the average milk yield per cow and year was 8,660 kg. Herd sizes differ a lot between countries. The survey analyses the intentions of dairy farmers over the next five years. The results imply growth in milk production, thanks to the farmers plans to increase their herd sizes by 10 cows/farm/year to an EU-average of 198 cows/farm by 2015. Dairy farmers planning to increase their herd size often face considerable limitations. Being asked about their problems when expanding their dairy enterprise substantially, more than 30% of the participating farmers reported that the availability of land is a big problem. Finding workers, getting more quota, access to money or obtaining licences are only big problems for less than 25% of the farmers. Intensification of dairy farming seems to be the strategy most farmers with land scarcity want to achieve in the future (80%). Other strategies like buying feedstuff externally (60%), cooperating with other farmers (57%), exporting slurry (50%), paying higher prices (39%) or even changing farm location (8%) find less acceptance among the participating dairy farmers. Farms with herd sizes below 100 cows in particular regard labour availability as a problem. That shows that stepping from a family farm without employees to a farm hiring labour units is not easy.

**Key words:** milk production, herd sizes, limiting factors, entrepreneurial strategies

**JEL Classification System:** Q12, Q13

## 1 Introduction

Breeders of dairy cattle across Europe are currently battling with a number of problems. The most dramatic is the fall of milk purchase prices at the turn of 2008/09 which persisted throughout 2009 (falling by an average of 30%, compared to 2008) and was slowly improving at the beginning of 2010. Most farmers have protested against the current conditions in the milk sector, with present quotas in milk production being maintained - even though it will be increased each year by one percent until 2015. The European Commission has now ruled out the chances of quota changes which farmers have been demonstrating for (including the implementation of minimum purchase prices, such as exists on the sugar or potato starch market). It is evident that, under present conditions and with reduced international demand, only the most productive farmers will survive in the subsequent competitive market.

Although panels have been used in consumer research for a number of years, the use of a panel of producers or farmers as a source of farm management data started in the 1960's [4]. Basically, a farm panel is a group of farmers questioned and revisited over a period of time to obtain various types of information. Panel studies can be used to identify both net and gross change in the dependent variable. Panel studies are also able to show up changing attitudes and patterns of behaviour which might not be observed using other research methodologies. The data produced by these panels are generally suitable for statistical analysis, and are able to expose cause-effect relationships.

The results from the panel data can also help managers of agribusiness companies, as implied by Štůsek and Ulrich [9], who applied such data in the strategic thinking models of decision making. The panel data could be also interesting for the processing industry. Bořková [1] e.g. tried to identify how important the distance was between the milk producer and the milk processor in their decision of which dairy plant would do the processing.

The aim of this paper is to ascertain the plans of European dairy farmers for the period from 2010 to 2015, to identify the trends in European dairy farms, and to identify factors concerned with limiting herd size.

## 2 Data and methodology

The main author is a member of the board of the European Dairy Farmers association (EDF), and had access to the raw data from a survey made by the EDF among European dairy farmers [7]. The main author also participated in the design of the questionnaire, and was responsible for gathering the responses from the Czech farms. The survey was done in March 2010, and 2205 farms participated across Europe. The tables presented in this paper were all computed by the authors. In total, 16 countries were involved, not only the EU members, but also Ukraine and Switzerland. In table 1 is shown the numbers of participating farms in particular states.

**Table 1.** Numbers of participating farms

<i>Country</i>	Belgium	Switzerland	Czech Republic	Germany	Denmark	Spain	France	Ireland	
	BE	CH	CZ	DE	DK	ES	FR	IE	
<i>Number</i>	<b>48</b>	<b>5</b>	<b>18</b>	<b>1458</b>	<b>37</b>	<b>120</b>	<b>74</b>	<b>21</b>	
<i>Country</i>	Italy	Luxemburg	Netherlands	Poland	Sweden	Slovakia	Ukraine	United Kingdom	
	IT	LU	NL	PL	SE	SK	UA	UK	<i>Total</i>
<i>Number</i>	<b>21</b>	<b>13</b>	<b>36</b>	<b>33</b>	<b>252</b>	<b>30</b>	<b>10</b>	<b>29</b>	<b>2205</b>

The farmers were asked about their current production characteristics, about their general farm situation, their investments, and about their plans for future – until 2015.

Some data, especially farm acreage and herd size, were associated with other data in a contingency table. The contingency table is often used to record and analyze the relationship between two or more categorical variables [12]. It displays the frequency distribution of the variables in a matrix format. If we have N observations with two variables, where each observation can be classified into one of R mutually exclusive categories for variable one, and one of C mutually exclusive categories for variable two, then a cross-tabulation of the data results in a two-way contingency table (also referred to as an R x C contingency table). The resulting contingency table has R rows and C columns.

A common question with regards to a two-way contingency table is whether we have independence. By independence, we mean that the row and column variables are unassociated (i.e.: knowing the value of the row variable will not help us predict the value of column variable, and likewise knowing the value of the column variable will not help us predict the value of the row variable).

A more technical definition for independence is that:

$$P(\text{row } i, \text{column } j) = P(\text{row } i) * P(\text{column } j) \quad \text{for all } i, j.$$

The standard test statistic for determining independence is the chi-square test statistic:

$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^s \frac{(O_{ij} - E_{ij})^2}{E_{ij}} \quad (1)$$

where

$\chi^2$  = Pearson's cumulative test statistic, which asymptotically approaches a  $\chi^2$  distribution.

$O_{ij}$  = an observed frequency;

$E_{ij}$  = an expected (theoretical) frequency, asserted by the null hypothesis;

r,s = the number of rows and columns in the table.

The Pearson's contingency coefficient is one method to provide an easier to interpret measure of strength of association. Specifically, it is:

$$C = \sqrt{\frac{\chi^2}{n + \chi^2}} \quad (2)$$

where

$\chi^2$  = the chi-square test statistic given above

n = the total sample size

So this statistic basically scales the chi-square statistic to a value between 0 (no association) and 1 (maximum association). It has the desirable property of scale invariance. That is, if the sample size increases, the value of Pearson's contingency coefficient does not change as long as values in the table change the same relative to each other.

Cramer's V is an adjusted test to the chi-square test. The value of the Cramer's V varies and is between 0 and 1. Cramer's V is also a symmetrical measure. Significance testing of the Cramer's V is the same as the chi-square test. The value of the Cramer's V can be reached at 1 if two variables have an equal marginal.

$$V = \sqrt{\frac{\chi^2}{n(q-1)}} \quad (3)$$

where

q = minimum(number of rows, number of columns)

### 3 Results and discussion

On average, it was found that the current farm manager took over the farm management in 1992. At that time the farm had 117 cows and the average milk yield per cow and year (MYPCY) was 6,601 kg. Today's herd size is 148 head, and the MYPCY is 8,660 kg. Herd sizes differ a lot between countries: next to regions where more than half of the farms have herd sizes below 100 cows (Poland, Belgium, France, Germany – western part, Sweden), there are also regions where more than 50% of the participating farmers farm more than 300 cows (the Eastern part of Germany, the Czech Republic, Slovakia and Ukraine). Average herd sizes mostly reflect these differences, and looking ahead they show that differences between

countries - and even within countries increase until 2015. This development is similar to the findings of Requillart et al. [8].

Looking at herd size growth, one can always consider two different figures: absolute growth (in cows) or percentile growth. Analysing the growing differences in herd sizes, looking at percentage growth is less meaningful, because most of the larger farms have lower percentage growth rates even though the absolute number of additional cows is higher than in smaller farms. Looking at absolute growth, farmers in the Ukraine, Eastern Germany, Slovakia, the UK mainland and the Netherlands plan the highest herd size enlargements (by more than 50 cows within the next five years). On the other hand, regions with smaller average herd sizes today also plan smaller enlargements. For example, the participating Polish farmers, having an average herd size of 34 cows/farm today, plan to increase their herd size by 12 cows by 2015, to a herd size of 46 cows/farm.

At the time of surveying the farmers, the farm individual milk price (without VAT) was about € cents 30.6 per kg of milk (standardised on 4.0% fat, 3.4% protein) Farmers stated that the delay in receiving payment for the milk bill was mostly either 2 (30.5%) or 3 (38%) months. The milk factory paid only 3.5% of farmers in the same month as deliveries were received.

Those questioned are currently farming an average 332 ha; from this 72% is rented. The cost of rented land is approximately € 550 / ha and farmers expect that the price will increase up to € 682 / ha.

In the question about farm strategy, about 56% of farmers plan to change their strategy due to recent market developments. The most common strategies are, to postpone planned investments for the dairy unit (22.3%), to specialise more on milk production (14.6%), to expand other farm enterprises (14.1%), or to increase an off-farm income (12.5%). With regard to investments planned for the whole farm within the next 12 months, almost two thirds of the farmers questioned plan to invest: 48% into dairy enterprise, 24% in renewable energies (e.g.: biogas, wind or solar power), 14.6% want to invest in land, and the rest plan to invest in some other farm enterprise. If we focus on investments into the dairy enterprise, the majority of the farmers plan to invest in barn (29%), then in milking equipment (16.7%), and in fodder equipment (13%).

Thinking five years ahead (in 2015), more than half of the farmers from the data set expect the increase of herd size to approximately 198 dairy cows – which means to increase their herd sizes by 10 cows/farm/year. That would be about a third more than in the last 18 years. This accelerating trend towards bigger herd sizes also confirms the results from last year's Snapshots where a three times faster development was shown. Obviously this trend is weighed down by milk prices, which in the survey period, remained low. This would not be in alignment with the conclusions of Bouamra-Mechemache et al. [2], which indicate decreasing consumption of butter and fluid milk.

They also expect to achieve the MYPCY 9,282 kg/cow yearly in average. It is interesting that although farmers expect stagnating milk prices in the long-term (58% vs. 35% of respondents which think an increase), for medium-term planning (about 5 years) they expect a slight increase, and use about 33 € cents per 1 kg of milk

Dairy farmers planning to increase their herd size are often facing considerable limitations. Being asked about their problems when expanding their dairy enterprise substantially, more than 30% of the participating farmers named the availability of land as a big or serious problem. Also volatile milk prices, legal requirements (e.g.: animal welfare, or environmental rules), or high prices of inputs, are felt by the farmers as a big problem, with share about 25%

of respondents. The last limiting factor with a relatively high perception (15%) is the availability of adequate labour (hired workers).

There also exists a dependency between the land acreage farmed or herd size, and the limiting factors mentioned above. As shown in table 2, medium strength of dependency appears in the factor of high input prices, where two thirds of small farmers (with acreage from 10 to 50 ha) feel this limitation as a “problem” against the big farmers or companies (100 – 500 ha) where the problem is felt only by a half of this farmer’s group. The differences between large-scale and small-scale farmers in the U.S. was also found by Kumbhakar et al. [6], who realised that large farms are more efficient (technically) than small and medium-sized farms.

**Table 2.** Dependencies between land acreage and given limiting factors<sup>1</sup>

	Land availability	Labour availability	Credit availability	Volatile milk prices	High prices of inputs	Animal health / diseases	Legal requirements
Numbers of observations	2120	2097	2086	2117	2113	2093	2103
$\chi^2$	169.1852	68.02979	65.66261	84.03611	277.9327	101.5397	147.0697
Pearson’s C	<b>0.2718571</b>	0.1772628	0.1746916	0.1953977	<b>0.3409464</b>	0.2151029	<b>0.2556605</b>
Cramer’s V	0.1412483	0.0900576	0.0887099	0.0996191	0.1621941	0.0985027	0.1182652

In case of herd size, a stronger dependency on input prices was also displayed, but also the volatile milk prices (table 3), where it was confirmed that the smaller herd size, the stronger the feeling of these factors as a problem (in range from 10 to 750 cows herd size; table 4).

**Table 3.** Dependencies between herd size and given limiting factors

	Land availability	Labour availability	Credit availability	Volatile milk prices	High prices of inputs	Animal health / diseases	Legal requirements
Numbers of observations	2120	2097	2086	2117	2113	2093	2103
$\chi^2$	83.99227	76.83030	59.98337	99.51610	90.16816	63.98043	66.62466
Pearson’s C	<b>0.1951714</b>	0.1879549	0.1671480	<b>0.2118426</b>	<b>0.2023032</b>	0.1722267	0.1751964
Cramer’s V	0.0994991	0.0956827	0.0847665	0.1083811	0.0923830	0.0781905	0.0795810

It is also interesting to recognise the perception of labour scarcity among the farmers. In particular, farms with herd sizes below 100 cows regard labour availability as a problem (64% farmers who see this factor as a problem were from this group). This shows that stepping from a family farm without employees to a farm hiring labour units is not that easy. However, in these farms in particular, the need for employees will increase within the next 5 years by 15 to 20%. So they face special challenges a) to find good labour and b) to change organisational aspects from a family farm to a farm with employees. Farms with more than 250 cows basically only replace employees, but are mostly set considering their employee structures.

<sup>1</sup> All computations in tables 2 – 4 are based on the authors' own calculations.

**Table 4.** Feeling the high input price and the volatile milk price as a problem according the herd size

Herd size	High prices of inputs		Volatile milk prices	
	Numbers of observ.	% of feeling as a problem	Numbers of observ.	% of feeling as a problem
to 10	7	57.14	7	42.86
(10 - 30>	185	71.35	191	78.01
(30 - 60>	469	62.47	471	64.97
(60 - 100>	608	59.05	607	61.78
(100 - 250>	530	53.77	534	54.31
(250 - 500>	207	51.21	203	54.68
(500 - 750>	52	40.38	51	39.22
(750 - 999>	16	31.25	16	50.00
over 1000	31	54.84	31	77.42
not counted	8	n.a.	6	n.a.

Finding labour units is one aspect, the other one is paying them. On average, participating farmers pay a trained worker about € 26,000 per year, an untrained worker about € 22,000 per year, whereas herd managers are being paid € 34,000 per year. However there are substantial differences between European countries. For example, hiring a herd manager costs less than € 20,000 per year in the Czech Republic, Slovakia, Spain and Italy whereas farmers in Germany, the Netherlands and Ireland have to pay up to € 45,000 per year for a herd manager. Tomšík et al. [10] assigned from their questionnaire survey among managers of medium-size agricultural companies in the Vysočina region (CZ) in 2007, that 35.2% of respondents estimated that the level of present wages was disproportionately low. At the same time, they anticipate the growth of requirements for qualification (66.7%), however, they do not expect (82.4%) a corresponding marked increase of wages. Høglund [5] confirmed that next to feed, labour is the most costly input in producing milk, accounting for 15 to 30% of total costs. Cost of labour largely determines the profitability of investing in labour saving housing and equipment. Also Cabrera et al. [3] found that production exhibits constant returns to scale and that farm efficiency is positively related to farm intensification, the level of contribution of family labour in the farm activities, the use of a total mixed ration feeding system, and milking frequency.

The importance of milk production in the long-term is surprisingly felt as decreasing by the highest group of farmers. The same, but with a lower share are thinking about beef production. On the other hand, about two thirds of farmers think that biogas or other renewable energies production are going to increase in importance.

On being asked how they see the EU policy development regarding milk, which is reducing involvement into the dairy market now (e.g.: end of quota, reduction of export subsidies etc.), farmers feel it slightly negative (3.32 from a 5 point scale). It matches the findings of Vágány [11] who mentioned that the new EU decision obligates all participants in the food chain to assure traceability and to introduce the HACCP or an equivalent food safety system, which is very time-consuming for the farmers.

Participating farmers in Central and Eastern Europe (Poland, Czech Republic, Slovakia and Ukraine) still have high potentials to meet increasing competition for land by increasing their intensity on existing fields. Whereas they are milking from 422 (Ukraine) to 4,741 (Poland) kg of milk/ha, farmers in Spain, Italy or Ireland are milking more than 10,000 kg of milk/ha (16,670, 15,670 and 11,360, respectively). Intensification of dairy farming seems to be the strategy most farmers with land scarcity want to achieve in the future (80%). Other strategies

like buying feedstuff externally (60%), cooperating with other farmers (57%), exporting slurry (50%), paying higher prices (39%) or even changing farm location (8%) find less acceptance among the participating dairy farmers.

## 4 Conclusions

The majority of the dairy farmers participating in the EDF Snapshot analysis are planning a relatively strong herd size growth in the coming years. Analysis shows that there is – despite the economic crisis – an accelerating trend to increasing herd sizes up to 2015. Snapshot figures enable an assessment of future entrepreneurial trends in the dairy industry. Participating dairy farmers in central and north-eastern Europe in particular are planning to expand dairy herds so that the distance between average herd sizes seems to be growing fast. Limiting factors to herd size growth differ between the 16 participating countries, but for the majority of almost 2000 dairy farmers, the availability of land and labour, high price of inputs and volatile milk prices are the key limitations of milk production.

## Acknowledgement

Knowledge presented in this paper is the result of grant solution MSM 6046070906 “Economics of Czech agriculture resources and their efficient usage within the framework of multifunctional agri-food systems”. The authors also wish to acknowledge the assistance given by Ms. Birthe Lassen (EDF), who provided the raw data of European countries from the EDF-agri benchmark Snapshot survey.

## References

1. Bošková, I.: Effects of the length of the milk collection route on the choice of the locality of milk processing. *Agricultural Economics (AGRIC. ECON. – CZECH)*, Vol. 55 (10), 2009, pp. 501 – 507.
2. Bouamra-Mechemache, Z. et al.: Demand for dairy products in the EU. *Food policy*, vol. 33 (6), 2008, p. 644 – 656.
3. Cabrera, V. E., Solis, D., Corral, J.: Determinants of technical efficiency among dairy farms in Wisconsin. *Journal of Dairy Science*, Vol. 93 (1), 2010, pp. 387 - 393.
4. Conneman, G. J.: Farm panels as a source of farm management data: The Cornell producer panel. *American Journal of Agricultural Economics*, Vol. 51 (5), 1969, pp. 1206-1210.
5. Hoglund, C. R.: Dairy facility investments and labour economics. *Journal of Dairy Science*, Vol. 56 (4), 1973, pp. 488-495.
6. Kumbhakar, S. C., Ghosh, S., McGuckin, J. T.: A generalized production frontier approach for estimating determinants of inefficiency in U.S. dairy farms. *Journal of Business & Economic Statistics*, Vol. 9 (3), 1991, pp. 279-286.
7. Lassen, B. et al.: EDF – agri benchmark Snapshot Survey 2010: “Cows are on the move – where to?” Press release available from [cit. 1.8.2010]: <[http://www.dairyfarmer.net/uploads/media/Snapshot2010\\_pressEN\\_01.pdf](http://www.dairyfarmer.net/uploads/media/Snapshot2010_pressEN_01.pdf)> .
8. Réquillart, V. et al.: Economic analysis of the effects of the expiry of the EU milk quota system. Final report of the Institut d’Economie Industrielle, 2008, 98 p. Open Access publications from University of Toulouse available from: <[http://neeo.univ-tlse1.fr/1940/1/report\\_idei\\_5.pdf](http://neeo.univ-tlse1.fr/1940/1/report_idei_5.pdf)> [cit. 5.6.2010].

9. Štůsek, J., Ulrych, L.: Strategic thinking in the management of agribusiness companies. *Agricultural Economics (AGRIC. ECON. – CZECH)*, Vol. 54 (3), 2008, pp. 117 – 124.
10. Tomšík, P., Minařík, B., Somerlíková, K.: Factors affecting the methods of employees management in agrobusiness companies in the region Vysočina. *Agricultural Economics (AGRIC. ECON. – CZECH)*, Vol. 54 (7), 2008, pp. 293 – 300.
11. Vágány, J.: The situation of raw cow milk production on small-scale farm level in Hungary from the point of quality. *Cereal Research Communications*, Vol. 35, (2), Akadémiai Kiadó, 2007, pp. 1257-1260.
12. Wonnacott, T. H. - Wonnacott, R. J.: *Introductory statistics for business and economics*. J. Wiley and Sons, 1990, 832 p. ISBN: 0-471-61517-X



# Ownership concentration and capital structure in the food industry sector of polish companies listed on the Warsaw Stock Exchange

Jakub Marszałek<sup>1</sup>, Bogna Kaźmierska-Józwiak<sup>2</sup>

<sup>1,2</sup>Faculty of Management, University of Lodz, Poland, Łódź, ul. Matejki 22/26  
<sup>1</sup>jakmarszalek@gmail.com, <sup>2</sup>bognakaj@uni.lodz.pl

**Annotation:** The relation between ownership concentration and financial policy has been analyzed in the literature very often. Generally the researchers argue that shareholders of a firm with more concentrated ownership may prefer less debt or even show their aversion to using it. This paper deals with the capital structure and financing choices of the companies. The main goal of the article is to analyze the relationship between ownership and capital structure in the food industry sector of polish companies listed on the Warsaw Stock Exchange. To measure firm's ownership concentration, the Herfindahl-Hirschman Index of the firm's ownership structure (HHI) was used. The analysis shows slight correlation between researched parameters. To make the research deeper we included also other financial data, like liquidity and efficiency, to find their influence on capital structure, but through ownership concentration analysis. We found that higher level of ownership concentration caused lower debt financing, which meant that these companies avoided debts and did not use the financial gearing. Strong shareholders rather tend to use equity. Cash, not the rate of return seems to be important to major shareholders. This means that growth of the shareholder concentration determines more passive financial policy, avoiding debt in the capital structure. Weak positive correlation between the liquidity ratios and ownership concentration level has been also observed. This means that growing shareholder concentration causes higher liquidity, and less risk acceptance. Analyzed companies with higher ownership concentration tend to minimize their assets in stock which another argument for the safe inventory policy. This fact supports passive financial strategy of these items, avoiding debts in the capital structure.

**Key words:** debt, equity, capital structure, ownership structure, food industry

**JEL classification:** G32

## 1 Introduction

Capital structure means the proportion between equity and debt. When a company chooses between borrowing money or using equity, it should analyze the benefits of using debt, relative to using equity, against costs borrowing poses to them. In the broadest sense debt provides two differential benefits over equity: tax benefit and added discipline imposed on management by having to make payment on debt. The main purpose of the article is to analyze if the ownership structure affects the capital structure. The analysis was made based on the food industry sector of polish companies listed on the Warsaw Stock Exchange.

## 2 Capital structure decisions

When a company chooses between borrowing money or using equity, it should analyze the benefits of using debt, relative to using equity, against costs borrowing poses to them. The primary benefit of debt is tax advantage. On the one side, debt causes tax benefits and rate of return on equity (ROE) increasing, but on the other causes growth of financial risk (bankruptcy risk), agency costs and loss of financing flexibility (greater the uncertainty about the future financing needs, higher the cost) [2]. If marginal benefits of debt exceed the marginal costs, the firm should use debt, otherwise equity should be used.

Chief financial officers of the Fortune 500 firms for 1986 surveyed in 1989 by Pinegar and Wilbricht (they obtained a response of 35 percent) indicated following financial principles important that by capital structure decisions undertaking (in order of importance in which they were given) ensuring long-term survivability, maintaining financial flexibility, financial independence, predictable source of funds.

The question is if capital structure is determined by the ownership structure? If the capital structure of the company with high concentrated ownership is different than the capital structure of the company with dispersed ownership? Do companies with concentrated ownership prefer any financial sources, debt or equity? This issues has been developed in the literature very often.

Jensen and Meckling [3] argue that shareholders of a firm with more concentrated ownership may prefer less debt if this can bring more monitoring by the debtholders. So, the companies with concentrated shareholders choose equity to ensure the owners fully control of the company. Rajan and Zingales [4] suggest that the effect of ownership concentration on capital structure is not obvious. From their point of view the presence of large shareholders should reduce the extent of agency costs between managers and shareholders and facilitate equity issues. Moreover, these shareholders should be undiversified, increasing their aversion to using debt.

Cespedes, Gonzalez, Molina argue that firms will prefer debt over equity if issuing equity means sharing or losing control. On the other hand, if there is low ownership concentration, the value of ownership control may lose importance for shareholders. In that situation other factors may be important by undertaking capital structure decisions [5].

Under the managerial perspective the capital structure decision is not only determined by internal and external factors, but also by the values, goals and preferences of managers. As Brailsford, Oliver and Pua argue at low levels of managerial share ownership, managerial share ownership is positively related to a firm's debt ratio due to convergence of interests. However, at high level of managerial share ownership, debt is reduced. Alternatively agency-related benefits from the use of debt are substituted through managerial share ownership. External block holders play an active monitoring role and their presence in the firm leads to higher debt ratios. Managerial share ownership and external block ownership interact. At low levels of managerial share ownership, external block holders are more effective leading to a positive relation with the debt ratio. However, as managers become entrenched at high levels of managerial share ownership, the association between external block ownership and a firm's debt ratio is weakened [6].

Shleifer and Vishny [7] argue that firms with higher external block-holding are likely to have a higher debt ratio. Managerial self-interests in continued viability of the firm may also be very important in inducing managers to lower debt, because large debt increases the risks of bankruptcy. From the Jensen's Point of view [8] corporate debt policy has also been viewed as an internal control mechanism that may lower agency conflicts between managers and shareholders, especially in the presence of free cash flow. Jensen notes that professional managers of a firm, who are not the owners, derive personal benefits from expanding beyond the optimal size of the firm by their desire to have, among others, power and status. The latter may increase leverage and lower firm efficiency.

Jensen and Meckling [9] suggest that managerial share-ownership may reduce managerial incentives to consume perquisites, expropriate shareholders' wealth and to engage in other non-maximising behavior and thus helps in aligning the interests of management with those of the shareholders. Fama and Jensen [10] and Demsetz [11] insisted that managerial share-ownership may still have adverse effects on agency conflicts. The latter may in fact entrench the incumbent management leading to an increase in managerial opportunism.

Brailsford, Oliver and Pua [6] argue that the relationship between managerial share ownership and leverage may in fact be nonlinear. As they maintain at low level of managerial ownership, agency conflicts fall leading to higher debt and capital structure. However, when managers already hold a significant share of firms' equity, an increase in managerial ownership may lead to an increase in managerial opportunism and therefore may cause lower debt.

In the literature the relation between ownership structure and firm value/ performance/efficiency has been also developed. This issue has been the subject of an analysis made by Berle and Means [12], who suggested that firms with a wide dispersal of shares tend to under-perform. In general, a positive relation between ownership concentration and firm efficiency is predicted and many studies have confirmed this, for example Shleifer & Vishny [13], Short [14], Gedajlovic & Shapiro [15], Thomsen and Pedersen [16]. They formalized a concave relationship between managerial ownership and firm valuation, it means that an increase in managerial ownership and control will first increase firm value, but at a higher level of managerial ownership, firm value will decrease because of entrenchment effects.

Demsetz and Lehn [17] however argued that concentration is endogenous to value and therefore has no effect. Much of this variation in these results may however be attributable to the difficulties in obtaining a uniform measure of firm performance, firm value or efficiency.

### 3 Data and methodology

Our data sample includes companies, from the food industry sector, listed on the Warsaw Stock Exchange. To measure firm's ownership concentration, the Herfindahl-Hirschman Index of the firm's ownership structure (HHI) was used. HHI is calculated as the sum of the squares of the fractions of equity held by each individual shareholder:

$$HHI = \sum s_i^2 \quad (1)$$

where  $s_i$  – percentage ownership of the shareholder  $i$  and  $n$  is the number of total shareholders in the firm.

High level of the Herfindahl-Hirschman Index represents high ownership concentration. Because of different ownership on shares and voting power from the shares we calculated HHI for both of kinds of ownership. In Table 1 we can see average level of HHI. It seems to be quite low. Besides four companies ownership concentration is lower than 0.5 and often it is very low, which may be supported by the calculated average at 0.4. This means that shareholders of analyzed companies don't tend to control majority of shares or votes. They behave very effective and take only minimal amount of shares to do the management. This situation also shows that shareholder structure of the food industry companies is quite distracted. It may be important for the analysis done in the paper, because a few major share owners of the company may have different financial management ideas, but they cannot impose it the others opponents. This can make the financial policy a bit unclear.

### 4 Results

First we analyzed the statistical relation between major financial debt ratios. We did the calculation for many debt ratios, but because many of them were statistically unimportant, we chose only three of them - the most significant.

We can observe quite interesting difference between correlation coefficient calculated for votes and shares. The shares are significantly more related to the analyzed ratios. We may prove that ownership concentration generally applies to ownership itself than the company's management. More concentrated ownership means more statically significant impact on the capital structure, so it applies rather to current management, than the strategic decisions.

Possessed rights to vote during the annual shareholder meeting seem to be unimportant. The real power is focused on the ownership, and possible profit from the shares. It can be explained by the debt taking ability. In case of doing the debt security, additional capital gained is determined by the amount of shares that may be used as a surety. Statistical unimportance may be also the result of specific shareholder structure formed during privatisation process. In many Polish companies some amount of shares, especially the preferred ones, were offered to the employees in times of getting listed on Warsaw Stock Exchange. These securities were usually issued to secure employee's influence on the company's management after the shareholder structure changes. They were preferred in voting rights, but not in property rights.

In the Table 1. we can see positive correlation between "EBITDA/Financial expenses" ratio and HHI. It means that more focused ownership the higher grow of the ratio, which may be achieved by the growing EBITDA or decreasing financial expenses. Such situation suggests that higher level of ownership concentration causes better operating efficiency and lower debt financing. This may mean that strong shareholders avoid debts and do not use the financial gearing. Their behavior can be explained by the good operating results. Major shareholders just tend to take these profits and do not expand, but first of all, they seem to avoid the insolvency risk.

**Table 1.** The correlation between some financial debt ratios and the Herfindahl-Hirschman Index of the companies forming WIG Food sub-index in the first quarter of 2010 characteristics.

Company	HHI for		Debt margin	EBITDA/ Financial expenses	Debt/EBITDA
	shares	votes			
AMBRA	0,39	0,38	0,38	2,46	5,48
DUDA	0,62	0,61	0,49	-0,13	-9,17
ELSTAR OILS	0,27	0,27	0,61	1,87	8,06
GRAAL	0,18	0,18	0,45	1,22	13,68
INDYKPOL	0,40	0,67	0,58	4,15	5,63
JUTRZENKA	0,40	0,41	0,31	11,42	3,10
KERNEL	0,33	0,33	0,49	5,38	1,80
HOOP	0,55	0,45	0,11	-0,15	-64,44
MAKARONY POLSKIE	0,29	0,29	0,42	5,01	5,75
MIESZKO	0,44	0,44	0,54	6,62	5,04
MISPOL	0,47	0,53	0,35	0,63	35,88
PAMAPOL	0,36	0,26	0,42	2,65	10,93
PEPEES	0,20	0,20	0,41	0,17	90,78
SEKO	0,59	0,66	0,34	31,69	3,31
SOBIESKI	0,24	0,28	0,99	0,47	21,28
WAWEL	0,80	0,30	0,25	56,87	1,26
WILBO	0,39	0,49	0,31	4,13	5,90
Average	<b>0,41</b>	<b>0,40</b>	<b>0,44</b>	<b>7,91</b>	<b>8,49</b>
Std. deviation	<b>0,16</b>	<b>0,15</b>	<b>0,19</b>	<b>14,70</b>	<b>29,10</b>
Correlation coefficient with	Shares		-0,49	0,69	-0,47
	Votes		-0,17	0,08	-0,33

Source: Self analysis made by data from Notoria Financials (www.securities.com)

Other data analysis of table 1 supports conclusions above. We can observe negative correlation between "Debt margin" ratio and HHI. It shows that the more focused ownership, the lower the level of the ratio is. This may be caused by the growing amount of liabilities or decreasing level of debt. It may mean that higher level of ownership concentration causes

lower gearing by less debt used to finance the company. Strong shareholders rather avoid debts using equity. This situation seems to be very interesting, because higher level of equity in the liabilities structure raises cost of capital. On the other hand more concentrated ownership means higher value of dividends paid to the major shareholders. We can conclude that cash, not the rate of return (cost of equity) is important to the major shareholders.

In the table 1. we can also observe negative correlation between “Debt/EBITDA” ratio and HHI. It shows that the more concentrated ownership the lower the level of the ratio is. This situation seems to be quite obvious, because decreasing value of Debt/EBITDA ratio means less value of debt or growing value of EBITDA ratio. Both of these relations have been already presented above.

As we can see, growth of the shareholder concentration determines more passive financial policy, avoiding debt in the capital structure. One of the elements affecting on the chosen sources of capital is financial liquidity policy. It determines short-term liabilities amount financing the current assets. Very often liquidity policy and financial policy are similar. They describe possible growth rate of the company and point the risk that should be taken to achieve this growth. If the passive financial policy of the researched companies might be noticed it would affect the passive liquidity policy. This means that companies should keep rather high level of cash in comparison to short-term debt. The data presented in table 2 confirm that presumption. We can observe positive correlation between all three liquidity ratios and HHI level. This means that the growing shareholder ownership concentration causes higher level of liquidity. This conclusion is quite similar to the financial policy analysis. As we can expect, the more concentrated ownership of the company, the lower level of risk is acceptable. Analyzed ratios show also that companies with higher HHI have lower level of short-term debt. It is obviously that the low correlation level cannot be ignored, and we cannot take the calculations very seriously, but the average levels of the current or quick ratios prove the most of the analyzed companies kept high level of liquidity. That is why liquidity ratios may be less sensitive to the HHI changes, and less correlated.

Another factor related to the capital structure is short-term assets/liabilities policy. It is a bit close to the liquidity management, but it concerns operating result analysis. In the table 3 correlation between HHI and some financial activity ratios have been presented. First of all we can see negative correlation between “Inventory turnover” ratio and ownership concentration. It means that the stronger owned companies keep the lower level of stock. This may be explained by the safe inventory policy. The companies with just a few important shareholders, using passive financial strategy, should tend to minimize their assets in stock. As we know, they try to avoid using short-term debts, so bigger inventory should be financed by bigger cash. Such a situation could not be accepted by major shareholders, because they can take their profit from the company generally in cash.

Another fact supporting thesis that more concentrated shareholding goes to passive financial policy can be found in positive correlation between “Amount due turnover” ratio and HHI. Such relation shows that stronger shareholder property increases the level of receivables. This argues that these companies avoid using external sources of capital, like securitization or factoring, that may decrease the level of receivables but raise the level of debt or cause cash expenses. Such situation may be also an example of strong cash policy determinant affecting short-term debt usage. Another negative correlation between “Liabilities turnover” ratio and HHI shows that higher level of ownership concentration causes lower level of short-term debt used to finance the company. This relation has been confirmed once again.

**Table 2.** The correlation between some financial liquidity ratios and the Herfindahl-Hirschman Index of the companies forming WIG Food sub-index in the first quarter of 2010 characteristics.

Company	HHI for		Current ratio	Quick ratio	Acid test
	shares	votes			
AMBRA	0,39	0,38	2,37	1,27	0,38
DUDA	0,62	0,61	0,47	0,41	0,16
ELSTAR OILS	0,27	0,27	1,28	0,47	0,22
GRAAL	0,18	0,18	1,12	0,85	0,07
INDYKPOL	0,40	0,67	1,16	0,76	0,07
JUTRZENKA	0,40	0,41	1,20	0,95	0,28
KERNEL	0,33	0,33	1,94	1,43	0,89
HOOP	0,55	0,45	0,71	0,54	0,11
MAKARONY POLSKIE	0,29	0,29	1,30	1,05	0,09
MIESZKO	0,44	0,44	0,83	0,68	0,02
MISPOL	0,47	0,53	3,34	3,09	1,20
PAMAPOL	0,36	0,26	1,11	0,74	0,06
PEPEES	0,20	0,20	1,54	0,77	0,34
SEKO	0,59	0,66	2,12	1,83	0,65
SOBIESKI	0,24	0,28	0,45	0,29	0,03
WAWEL	0,80	0,30	2,47	2,03	0,20
WILBO	0,39	0,49	2,59	1,25	0,02
Average	<b>0,41</b>	<b>0,40</b>	<b>1,53</b>	<b>1,08</b>	<b>0,28</b>
Std. deviation	<b>0,16</b>	<b>0,15</b>	<b>0,81</b>	<b>0,71</b>	<b>0,33</b>
Correlation coefficient with	Shares		0,24	0,39	0,13
	Votes		0,14	0,23	0,21

Source: Self analysis made by data from Notoria Financials (www.securities.com)

**Table 3.** The correlation between some financial activity ratios and the Herfindahl-Hirschman Index of the companies forming WIG Food sub-index in the first quarter of 2010 characteristics.

Company	HHI for		Amount due turnover	Inventory turnover	Liabilities turnover
	shares	votes			
MBRA	0,39	0,38	91,10	125,00	114,40
DUDA	0,62	0,61	31,50	8,20	131,80
ELSTAR OILS	0,27	0,27	33,50	112,40	139,80
GRAAL	0,18	0,18	0,00	48,30	175,00
INDYKPOL	0,40	0,67	43,50	26,00	65,00
JUTRZENKA	0,40	0,41	80,00	33,10	130,20
KERNEL	0,33	0,33	11,10	39,80	78,30
HOOP	0,55	0,45	63,20	27,60	159,20
MAKARONY POLSKIE	0,29	0,29	74,00	20,30	82,40
MIESZKO	0,44	0,44	110,20	26,30	176,20
MISPOL	0,47	0,53	180,60	23,90	95,70
PAMAPOL	0,36	0,26	98,50	52,10	142,90
PEPEES	0,20	0,20	68,90	114,40	148,90
SEKO	0,59	0,66	69,80	17,80	61,90
SOBIESKI	0,24	0,28	44,40	no data	no data
WAWEL	0,80	0,30	97,80	26,70	61,60
WILBO	0,39	0,49	70,70	79,30	59,40
Average	<b>0,41</b>	<b>0,40</b>	<b>68,75</b>	<b>48,83</b>	<b>113,92</b>
Std. deviation	<b>0,16</b>	<b>0,15</b>	<b>42,25</b>	<b>37,80</b>	<b>41,94</b>
Correlation coefficient with	Shares		0,34	-0,52	-0,36
	Votes		0,19	-0,48	-0,42

Source: Self analysis made by data from Notoria Financials (www.securities.com)

## 5 Conclusions

The relation between ownership concentration and financial policy has been analyzed in the literature very often. Generally the researchers argue that shareholders of a firm with more concentrated ownership may prefer less debt or even show their aversion to using it. It is connected with the probability of sharing or losing control. If the company is characterized by low ownership concentration, the value of ownership control may lose importance for shareholders.

The research presented in the paper shows slight relation between ownership concentration measures and financial ratios illustrating financial structure of the analyzed companies. We found that higher level of ownership concentration caused lower debt financing, which meant that these companies avoided debts and did not use the financial gearing. Strong shareholders rather tend to use equity. Cash, not the rate of return seems to be important to major shareholders. This means that growth of the shareholder concentration determines more passive financial policy, avoiding debt in the capital structure.

We also observed weak positive correlation between the liquidity ratios and ownership concentration level. This means that growing shareholder concentration causes higher liquidity, and less risk acceptance. Analyzed companies with higher ownership concentration tend to minimize their assets in stock which another argument for the safe inventory policy. This fact supports passive financial strategy of these items, avoiding debts in the capital structure, once again.

## References

1. Myers S. C.: The Capital Structure Puzzle, "Journal of Finance", July 1984, vol. 39, nr. 3.
2. Damodaran A.: Corporate Finance, Theory and Practice, John Wiley and Sons, Inc., New York 1997, ISBN 0-471-07680-5.
3. Jensen M., Meckling W.: Theory of the firm: managerial behavior, agency cost and capital structure, "Journal of Financial Economics", 1976, No 3.
4. Rajan R., Zingales L.: What do we know about capital structure? Some evidence from international data, Journal of Finance, 1995, No 50, 1421-1460.
5. Céspedes J., Gonzalez M., Molina C. A.: Ownership concentration and determinants of capital structure in Latin America, 2008, <http://www.iae.edu.ar>.
6. Brailsford T. J., Oliver B. R., Pua S. L. H.: On the relation between ownership structure and capital structure, "Accounting & Finance", March 2002, Vol. 42, Issue 1.
7. Brailsford, T. J., Oliver B. R., Pua S. L. H.: On the relation between ownership structure and capital structure, "Journal of Accounting and Finance" 2002/ 42, 1-26.
8. Jensen, M. C., Meckling W. H.: Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure, "Journal of Financial Economics" 1976/3 (4), 305-360.
9. Jensen, M. C.: Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers. American Economic Review, Vol. 76, No. 2, Papers and Proceedings of the Ninety-Eighth Annual Meeting of the American Economic Association (May, 1986), 323-329.
10. Fama, E., Jensen M. C.: Separation of Ownership and Control," Journal of Law and Economics" 1983/26, 301-325.
11. Demsetz, H.: The structure of ownership and the theory of the firm, "Journal of Law and Economics" 1983/ 26, 375-390.

12. Berle, A., Means G.: *The Modern Corporation and Private Property*, Harcourt, Brace and World, New York 1932.
13. Shleifer, A., Vishny R. W.: Large Shareholders and Corporate Control, „*Journal of Political Economy*” 1986/94, 461-488.
14. Short, H.: Ownership, Control, Financial Structure and Performance of Firms, „*Journal of Economic Surveys*” 1994/ 8, 209-249.
15. Gedajlovic E., Shapiro D.: Management and Ownership Effects: Evidence from Five Countries, „*Strategic Management Journal*” 1998/ 19, 533-553.
16. Thomsen S, Pedersen T.: Ownership Structure and Economic Performance in the Largest European Companies, „*Strategic Management Journal*” 2000/21, 689–705.
17. Demsetz H., Lehn K.: The Structure of Corporate Ownership: Causes and Consequences, „*Journal of Political Economy*” 1985/ 93(6), 1155–1177.



# Concession as the perspective form of public-private partnership development in the realization of large capital-intensive projects in Russia

Elena Selevanova<sup>1</sup>

<sup>1</sup>North Caucasus State Technical University, Kulakov Avenue, 2\2,  
355029, Stavropol, Russia  
Elena.Selevanova@daad-alumni.de

**Annotation:** The article focuses on the role and importance of concessions to increase the efficiency of infrastructure sectors of a market economy and, particularly, agricultural sector of the Russian Federation. The article which is theoretically rooted in institutional economics paying the attention to the state and its role in economy deals with the essence of concessions. It outlines their characteristics, namely: the subject of concession is always public (municipal) property; one of the parties of the concession agreement is the state. On the grounds of the analysis of world experience the classification of all existing types of concession agreements is given, as well as the types which in accordance with the Federal law “Concerning concession agreements” exist in the Russian Federation in agricultural sector and other sectors of the national economy. The article mentions that the concession is an effective mechanism for financing of capital-intensive projects that stimulate the reduction of the financial burden on budgets of all levels and creation of additional jobs. Special attention is given to the analysis of the reasons that hamper the development of concessions in Russia in general and in the agricultural sector. The main reasons are: a lack of **comprehensive**, systematic approach to the development of the mechanism of the operation and management of concessions, insufficient **protection** of concessioner’s rights, as well as a lack of methodological support in the sphere of preparation of specialists in concessions. The article emphasizes that the economic potential of concessions in Russia is high. The priority directions for the application of concessions are primarily the objects of production and transport infrastructure in the agricultural sector of the national economy, but for further promotion of concessions it is necessary to develop a number of by-laws in the sphere of regulation of the relationship between the concedent and the concessionaire.

**Key words:** Concession, public-private partnership, agricultural sector.

**JEL classification:** M21

## 1 Introduction

Although the economists had traditionally paid little attention to the state and its role in the history [14], the relations between government and private business are very important to understand the dynamics of economic processes. One of the forms of the interaction between state and private business which is worth to be studied are the concessions. As Miranda [11] writes “A concession agreement is an agreement between a government and a private company (the “concessionaire”), in which the government transfers to the company the right to maintain, produce, or provide a good or service within the country for a limited period of time, but the government retains ultimate ownership of the right.”

This paper will focus on the concessions in Russian rural economy. Although the concessions might be seen as the new factor in Russian economy, they were used to attract foreign capital in Russia also in the 1920s and despite the fact they failed because they were terminated by Soviets, sectors like lumbering benefited from them because of the Western technology and know-how [8].

The necessity of using concessions today is a result of the intense development of the Russian economy. Similarly to other former communist countries of Central and Eastern Europe, the

reason for concessions was the **insufficiency** of public financing for large-scale projects in the sphere of housing and communal services, fuel, energy and transport infrastructures which was combined with the policy of increasing the role of public sector in economy [1]. In each of these spheres where concessions in Russia are used, there is need for the government control over the quality of public services, adherence to tariffs and safety rules and the mechanism of concession allows the attraction of private capital and provision of control from the state. The state acting as the guard of the quality prevents the misbehaviour of private actors. The question behind is the issue to ensure that the concessionaire will behave to meet the objectives of the state [5]. Because the concessions are based on the agreements, the concepts of institutional economics will be used in this text. Namely, they are transaction costs. They are the costs to arrange and enforce contracts. Within institutional economics various institutional settings can be investigated in the term how do they influence (increase or decrease) transaction costs [9].

## **2 Goals of the paper and methods of data collection**

This article examines the nature of concessions, their characteristics and types of concessions. The classification of possible types of concession agreements is given, as well as the outline of the types which in accordance with the Federal law “Concerning concession agreements” exist in the Russian Federation in agricultural sector of economy. Using the typology of the concessions they are scrutinized to analyze the factors contributing to the development of the mechanism of concessions. Also the analysis of the reasons hampering the development of concessions in Russia in general and in the agricultural sector in particular is performed. As the theoretical background of the analysis the institutional economics with its transaction costs is exploited.

The method used for this paper is related to the documentary research (documentary analysis) which generally means the systematic use of printed or written materials for investigation [7]. Within the documentary analysis the specific method of secondary document analysis was detected as the most appropriate for the goals of the paper. Similarly to secondary data survey [13] the secondary document analysis reanalyses previous findings and research outcomes that were achieved by other. It focuses on analysis rather than on collecting data.

## **3 Material and background data of the paper**

The paper has already pointed out the concept of concessions. There is the agreement [3], [11] and [17] that concession is a system of relationships between, on the one hand, government (concedent) and, on the other hand, a private legal or physical person (concessionaire), that arises as a result of rights granted by the concedent to concessionaire to use the publicly owned item specified in the contract for payment and for a limited period, and also the right to participate in the kinds of activity which are the exclusive monopoly of the state. As such “concession” is a form of public-private partnership that allows the involvement of private business in the management of public ownership on mutually advantageous conditions. For using public or municipal property the concessionaire fulfills the conditions stipulated in the concession agreement. The right to produce by this concession is transferred to the concessionaire.

Researches carried out have shown that the role of concessions is growing in the world economy [2]. During the 20<sup>th</sup> century concessions in economy were used mainly in the mining industry. However, probably with the dominance of neoliberal discourse in the policy, in the 1990s numerous other items (goods) or services which cannot be privatized since having the features of public goods or public services, such as highways, underground, bridges, ports,

airports, railways, public transport systems, public health services, education, culture and sports began to be included in concession agreements.

One of the leading Russian economists in the sphere of public-private partnership Deryabina M.A. distinguishes the following characteristics of concessions [3]:

- the subject of concession is always public (municipal) property, and also exclusive kinds of activity of the state or municipal unit (such as public services);
- one of the parties of the concession agreement is the state or municipality (in the name of corresponding enforcement authorities);
- the aim of the concession is the satisfaction of needs and requirements that the government can due to various reasons provide;
- concession always has a contractual basis (concession agreement);
- concession is based on the ultimate return of the subject of the agreement.

The text already pointed out that in Russia during the period of the New Economic Policy and industrialization concessions were created in almost all branches of the national economy of the former Soviet Union. The design and building of almost all Soviet factories, the development of new industries was, in many respects, provided at the expense of making concession agreements with foreign firms. Over 80 % of these concessions have been concentrated in the following sectors: gold mining, silver, lead, manganese, oil, in the manufacture of nonferrous metals, the exploitation of wood and fish resources, mechanical engineering, the electric power industry or in the sphere of city infrastructure and municipal services where the inflow of private investments and highly skilled management are necessary [18].

The following types of concession agreements are distinguished in international practice [2]:

**BOT (Build — Operate — Transfer).** Concessionaire carries out building and operation (basically — on the property right) during a specific period after which the object is transferred to the state;

**BTO (Build — Transfer — Operate).** Concessionaire builds the object, which is transferred to the state (concedent) as a property right after the building ends, but the operation stays with the concessionaire;

**BOO (Build — Own — Operate).** Concessionaire builds the object and carries out the subsequent operation, owning the property right for an unlimited time period;

**BOOT (Build — Own — Operate — Transfer)** — possession and usage of the constructed object with private property right during a stated time period after which the object is transferred to the state;

**BBO (Buy — Build — Operate)** — the form of sale which includes restoration or expansion of an existing object. The state sells an object to a private sector firm which does the necessary improvements for efficient operation.

The origins of concession legislation in the Russian Federation dates back to the adoption of the Federal law of 21.07.2005 No 115-FZ “Concerning concession agreements”. The main objectives are to attract the investments into the economy of the Russian Federation, to support efficient utilization of a property which is state or municipal property on agreed conditions and to improve the quality of goods, works and services provided to consumers [4].

From the listed types of concession agreements above the law “Concerning concession agreements” covers only the first type BOT (Build – Operate –Transfer). However not all

agreements between the state and business are of this type and are therefore not regulated by this law.

Adoption of the Federal law No 115-FZ has given a new qualitative push to the development of mutual relations between the state and private business in a number of key industries in the Russian economy [6]. The law fixes that the conclusion of corresponding contracts applies with typical agreements which are approved by the Government of the Russian Federation. Thus, it is supposed that, despite differences and the unique nature of projects and contracts, the corresponding concession agreement should contain essential conditions of the typical concession agreement that will facilitate substantially preparation work, conclusion and performance of future concession agreements (i.e. it should decrease transaction costs related to setting and monitoring the contracts). It is necessary to mention that according to world practice in the sphere of public-private partnership such agreements are considered to be the most difficult and prolonged – it means to achieve them is of high transaction costs.

The application of concessions in the sphere of transport infrastructure is particularly significant in Russia at the present time. The transport federal program signed in May 2008 stipulated that the majority of the money would be provided by private investors. Private investment in transportation projects is expected to increase to 4 - 5% of GDP, and the proportion of public and private funding would be close to 35:65 [3].

Thus, in February this year the Ministry of Transport of the Russian Federation approved the project of building a toll road in the Moscow region connecting the Moscow Ring Road to the Moscow-Minsk Highway on conditions of PPP. According to the conditions of the project the state gives a plot of land, private investors build the road, charge a fee during a certain period of time, and then return it to the state. It was decided to finish the construction of toll bypass road around St. Petersburg and the system of water transport on the Neva River and the Baltic Sea under similar conditions. The total value of the project is over 400 million rubles [16].

## **4 Results and their analysis**

The secondary document analysis research found out some conditions for the emergence of concessions as one of the forms of public-private partnership. Generally, the main reason for origin of concessions (and public-private partnership) now is the lack of public funds for the development of large-scale projects (especially infrastructural projects). This is also the case of Russia. The other reason (which is not very significant for Russia) is the support given to the development of private sector. The public-private partnership projects came into being during the dominance of neo-liberal discourse in economic theory. This discourse coined [7] controlling money supply (resulting in decreasing public funding) and [10] support to private ownership since it was assumed this type of ownership (with clearly delineated ownership rights) minimizes transaction costs (which are high in the case of collective ownership to the problems of negotiating and monitoring). Private ownership based on delineated ownership rights and protection of the ownership should motivate the owners to be the real custodians of the property they own (eliminating free rider effects). It is interesting that the analysis of Russia shows the endeavour to support the private ownership is not so high. On the other hand Russian government sees the involvement of private actors as the reaction to the growth of discontent of population over the quality of the state provision of public services. As such the government minimizes transaction costs when dealing with public and transfers risks (including criticism) to private bodies. These bodies might, contrary, in Russia situation expect higher returns on capital in the private sector and market competition.

The research that has been carried out has also shown that the main reasons for preventing development of concessions in Russia are the following [17]:

1. Insufficient government and business understanding of the essence of concessions, their application in practice and the potential socio-economic consequences. The transition to the system of concessions means a change in the nature of the relationship between the government and business, in both a legal and an economic context. As such this change is of high transaction costs. The Czech institutional economist L. Mlčoch [12] writes the way of understating the world increases transaction costs and makes the systems less efficient. When concessions are not properly understood, they would not be used efficiently because of high transaction costs to negotiate them and to monitor them.
2. Lack of comprehensive approach. Dealing with concession problems is not systematic in the country: the authorities are concentrated mainly on legislative issues, not paying proper attention to economic and social problems as well as the mechanism of the operation and management of concessions. The problem of concessions has a complex, institutional nature and must be solved on the basis of a systematic approach. The problem increasing transactions costs are the institutions which are not set in proper way to minimize the transaction costs. They are the institutions considered as the “rules of the game” which constrain human interactions. They define the incentive structure of societies and specifically economies [15]. It seems the institutions related to concessions are not set yet in Russia in the way to enable efficient operation of concessions.
3. Insufficient protection of concessionaire’s rights. Thus, the risks that he carries, high expenses connected with the concession activity are increased by the need to pay a high concession fee to the state. At the same time, the penalty for a breach of obligations by the government does not exist in law. As the paper has already said, the public-private partnership has to have clear delineation of ownership right and all rights (of both parts in the agreement) must be protected otherwise transaction costs will be too high due to asymmetric information and the space within is not properly defined.
4. The procedure for the selection of projects and allocation of funds for the concession agreements from the Investment Fund of Russian Federation is imperfect and needs work to be done on it. Concessions are usually aimed at the modernization and operation of existing proprietary complexes such as airports, ports, railway stations. For example, in April 2008 a tender competition for the reconstruction of Pulkovo airport in St. Petersburg was announced. The concessionaire must invest 600 million Euros in the construction of new terminals, and in return operates the airport for 30 years [2].
5. The expectations of the state concerning the amount of private financing of projects are overstated. World experience shows that in expensive, infrastructural projects the investment share of state participation can not be below 40-60% [17]. The practice of concessions in the Soviet Union during the period of the New Economic Policy indicates that one of the essential conditions of concession agreements concluded by the Soviet government with foreign private investors (legal and physical person) was a preferential tax regime.
6. Shortage of experienced people dealing with concessions. There are not enough specialists in the field of public administration in Russia, who are capable of making long-term concession contracts professionally. Russian education does not prepare such experts, there are no appropriate programs or special courses. There is no methodology of drawing up investment agreements with a long payback period by state authorities. And if according to the agreement public property is taken into the possession of a private company for 20-50 years, the burden of responsibility on the shoulders of the signatory for the state must be taken into account. This situation also suggests high transaction costs since the milieu is unclear (nobody knows how to act properly which increases the transaction costs).

## 5 Conclusions

To sum up, it should be noted that the economic potential of concessions in Russia is high. However, the development of concessions is blocked by high transaction costs resulting because the institutions are not set up in the way to make the situation clear and to enable rational decision making for the shareholders. The concessions are targeted primarily to industrial infrastructure such as roads, railways, ports, airports, power stations and utility systems. However, the relations between private body the public (the state) are regulated (constrained) by not well defined institutions which results in big problems in negotiation and monitoring concessions.

The adoption of the Federal Law “Concerning concession agreements” in the Russian Federation was an important institutional step forward in the development of infrastructural industries in the economy of Russia, but it is necessary to develop a number of bylaws to cover different situations, as well as the mechanism of compliance with the obligations of the state and private business. Practical application of the concession mechanism requires changes in regulation of relationships between the concedent and the concessionaire, as well as the enactment of norms about investors’ financial guarantees to the Tax and Civil Codes of the Russian Federation.

Thus, the Government of the Russian Federation, relevant ministries and agencies must do a lot in order to develop a normative-legal basis that will allow the implementation of the concession mechanism of public-private partnership most effectively in the Russian economy.

## References

1. Carpintero, S.: Toll Roads in Central and Eastern Europe: Promises and Performance *Transport Reviews*, Vol. 30, Issue 3, 2010, pages 337 - 359.
2. Deryabina M.A.: Public-private partnership: theory and practice. *Economic questions*, No. 8, 2008, pages 61-77.
3. Deryabina M.A.: Report at the Scientific Council of the sectional scientific direction “Theory of Economics” “Theoretical and practical problems of public-private partnership”. Site of the Institute of Economics of the Russian Academy of Sciences <http://www.inecon.ru/ru/index.php?go=Content&id=29>. Document accessed 1 June 2010.
4. Federal law of 21.07.2005 No 115-FZ “Concerning concession agreements” (amended on November 8, December 4, 2007, June 30, 2008, July 17, 2009).
5. Ferris, J. M. Graddy, E.: Production costs, transaction costs, and local government contractor choice. *Economic Inquiry*, Vol. 29 Issue 3, 1991, pages 541-554.
6. Furschik M.A.: “Concession will help the development of regions”. *Magazine Inside*, No. 1, 2010, pages 18-23.
7. Giddens, A.: *Sociology*. Cambridge: Polity Press 1989.
8. Heywood, A.: Soviet Economic Concessions Policy and Industrial Development in the 1920's: The Case of the Moscow Railway Repair Factory. *Europe-Asia Studies*, Vol. 52, Issue 3, 2000, pages 549-569.
9. Johnson, B.: Institutional Economics: What's That? *Acta Sociologica*, Vol. 30, Issue 3-4, 1987, pages 393-397.
10. Lošťák, M., Hudečková, H. Rikoon, S.: Land Ownership and the Challenge of Late Modernity (New Institutional Settings and Behaviour of Czech Landowners). *Agricultural Economics (Zemědělská ekonomika)* Vol. 45, Issue 11, 1999, pages 481-490.

11. Miranda, N.: Concession Agreements: From Private Contract to Public Policy. *Yale Law Journal* Vol. 117, Issue 3, 2007, pages 510-549.
12. Mlčoch, L.: *Institucionální ekonomie*. Praha: Karolinum, 1996.
13. Neuman, W.: *Social Research Methods (Qualitative and Quantitative Approaches)*. 6<sup>th</sup> edition. Pearson Education Int. 2006.
14. North, Douglass C.: *Structure and Change in Economic History*. New York: W.W. Norton, 1982.
15. North, Douglass C.: *Institutions, Institutional Change, and Economic Performance*. Cambridge: Cambridge University Press, 1990.
16. Public-private partnership in Russia: information portal. Available online at <http://ppp-russia.ru/projects/viewlist/>. Document accessed 27 April 2010.
17. Varnavsky V. G.: Public-private partnership in Russia: problems of formation. *Domestic notes*, No. 6, 2004, pages 20-27.
18. Varnavsky V. G.: Processes of institutionalization of public-private partnership in the real sector of economy. *Economic sciences of modern Russia*, No. 11, 2007, pages 18-25.





# Cross-cultural Communication in Town-twinning

Klára Šimonová<sup>1</sup>, Luděk Kolman<sup>1</sup>

<sup>1</sup>Department of Psychology, Faculty of Economics and Management,  
Czech University of Life Sciences Prague,  
Kamýcká 129, 165 21 Prague 6 Suchbát, Czech Republic  
simonova@pef.czu.cz

**Annotation:** The paper deals with an analysis of cross-cultural communication between the representatives of local authorities and their twin-towns in foreign countries. The representatives are more likely to concern cross-cultural issues if they are expecting a foreign delegation than when they prepare their stay abroad. The research has also pointed out the different approach to nations that lay to the west and to the east from the CR, and the warm or cold relationships that arise from common historic experience. The paper also touches the willingness to keep local rules of the social game, the advantages and disadvantages of using the services of an interpreter, formal addressing, and the stereotyped image of other nations concerning above all the neighboring countries. Further the paper provides examples of results of cooperation of twin towns, both common that are practiced by almost every researched twin town, such as the exchange of students or culture and sports events, as well as the unique examples of towns that maintain above average relationship with their twin towns. Such an extraordinary cooperation has to be built on solid foundation, for example common history or geographical location; it has to be long lasting, and as many social interest groups as possible should be involved. The paper also suggests few other possible ways to extend the cooperation that have already been implemented in the Czech environment and proved to work, such as promoting culture by open-air happenings or by entertainment in courses of dancing or cooking. However, the most controversial issue is the discussion on greater independency of regional governments on central state authorities.

**Key words:** Culture, Cross-cultural communication, Town-twinning, Local authority, Cooperation, Town halls

**JEL classification:** Z19

## 1 Introduction

Town-twinning of municipalities, towns, city districts, and cities is very frequent and popular in the Czech Republic as well as in the whole Europe [9; 7]. Representatives of local authorities are exchanging their experience and build cooperation in order to develop projects either to facilitate mutual cultural contact or to gather ideas abroad of how to improve the life of citizens of their municipalities. [8]. The town-twinning was initially intended “*as a way to bring European people into a closer understanding of each other and to promote cross-border projects of mutual benefit*” [9], or “*as a facilitating instrument of international friendship and cultural exchange at the local level*” [10]. However, any contact of cultures can immediately bring culture clash, confusion, and difficulty if people are not interested in cross-cultural differences. “*There are many opportunities for cultural travellers inadvertently to infringe the rules of cross-cultural etiquette.*” [11, p. 55] Culture system, which is a set of rules of proper behaviour, varies in every country. Culture pattern can be thus defined as “*the system of forms of behaviour, values, and norms typical for any society. The system is generally accepted and followed ... and is stabilized in habits, customs, and rituals.*” [5, p. 47].

The paper aims to point out problems of cross-cultural issues that arise from researched town-twinning. The paper also aims to provide an overview of some selected results of cooperation of twin-towns and to offer ideas that could be implemented in other municipalities, too.

## **2 Data and Methodology**

This paper uses mainly qualitative approach to data collection as it allows understanding of successful mechanisms of cooperation and finding common features in ideas that were gained by the representatives of local authorities in foreign countries and were either successfully or unsuccessfully launched into practice. The research used more methods of data collection. First, the analysis of available documents took place, i.e. publicly accessible information published e.g. on web pages of municipalities, in press issued by local authorities, in programs of municipality development, yearbooks etc, later also internal documents such as records from municipal councils and executives, reports of financial committees, long-term plans of municipality development etc. However, the key part of the research was the interviewing part. Interviews were generally opened by semi-structured with prepared questions same for every respondent. These questions were also sent by e-mail to local authorities that, according to publicly available information, were cooperating with a foreign town but did not reveal the competent person. Hence the interviews were held by several means, e.g. by e-mail correspondence if the respondent was busy, by telephone, or by combination of both, i.e. questions were sent by e-mail and answered by telephone, which was the most common as the respondents had time to think the answers over and had the possibility to tell more information than they would bother to write. Some respondents preferred personal meeting and these personal interviews brought the most valuable and comprehensive, but also sensitive data. The intended sample of respondents was concerning equal distribution of municipalities according to number of inhabitants, geographical location in the Czech Republic etc., but considering the unwillingness of respondents to participate in the research and low return of questionnaires, this research can not grant generalization of results. There were 32 respondents taking part in this research, which is less than 23 % of asked authorities. Where possible, the research provides generalized results, but these results can not be stretched to all municipalities engaging in town-twinning. The semi-structured interviews were divided into three key areas. The first one was analyzing both successful and unsuccessful projects that were launched into practice either in cooperation with twin-town or after gaining the idea abroad, the second one concerned cross-cultural issues, misunderstandings and their analysis, and the last one concerned the representatives of local authorities who either participated as a member of delegation going abroad or were appointed as coordinators of town-twinning.

## **3 Results**

The results are divided into three parts. The first part of general results concerns the issue of cross-cultural communication, the second part provides an overview of the most interesting results of town-twinning, and the third part offers some ideas that could be applicable in other municipalities as well because were already tested in the Czech environment and proved to work out. As the research was mainly qualitative, the results are structured in order to contain both unique answers of respondents and answers that appeared very often. Frequent answers are generalized; however, it has to be reminded that such a generalization can not apply to all municipalities.

### **3.1 General outcomes**

The answers of the researched sample show that the representatives of local authorities usually do not pay enough attention to preparation of their trip abroad concerning cultural differences. If some proactive individuals buy a guidebook, they do so because of their own interest and in their leisure time. Generally the preparation of the representatives of local authorities comprise only of choosing presents for hosts and preparation of agenda to be discussed. Purchase of presents and other favors is usually driven by willingness to represent

the municipality or the Czech Republic, though there are preferred gifts of personal nature in some cultures, especially if the persons know each other.

On the contrary, the representatives of local authorities concern cross-cultural issues if they are inviting a foreign delegation to come to their town. Respondents answered that they are using the services of an interpreter because he/she is aware of both language and culture of incoming guests. The interpreter then points out differences concerning e.g. religion, alimentation, greetings and other acts of courtesy. [1]. The city of Zlin was warned that the Asians are not used to consume dairy products therefore their diet should take this into account so that there are not any complications and delays in their itinerary again, and that the Polish welcome free Sunday mornings so that they can visit the mass in church. So, it is necessary to get to know the culture in question as much as possible so that the stay of foreign delegation avoids problems streaming from cross-cultural differences. Sometimes it is necessary to count with difficulties of another kind: *“From the city of Ramnicu Valcea (Romania) repeatedly come more people than invited. We invite five people and twelve are coming. We do not solve it, because it is improper to tell them they are not welcomed in such a number. So we count with it and order more bedrooms, more food, more materials...”* (L. Fila, Kromeriz). This results in restriction of contact with the Romanians. This swelling of group can be explained, according to Hofstede [2], by inclining to collectivism and tendency to avoid uncertainty as Romania scored higher than the CR in both dimensions.

The relationship of the Czech representatives of local authorities to their twin-towns or nations and cultures respectively shows certain imbalance. It seems from the answers of respondents that there appears a tendency to self-enhancement in the relationship to the countries laying to the east from the CR and at the same moment some kind of an “inferiority complex” in the relationship to countries laying to the west [3, 5]. The Czech representatives prefer to collect ideas in the countries of Western Europe (Germany, France, Switzerland, etc.) while in the countries of Eastern Europe (Slovakia, Hungary, Romania, etc.) they rather advise what to do and how to do it. Nevertheless, the respondents also stated that they felt better in the countries of Eastern Europe, as equals, relaxed, and think these nations are more friendly and emotional. Moreover, in Slovakia there has disappeared the perceived feeling of discomfort when using the interpreter, and thus the conversation was more natural [6]. This above mentioned imbalance in the relationship to the countries laying east or west from the CR can be possibly explained by psychological characteristics usually used for individuals but applicable for a nation as a whole, or cross-cultural differences in negotiating behavior of ethnics and nations respectively. So it is possible to explain the perceived hostility and mistrust toward the Germans and French by national historic experience of past generations as well as contemporaries (so called “memory of a nation”) and subsequent suspicion and distant and cold relationship. The experience of a nation can not be easily forgotten. Warm affection for countries of Eastern Europe can be explained, too, by common recent history e.g. by the membership in the former Council for Mutual Economic Assistance, by attachment and generally warm affiliation to countries that are as small as the CR or even smaller (though Romania has twice as many inhabitants as the CR, its economy is far weaker, hence the Czechs perceived certain superiority [1]), or less intensive mutual contacts when the nations did not have enough time to create their own stereotypes. One of such examples of cooperation full of misunderstandings and cold partnership is the cooperation between Tremosnice and Embrach (Switzerland). *“We keep the contact only because of our firemen. The Swiss are very cold, they have everything in perfect order so that we are ashamed to invite them here. What is not perfect, it is bad. We wanted to mediate the exchange of elementary school pupils and that was a problem, that they were too small. I do not know what they thought about us.”* (J. Kocova, Tremosnice). Other example of discrepancy in treating western and eastern countries appears in the city of Kralupy nad Vltavou, which accepted financial help from German Hennigsdorf after the floods, but itself supported only

Slovakian Komarno, because: *“we are just as Robin Hood, we take from the rich and we give to the poor. Why should we send money to the Germans? They would say it was too little.”* (L.M., Kralupy).

The communication between members of distinct culture groups is very difficult in practice.. The Czechs tend to apply their own cultural norms to members of different cultures and they also tend to assess negatively any form of discrepancy from these rules, though they are aware that cultural norms are not universally valid. For example, in this context it could be mentioned the expectation of addressing individuals. Formal addressing is typical above all in the countries of former Austro-Hungarian Empire and in Germany. In such a case when a French or a Scandinavian would address a Czech only with his or her first name, the Czech could feel puzzled, because such an informal addressing in totally formal situation is perceived as improper, wrong, not fitting to the cultural pattern and normal social behavior. It should be pointed out that the research revealed that *“at home, at own territory”* the Czech representatives of local authorities expect basic knowledge of the rules of etiquette and rigorously stick to it. So, for example, if they would go to Japan, they would most probably be aware of the Japanese habit of not offering a hand to shake to their counterpart but would bow. They would be pleasantly surprised if a Japanese aware of European rules of etiquette would offer his or her hand to shake. And vice versa, if Japanese would arrive to their town, a handshake would be most probably the first way to welcome them. A bow can follow only as an amendment. Informal addressing is confusing in Japan as well, hence the Czechs can feel more comfortable: (...) *“the differences between the two norms that may cause English speakers and Japanese difficulty when showing familiarity in cross-cultural interaction”* [4] It could be stated that the Czech representatives of local authorities usually try to conform to different rules of behavior abroad, but in their own country they insist on using their own rules of behavior.

Stereotypes are: *“images, opinions, and attitudes held by individuals or groups toward other groups or to themselves (auto stereotypes). These opinions and attitudes are relatively stable, are transferred between generations, and are hardly changeable. Stereotypes and prejudice are very emotional while the rational content may be suppressed. (...) Insufficient objective knowledge of certain subject or group of people is compensated in stereotype or prejudice by generalized opinion or image adopted unverified from other people.”* [5, p. 67]. National stereotypes are a common phenomenon. The most detailed opinions and most frequent stereotypes are held about neighboring countries. For example in the Czech Republic there exist negative stereotypes toward the Germans, who are perceived as cold, distant, egoistic, nationalist, racist, aggressive, and invasive. This is caused above all by the natural need to differ from the nations that the country has a negative historic experience with, and Germany still represents the well known enemy against which the past generations were fighting and which is still potentially dangerous for a small neighboring country such as the CR. The Czech representatives of local authorities have their own experience with other cultures, but only a minority of them said that they held some prejudice but afterwards changed their minds. On the other hand, the majority of them admit that hold a stereotyped opinion on the culture of their twin-town, but realized that only after they were asked about it. Moreover, it is very interesting that every respondent had his or her own certain view of the nation before he or she travelled into the country, and also he or she usually tried to confirm his or her original opinion – in other words, to strengthen the stereotype. *“If I can generalize, I would say that the Polish are unbelievably hospitable, the Belgians are partial to high quality chocolate, the Germans are loud, the French are partial to high quality wine and long lunches, out of sports they prefer cycling, and do not use academic degrees, which we, the Czechs, insist on.”* (R. Kratochvilova, Zlin) *“The Italians do not fulfill deadlines and agreements. However, they are charming gentlemen; just they are convinced they have the best coffee in the world.”* (J. Vaculikova, City District Prague 1)

### 3.2 Results of cooperation

Cooperating twin-towns usually exchange their students, employees of allowance organizations; they usually organize some cultural events or sports matches etc. The representatives of local authorities think that the inhabitants of the municipality are interested in town-twinning, but that they above all expect the town hall to facilitate and mediate contacts to the representatives of foreign authorities or foreign groups of the same interest. Some groups of people also need some financial support while cooperating with their foreign partners, e.g. for the exchange of students, seniors etc. *“Cultural interest groups are very interested in town-twinning. However, they expect the town hall to help them, and not only financially. They need help with contacting new people and facilitating performances held during official culture events organized by their twin-towns.”* (Jablonec nad Nisou)

It seems that the town-twinning serves only as free vacation for many representatives of local authorities. They go abroad, meet old friends, go sightseeing, but they hardly ever come back with any ideas how to improve things in their municipality. However, there are also many municipalities that take their partnerships seriously and even go far beyond a common partnership. One of the examples of extended cooperation is Jablonec nad Nisou and Kaufbeuren, Germany. After the Second World War many refugees and expellees from former Czechoslovakia settled there, and as they had thorough knowledge of traditional glass craft, Kaufbeuren now belongs to the most important producers of glass, bijouterie, and other glass products. The representatives of the two local authorities started a mutual contact and they came up with the idea of building their partnership on their common tradition. They aimed not only to not to let the tradition perish, but also to attempt to develop it. Hence now the glass-making training schools from both cities exchange their students, museums of glass and bijouterie in both cities cooperate on exhibitions, the State district archive in Jablonec works on a project of explanation the history of expelled Germans from Jablonec and recording the memories, the cities support the exchange of scientists, especially historians, they support the cooperation of their inhabitants united in some form of interest groups such as exchange of parishioners, seniors, etc. Jablonec thus focuses on maintaining common tradition, on exchange of experience, information, procedures, and historical knowledge. The success of cooperation of the two twin-towns of Jablonec and Kaufbeuren can be explained, according to Katerina Hujerova from Jablonec, by these principles, that actually copy the ten keys to success [9]:

- Preference of planning long-term projects to one time actions
- Thorough preparation of all projects
- Willingness and ability to work on the project properly until it is finished
- Having something in common what to build the relationship on, not to start a partnership and then search for common features
- Stability and certainty –the same people should keep in contact, not changing the representatives after every election
- Preparation of the representatives for the stay abroad – they usually speak German hence can talk without an interpreter, and moreover they were interested in common history as well as cultural differences.

The city of Blansko has an exceptional cooperation with their twin-town, which is Scandiano, Italy, where they participate in a food fair with culinary specialties. Thanks to this fair the Czech and Italian food processing enterprises began to cooperate and facilitated cooperation also to connected industries. Subsequently Scandiano established a large Italian department in the public library of Blansko and supplied it with a number of books written in foreign languages; the Italians also support the language courses at schools and mediate the exchange of students.

The City District Prague 1 organizes a unique meeting of all its twin-towns, which they call “the melting pot.” There arrived the representatives of Vienna 1 – Innere Stadt, Bratislava – Old Town, Budapest – Budávar, Italy – Trento and Ferrara, Germany – Bamberg, France – Nimes, and Israel – Rosh haAyin. According to Vaculíková, the coordinator of this assembly, the meeting was an exceptional multicultural experience and brought the most possibilities for further cooperation. As the meeting has grouped together many various participants, it has revealed that almost all the participants have trouble with communication, but it is solved easier in a group and that it is possible to use the strengths of more participants and thus arrive to more interesting results. The fruit of the new way of town-twinning should be revealed on the next meeting in Israel in autumn.

There are several problems that are being solved virtually in every municipality, such as security, coexistence of various interest groups, cleanliness of the town etc. Security in transportation is a hot topic. Antagonistic demands of pedestrians, drivers, and civic salvation workers such as the police, firemen or ambulance have to be taken into account. Zebra-crossings raised above the level of the road are safe for pedestrians, but dangerous for an injured patient in an ambulance car. Prague 6 is said to be successful with their idea of illuminating zebra-crossing by large amount of small reflectors in the surface of the road that slightly (not dangerously) dazzle drivers. However, some projects also failed when implemented into the Czech environment. One of the most publicly known projects that failed is installation of paper dummies and faked plastic policemen nearby schools and dangerous roads. The Czechs initially slowed down, but soon saw the trick and stole all the dummies. Now the dummies are used by the police but are watched. Another partially successful idea is the building of dog-sandpits, where the dogs are free to excrete. Some dog owners were totally ignoring it and let their dog excrete in other parts of parks. Sandpits were used only by responsible dog owners, who though usually clean up after their dog wherever they are. The City District Prague 2 claims that will be looking for ideas in their twin-towns that would help to solve the desperate situation of leaving dog excrements in parks and in the streets. Maintenance and administration of public places and coexistence of various interest groups is the most discussed topic among the representatives of local authorities with their twin-towns. The coexistence of dog-owners, cyclist, parents with children, and handicapped people; facilitating the mobility of wheelchair bounds, parents with prams etc. on the sidewalks and while accessing public buildings seem to be a never-ending story. Some solutions could perhaps work in the Czech environment but are unbearably expensive.

### **3.3 Proposal of ideas**

Some projects and ideas could be implemented in other municipalities as well, e.g. the extension of common student exchange to longer study stays for talented students who can practice their language and get some experience when working at the town hall.

Culture events are very frequent and well-liked by many people. They visit exhibitions, street markets, happenings, degustation of special food typical for every region. These projects introduce other cultures by a nice and popular form. However, successful projects were mainly open-air and free, so the town halls should not attempt to move them to buildings. Sports events are rather quick and do not leave enough personal leisure time for the participants, so they often come back with friends because they are interested to get to know the place better, and thus they should be provided with more tourist information.

Another very popular form how to meet different cultures is entertainment. Foreigners, no matter if students, immigrants, asylum-seekers, or expatriates, welcome joint projects such as common dinner with the exchange of recipes how to make exotic food from locally accessible foodstuffs, courses of local dancing, cooking, handicraft etc.

Some respondents, representatives of town halls, would vote for decentralization of decision-making, because they want municipalities to have more competence concerning e.g. infrastructure, building, and community service. They would like to decide themselves, as they saw it in their twin-towns, not to allow construction of new houses if the civic amenities are not able to serve more people, if the sidewalks are too narrow to allow a pram and a wheelchair pass by, if there are not enough parking places, if the access road does not suffice, if there is not any public transportation, if it is complicated to access the public transport stop (zebra-crossing is far and pedestrians would risk walking on the road) etc. Jiri Kucera from Blansko says: “*We would like to concentrate on services for our citizens, not to keeping all the state bureaucratic rules and laws.*” However, so far it is a problem that has no solution. There are some cities that welcome centralized power: “*We can not decentralize the competence of the building authorities, otherwise soon we would not have colonnade but another Cathedral of Basil the Blessed.*” (K. N., Karlovy Vary)

## 4 Conclusions

The paper dealt with cross-cultural issues in town-twinning, described some Czech attitudes towards other nations and their etiquette, provided examples of results of cooperation in various areas of life of inhabitants of their municipalities, and discusses some ideas for extending cooperation. Nevertheless, some representatives consider town-twinning as a formal vacation. Though they reason their stay abroad with studying foreign practices, they do not finally make anything new.

## References

1. Berry, J. W. et al.: Cross-cultural Psychology. Research and Applications. Cambridge University Press Cambridge, 2007. ISBN 0-521-64617-0.
2. Hofstede, G., Hofstede, G. J.: Cultures and Organizations. Software of the Mind. McGraw-Hill New York, 2005. ISBN 0-07-143959-5.
3. Kolman, L.: Komunikace mezi kulturami. Psychologie interkulturních rozdílů. ČZU Praha, 2005. ISBN 80-213-0735-8.
4. Okamura, A.: Do English speakers address their Japanese colleagues by their first name, while talking in English in Japan? Multilingua-Journal of Cross Cultural and Interlanguage Communication, vol. 28 (4), pp. 355 – 377, 2009. ISSN 0167-8507.
5. Průcha, J.: Interkulturní psychologie. Portál Praha, 2007. ISBN 978-80-7367-280-5.
6. Sam, D. L., Berry, J. W.: Acculturation Psychology. Cambridge University Press Cambridge, 2007. ISBN 0-512-61406-6.
7. Sister-cities. <http://www.sister-cities.org/> [online. Acc. 2010-04-15].
8. Šimonová, K.: Cross-cultural Communication in Cooperation of Authorities of Twin Towns. Proceedings of the Think Together Conference 2010. Prague 2010. ISBN 978-80-213-2052-9.
9. Town-twinning. <http://www.twinning.org/en/page/ten-keys-to-success.html> Ten keys to success. [online. Acc. 2010-04-15].
10. de Villiers, J. C.: Success factors and the city-to-city partnership management process – from strategy to alliance capability. Habitat International, vol. 33 (2), pp. 149 – 156, 2009.
11. Ward, C. A., Bochner, S., Furnham, A.: The Psychology of Culture Shock. Routledge Sussex, 2001. ISBN 0-415-16234-3.





# Using Experiential Learning in Marketing Communication Course

Václav Švec<sup>1</sup>, Tereza Kadeřábková<sup>1</sup>

<sup>1</sup> Department of Management, Faculty of Economics and Management,  
Czech University of Life Sciences Prague,  
Kamýčká 129, 165 21 Prague 6 Suchbát, Czech Republic  
{svec, kaderabkovat}@pef.czu.cz

**Annotation.** Experiential and active learning has now become a usual learning method. Experiential learning is the process of making meaning from direct experience [10]. Active learning is a link between academic theory or concepts and experiential learning. As Revans (1940 in [5]) observed active learning has two components: learning garnered from authorities (academic theory, concepts) and learning from students questioning of their own experience.

In the course of Marketing Communication we did involve these approaches in the form of theoretical lectures and practical workshops. The theoretical lectures were same for all students attending the course (cca 300 students). The workshops did differ. Students were able to choose in advance between practical workshops in the area of public relations (press conference), event management (organizing a conference), online advertising (Google Online Marketing Challenge), planning marketing communication (for Allianz insurance company) and marketing communication plan (for microbrewery in the small city).

Aim of the research presented in this paper is to explore the students understanding and evaluation of results achieved by completing a course focused on experiential learning through live case studies in comparison with learning through mini-case studies with the support of multimedia class tools. The specific aims of the article are to verify the benefits of experiential learning to the students in the area of marketing communication and to find out which competencies were developed by used teaching approaches. Following methods had been used to fulfill the aims: observation, questionnaire, group discussion (for sets of competencies creation), non-parametrical statistical testing (Mann-Whitney test) and also analogy, induction, deduction, specification, abstraction, analysis and synthesis.

**Key words:** cognitivism, experiential learning, case-based learning, mini cases, live cases

**JEL classification:** JEL A23

## 1 Introduction

Society in general, and companies in particular, demand not only knowledge but also new skills and abilities (e.g., teamwork skills, communication skills, familiarity with information and communication technologies, adaptability to changing problems) that are not adequately dealt with in conventional approaches to learning. [4] Teaching methods that have been considered "tried and true" are no longer working with today's active learners. [13] Student learning, rather than teaching, is becoming the defining element of the instructor's role. [6] Active teaching methods can be also seen as a "hook" that enables to engage the students in the classroom and to motivate them to follow the teacher through this process. [7] Development of educational methods moved from the traditional beginning with behaviorism to theories emerging in the sixties - cognitivism, constructivism and humanism as a framework for experiential learning theory. [12] For this research was the starting framework the experiential learning theory. Cognitivism has affected educational theory by emphasizing the role of the teacher in terms of the instructor's effectiveness of presentation of instructional material in a manner that facilitates students' learning (e.g., helping students to review and connect previous learning on a topic before moving to new ideas about that topic, helping

students understand the material by organizing it effectively, understanding differences in students' learning styles, etc.).” [14] Rogers distinguished two types of learning: cognitive (meaningless) and experiential (significant). The key to the distinction is that experiential learning addresses the needs and wants of the learner. Rogers lists these qualities of experiential learning: personal involvement, self-initiated, evaluated by learner, and pervasive effects on learner. [17]

## **1.1 Experiential learning theory**

There are many different experiential learning models that use cycles with varying numbers of stages (three, four, five, or six). However, the number of stages (all of which are common) does not matter; what is important is that the phases of experiencing (doing), reflection and applying are present. It is also important to note that the stages of reflection and application are what make experiential learning different and more powerful than the models commonly referred to as "learn-by-doing" or "hands-on-learning". [16] Kolb stated that learning is the process whereby knowledge is created through the transformation of experience. He also developed four components of the experiential learning cycle: concrete experience, reflective observation, abstract conceptualization, and active experimentation. [11] The cycle begins with an experience that the student has had, followed by an opportunity to reflect on that experience. Then students may conceptualize and draw conclusions about what they experienced and observed, leading to future actions in which the students experiment with different behaviors. This begins the cycle anew as students have new experiences based on their experimentation. [15]

Experiential learning has been often thought of as an activity-based learning or even internships – practical experience. [9] One of the most significant benefits of experiential exercises is that they enhance learning by increasing student involvement in the learning process. [3] To sum up, experiential learning activities increase student learning and motivation, and help students to integrate marketing theory and real-world practice, as well as improve important skills such as critical thinking and communication skills. [4] In a marketing context, several authors have evidenced the advantages of merging traditional classroom learning methods with experiential learning methods such as team-projects combining several courses [3], case-based courses [2], classroom projects [4], semi-structured classroom activities [8], and live cases [6].

## **1.2 Case-based learning through mini cases and live cases**

Using a case-based approach engages students in discussion of specific situations, typically real-world examples. This method is learner-centered, and involves intense interaction between the participants. Case-based learning focuses on the building of knowledge and the group works together to examine the case. [20] Even if the case has to be written in narrative form and demonstrate the contextualization and specificity of case, to provide well-written content for cases is not sufficient for successful case-based learning. [2] The key to the case method are discussions that enable students to analyze, propose solutions, solve problems or make decisions. [1] The instructor's role is that of a facilitator and the students collaboratively address problems from a perspective that requires analysis. Much of case-based learning involves learners striving to resolve questions that have no single right answer. [20] In the analysed course, there were two methods used - the method of mini cases and live cases. The first method - mini cases may be used in a wide variety of settings. These are short, often only a paragraph or two long, describing a situation or dilemma. Designed to be used in a single class meeting, their content is usually tightly focused. Useful for introducing and grounding a new topic in lecture, for pre-assessing student knowledge, for helping students apply concepts, for introducing practical applications in lab settings, or as a pre-activity exercise designed to make the work more meaningful. [19] The second method, a blend of experiential learning and the case method, is the use of a live case approach to teaching. By the live cases,

the problem or issue has not been resolved and the company is seeking input from the students to assist them in making a management decision. In other words, everything is happening now. [18] Simkins believes that the live case method requires the student to apply even deeper intellectual thinking and as a result, achieve greater wisdom – more so than other pedagogical techniques. [18] This type of deep knowledge is necessary for the student to achieve exceptional performance, not only in the classroom, but also in one’s career. The main disadvantage to using the live case method in the classroom is the amount of time it involves both for the student, the instructor, and the company. This project required minimal one-half of the semester. [18]

### 1.3 Context

The Marketing Communication Course did last for 13 weeks. The course were attended by 150 students and was divided to classes with case study and project teaching and classes with live cases. The figure 1 shows the timeline of the course.

The course has been divided into 6 different classes as show in the figure 1: Online Advertising, Press Relations, Events, Integrated Communication, Product Advertisement and Communication Mix. As figure 1 shows the only class using mini cases and project teaching was Communication Mix. The other classes were using live case study teaching and approach.



Figure 1. Orientation of Marketing Communication Course’s Classes

Students were allowed to decide which class they want to attend in the beginning of course with purpose to increase their motivation in classroom. The separately lectures of marketing communications theory were common for all classes.

## 2 Data and Methodology

Aim of the research presented in this paper is to explore the students development in a course focused on learning through live case studies in comparison with learning through mini cases and projects. The specific aims of the article are:

- to verify the benefits of action learning to the students in the area of marketing communication,
- to find out which competencies were developed by used teaching approaches.

For this purpose 4 hypothesis were formulated:

H0-1: There is not a statistically significant difference in students capture between the classes with mini cases/projects teaching and classes with live case studies.

H0-2: There is not a statistically significant difference in studying results between the classes with mini cases/projects teaching and classes with live case studies.

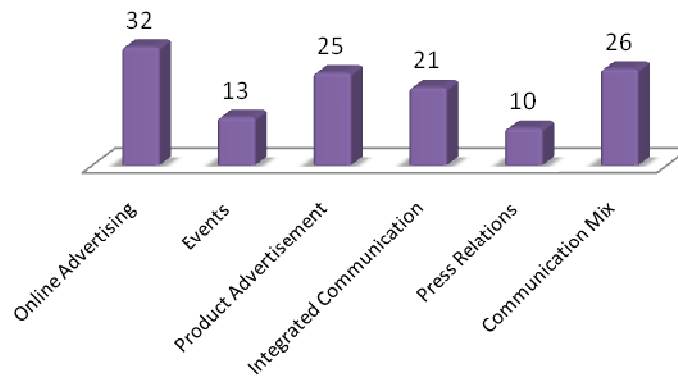
H0-3: There is not a statistically significant difference in development of marketing communication skills between the classes with mini cases/projects teaching and classes with live case studies.

H0-4: There is not a statistically significant difference in development of observed competencies between the classes with mini cases/projects teaching and classes with live case studies.

Used methods: questionnaire, group discussion (for sets of competencies), non-parametrical statistical testing (Mann-Whitney test).

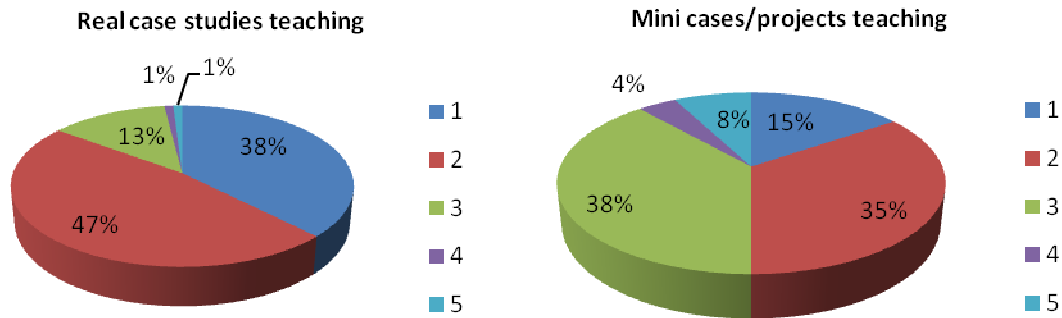
### 3 Results

130 respondents did answer the questionnaire but 3 questionnaires did have to be excluded because of inadequate completion. The answers were divided into 2 groups according to type of teaching (group variable). The frequency did not drop until 26 answers in any of group. The respondent's distribution within attended classes is shown in figure 2.



**Figure 2.** Respondent's distribution

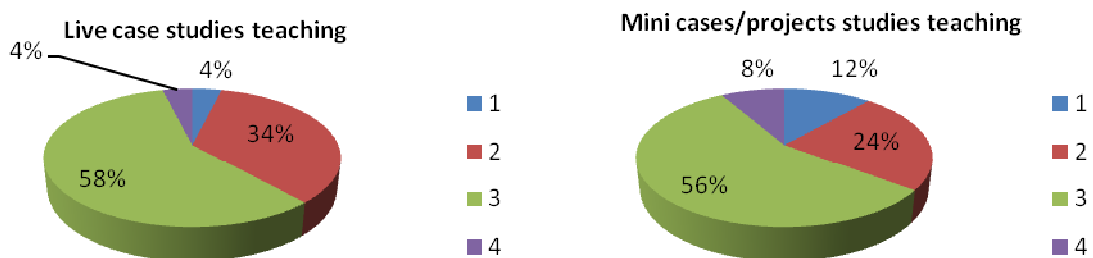
Students capture in subject is shown in figure 3. The scale means 1 is the highest capturing, 5 means the lowest.



**Figure 3.** Students capture in both types of teaching

Ordinal (categorical) variables are used in both samples - for statistical confirmation of H0-2 has been chosen nonparametric statistical testing method of Mann-Whitney test. The criterion  $p = 0,0005$ . The H0-1 can be rejected. There is statistically significant difference in students capture between the classes with project/mini cases teaching and classes with live case studies.

Studying results of students are shown in figure 4. The scale used in this case means marks (1 – excellent, 2 – very good, 3 – good, 4 – failed).



**Figure 4.** Studying results for both teaching approaches

There are used ordinal (categorical) variables in both samples therefore statistical confirmation of H0-2 has been chosen Mann-Whitney test. The criterion  $p = 0,682$  which means H0 cannot be rejected. As shown in figure 4 there is no statistically significant difference in studying results coming from method of class teaching, i.e. live case studies teaching and mini cases/projects teaching.

The set of observed competencies and their development is shown in figure 5. Students did record shift in their competencies at the beginning and in the end of course on scale 0-4, where 0 meant no shift and 4 the significant shift.

Every competency has been tested separately as two independent samples. Because in both samples are used ordinal (categorical) variables for statistical confirmation of H0-3 and H0-4 has been chosen the Mann-Whitney test. There is no statistically significant difference in developing Marketing communication competency between mini cases/project and live case studies teaching ( $p = 0,09 > 0,05$ ).

The competencies with statistically significant difference are:

- creativity ( $p = 0,001 < 0,05$ ),
- relationship building ( $p = 0,03 < 0,05$ ),
- dispute settlement ( $p = 0,012 < 0,05$ ),
- quality decision ( $p = 0,031 < 0,05$ ).

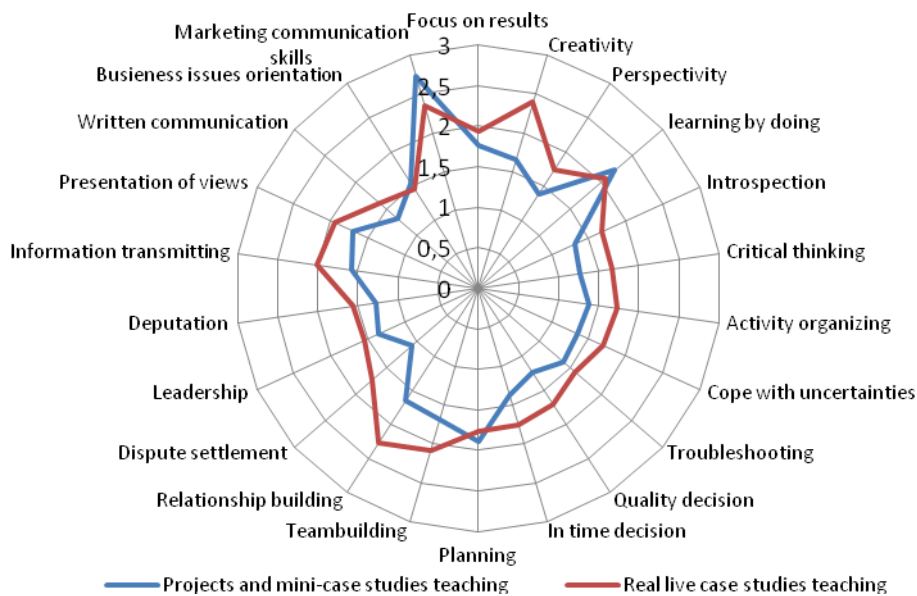


Fig. 5. Evaluation of competencies for both teaching approaches

## 4 Conclusions

Teaching with live case studies in marketing communication is comparable with mini cases/projects approach in the criterion of marketing communication skills level. Therefore is possible to say that this method is applicable.

It has been statistically proven that usage of live case studies has better impact on students capturing for subject than mini cases/projects teaching. These results are in agreement with Hackbert's statement that live case studies teaching methods can be also seen as a "hook" that enables to engage the students in the classroom and to motivate them to follow the teacher through this process. [7]

Camarero, Rodriguez and San Jose stated that experiential learning activities increase student learning and motivation, and help students to integrate marketing theory and real-world practice, as well as improve important skills such as critical thinking and communication skills.[4] Our research also proved significant development of creativity, making of decisions, dispute settlement and relationship building through the experiential learning activities.

## Acknowledgements

The paper is supported by the grant project of the Ministry of Education of the Czech Republic No. MSM6046070904 Information and Knowledge Support for Strategic Management

## References

1. Barnes, L. B., Christensen, C. R., Hansen, A. J.: Teaching and the case method: text, cases, and readings. Harward Business School Press, 1987, Boston. ISBN 0-87584-403-0.

2. Blackmon, M., Hong, Y., Choi, I.: Case-Based Learning. In M. Orey (Ed.), *Emerging perspectives on learning, teaching, and technology*. [cit. 2010-06-01]. Online <http://projects.coe.uga.edu/epltt/>.
3. Bobbitt, M. L., Inks, S. K., Kemp, K. J., Mayo, D. T.: Integrating Marketing Courses to Enhance Team-Based Experiential Learning . *Journal of Marketing Education*, Vol. 22, No. 1, 15-24. [cit. 2010-06-01]. <http://jmd.sagepub.com/cgi/content/pdf/22/1/15>.
4. Camarero, C., Rodriguez, J., San Jose, R.: A comparison of the learning effectiveness of live cases and classroom projects. [cit. 2010-06-01]. [http://www.heacademy.ac.uk/assets/bmaf/documents/publications/IJME/Vol8no3/6IJME\\_254.pdf](http://www.heacademy.ac.uk/assets/bmaf/documents/publications/IJME/Vol8no3/6IJME_254.pdf).
5. Clawson, J. G. S., Haskins, E.: *Teaching Management – A Field Guide for Professors, Consultants, and Corporate Trainers*. Cambridge University Press, 2006, Cambridge. 494 p. ISBN 0-521-68986-4.
6. Elam, E. L. R., Spotts, H. E.: Achieving marketing curriculum integration: A live case study approach. *Journal of Marketing Education*, 26, 50-65. [cit. 2010-06-01]. <http://jmd.sagepub.com/cgi/content/pdf/26/1/50>.
7. Hackbert, P. H.: Integrating Active Learning And Cases In Undergraduate Entrepreneurship Classes Across The Curriculum. [cit. 2010-06-01]. <http://usasbe.org/knowledge/proceedings/proceedingsDocs/USASBE2006proceedings-Hackbert%20-%20EE.pdf>.
8. Hamer, L. O.: The Additive Effects of Semistructured Classroom Activities on Student Learning: An Application of Classroom-Based Experiential Learning Techniques , *Journal of Marketing Education*, Vol. 22, No. 1, 25-34 (2000), [cit. 2010-06-01]. <http://jmd.sagepub.com/cgi/content/pdf/22/1/25>.
9. Christ, W. G.: *Leadership in Times of Change : A Handbook for Communications and Media administrators*. Lawrence Erlbaum Associates, Inc., 1999, Mahwah. ISBN 1-4106-0128-5.
10. Itin, C. M.: Reasserting the Philosophy of Experiential Education as a Vehicle for Change in the 21st Century. *The Journal of Experiential Education*. 22(2), 1999, pp. 91-98.
11. Kolb, D. A.: *Experiential learning*. Prentice Hall, Inc., 1984, New Jersey. ISBN 0-13-295261-0.
12. Learning Theories Knowledgebase. [Learning-Theories.com](http://www.learning-theories.com). [cit. 2010-06-01]. <http://www.learning-theories.com>.
13. Matulich, E., Haytko, D. L., Papp, R.: Continuous Improvement through teaching Innovations: A Requirement For Today’s Learners. [cit. 2010-06-01]. <http://www.britannica.com/bps/additionalcontent/18/32739796/CONTINUOUS-IMPROVEMENT-THROUGH-TEACHING-INNOVATIONS-A-REQUIREMENT-FOR-TODAYS-LEARNERS>.
14. Ormrod, J. E.: *Human learning*. Prentice-Hall, 2007, New Jersey. ISBN 978-0132327497.
15. Oxendine, C., Robinson, J., Willson, G.: Experiential learning. In M. Orey (Ed.), *Emerging perspectives on learning, teaching, and technology*. [cit. 2010-06-01]. <http://projects.coe.uga.edu/epltt/>.
16. Proudman, B.: *Experiential Education as Emotionally-Engaged Learning*. *Journal of Experiential Education*, 1992 v15, Ontario. ISSN 1053-8259.
17. Rogers, C. R., Freiberg, H. J.: *Freedom to Learn*. Prentice-Hall, 1994, New Jersey. ISBN 978-0024031211.

18. Simkins, B. J.: An Innovative Approach to Teaching Finance: Using Live Cases in the Case Course. [cit. 2010-06-01].  
[http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=271729](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=271729).
19. Waterman, M., Stanley, E.: Case format variations. [cit. 2010-06-01].  
<http://cstl-csm.semo.edu/waterman/cbl/caseformats.html>.
20. What is case-based learning? Centre for Teaching and learning, Queens University. [cit. 2010-06-01]. <http://www.queensu.ca/ctl/goodpractice/case/index.html>.



# **Rural Development**



# Testing causality between unemployment and population changes in rural areas in the Czech Republic

Michaela Antoušková<sup>1</sup>, Zdeňka Malá<sup>1</sup>, Gabriela Červená<sup>1</sup>

<sup>1</sup>Department of Economics, Faculty of Economics and Management,  
Czech University of Life Sciences Prague,  
Kamýcká 129, 165 21 Prague 6 Suchbát, Czech Republic  
{antouskova, malaz, cervena}@pef.czu.cz

**Annotation:** A disparity in income and employment between rural and urban regions of the Czech Republic has emerged. High unemployment rates, low incomes and lack of economic opportunities – these are current problems faced by people living in rural areas. This can result in an acceleration of rural to urban migration and altering of population structures. The main aim of this paper is to study the relationship between the depopulation of rural areas and the rate of unemployment in order to detect if the depopulation is caused by high unemployment in these rural areas. A secondary aim is to analyze if the relationship between the migration balance and rate of unemployment is connected with the size of municipality and if there are differences between municipalities located near large cities i.e. suburban villages and the others. Another question is to determine whether there are also other factors that influence depopulation of rural areas? The methodological tool for achieving these aims is an analysis using a Granger causality test based on F-test. The analysis was based on balanced panel data from all Czech municipalities, obtained over the period 2004–08. Analyzed municipalities were divided into four groups: Small (up to 499 inhabitants), Middle (500-999 inhabitants), Big (over 1000 inhabitants) and Suburban villages. The model of panel data used a special configuration of the model with respect to heterogeneity. The proper specification of the model was based on analysis of variance and Hausman test. Results from the analyses indicated that depopulation of the rural area is influenced by the unemployment of rural population and also by the number of economic subjects located in rural areas. Such a relationship is typical in big villages. However in the small ones the number of economic subjects does not influence the depopulation, which is only effected by the unemployment.

**Key words:** Unemployment rate, migration balance, Granger causality, size of village, panel data analysis.

**JEL classification:** R15, R58

## 1 Introduction

Depopulation and the lack of economic opportunities are a common problem to which many European regions have to face up to, especially in small peripheral municipalities. Although overall figures show that the depopulation of rural regions in the Czech Republic has halted (in comparison to 2003, the population of rural villages rose by 3 % in 2009), a closer inspection of the figures challenges this assertion. [see 11] The positive rural to urban migration is largely characteristic of villages in suburban areas. The intermediate and remote rural areas still face depopulation, which is connected with the problem of high unemployment and lack of job opportunities.

Several authors, such as Greenwood M. J. and Hunt G. L. [5], Freeman [3], Aguayo and Guisan [1], Marthur and Song [9], has pointed out that employment and population are interdependent in many countries.

Freeman mentions two alternative theories of regional economic development which explain the relationship between population and employment change across regions. The demand side approach explains regional labour supply as highly elastic, with changes in regional employment driven primarily by changes in the demand for regional output and particularly the demand for regional exports. In short, employment shocks precede migration and is the “people follow jobs” thesis. [3] This thesis has a bearing on the base export model, in which, the labour supply adjusts (through immigration) to the demand for labour. [2]

On the other hand, there are several positive impacts of population growth on employment because the increase in population generally implies an increase in labour supply and in the demand for goods and services. These variables have, to some extent, a positive impact on employment. This supply side approach represents the “jobs follow people” thesis. [3]

Muth calls these interdependencies between population and employment a “Chicken or Egg” problem of regional migration. [10] Many authors [see 1, 3, 9] try to detect this causality by the means of Hausman’s test or Granger’s test. A review of the literature highlights many different debates and results concerning the importance of a supply side or demand side approach.

Muth concluded that the estimated response of employment to migration and the smaller estimated response of population to migration provided stronger support for the supply side argument that “jobs follow people”. [10] Furthermore, “jobs follow people” is given greater support over the “people follow jobs” hypothesis by econometric estimations presented in Aruzo-Carod’s paper. [2]

Freeman’s results support the argument that employment causes population, rather than population causes employment. [see 3] Aguayo and Guisan agree with these results. They examined interdependence between non-agrarian employment, production and population in 98 European regions. [1] Marthur and Song suggest that the relationship between employment and population is region-specific. [see 9]

It is clear that the rural economy depends on the density of the population, which provides workforce for this area, and on the sufficiency of job opportunities that motivate people to stay or stimulate in-bound migration. This paper supposes that these interdependencies between unemployment and depopulation (measured by migration balance) have different intensities depending upon the size categories of rural municipalities. The purpose of this paper is to detect the issue of causality between unemployment and population changes in rural villages in the chosen region using Granger causality test in cross-section data. These questions remain an important issue, especially given the implications they have for future public policy creation.

## **2 Data and Methodology**

To study the relationship between rate of unemployment (RUE) and migration balance (MB) and also between number of economics subjects (NES) and migration balance of rural villages, the Granger causality was used. The mentioned analysis was based on data of all municipalities in Hradec Králové region (LAU 2), which was obtained from the Czech Statistical Office. The relations were studied in four groups of rural municipalities according to the number of inhabitants and their position. The villages up to 499 inhabitants were considered as small villages (281 villages in the category); villages with inhabitants between 500-999 were considered middle (86 villages); big villages, those with between 1000-2000

inhabitants (30 villages). The fourth group represents the suburban villages (12 villages). The criteria for the division of the villages were used according to the Czech Statistical Office<sup>1</sup>.

Granger defined the causality as a relation in which the lagged values of variable, f.e.  $x_{t-n}$ , have explanatory power in a regression of variable  $y$  on lagged values of  $y_{t-n}$  and  $x_{t-n}$ . [4]

In order to judge the Granger causality the F-test of following parameters was used:

$$F = \frac{(RSS_R - RSS_{UR})/m}{RSS_{UR}/(n-k)}, \quad (1)$$

Where:  $RSS_R$  is the coefficient of determination of unrestricted equation;  $RSS_{UR}$  is the coefficient of determination of restricted equation;  $m$  is the number of lagged periods;  $n$  is the number of observations;  $k$  is the number of estimated parameters of unrestricted regression.

The use of panel data requires performing an analysis of heterogeneity. Omitting the analysis of heterogeneity may lead to the distortion of parameters estimation. The existence of heterogeneity is examined by analysis of variance of explained variables in estimated models. The analysis of variance is based on testing mean values of a relevant variable. The null hypothesis assumes the same mean values in all subjects. Conversely the alternative hypothesis assumes that at least one the mean values differ. Testing the differences was based on F-test. [see 7] The null hypothesis about the equality of mean values of all villages is rejected if the F-value on the chosen level of significance ( $\alpha=5\%$ ) and with the degrees of freedom (K-1, N-K) is higher than the critical value.

The determination of a type of heterogeneity is based on determining the proportion of inter-municipality variability on total variability. The heterogeneity is analyzed in two alternatives, as cross-sectional variability (variability among municipalities) and as time variability (variability among time periods). The type of heterogeneity influences the specification of model and the estimation techniques.

In the case of cross-sectional heterogeneity, the inclination of regression function may be kept the same for all villages, however the constants have to have different values. This fact is taken into consideration by analyzing “error component models” (Fixed Effects Model (FEM) and Random Effects Model (REM)). [8]

The appropriate model is chosen according to the testing of Hausman statistics. [ see 4] The Hausman statistics values are for all models higher than the critical one  $\chi^2$  on the chosen level of significance ( $\alpha=5\%$ ) and with the degrees of freedom (J-1), therefore the null hypothesis was rejected and for all studied relations the FEM model was used.

The Fixed Effects Model assumes the correlation between villages’ characteristics and explained variables. The FEM may be estimated by the ordinary least square method. The result of this method is the best linear unbiased estimation – if all conditions are fulfilled. The quality of estimation may be tested by common statistical induction; therefore the statistical significance was tested by standard t-test. Based on the results of t-test the parameters were considered as statistically significant if t-value was higher than critical value on the significance level ( $\alpha=5\%$ ) and with the relevant degrees of freedom. [see 6 ] Statistical significance of the whole model was measured by the coefficient of determination and was tested by F-test. To compare the FEM models, the Akaike information criterion (AIC) was used. [6] The model with a lower value of Akaike criterion was chosen.

---

<sup>1</sup> The statistical limit, commonly used in the Czech Republic for determination of rural villages, is 2 000 inhabitants.

In the case of heterogeneity within the groups the random coefficient model (REM) was used. [see 6] The Granger causality was tested by likelihood ratio test in mentioned type of model. The test is characterized as follows: If the restriction  $c(\theta) = 0$  is valid then imposing it should not lead to a large reduction in the log-likelihood function. Therefore the test on difference  $\ln L_U - \ln L_R$  was applied, where  $L_U$  is the value of the likelihood function at the unconstrained value of and  $L_R$  is the value of the likelihood function at the restricted estimate. [4]

### 3 Results

Firstly, the heterogeneity is verified. The assumptions of the aforementioned analysis were satisfied and the results of verification of the existence of heterogeneity in the panel data and determination of a type of heterogeneity in all groups of villages, which are shown in Table 1, can be considered valid.

**Table 1.** Heterogeneity in panel data

Panel	Variable	F-value	$\eta^2$	Kind of heterogeneity
Small v.	MB	1,587***	0,283	Within group
	RUE	14,24***	0,780	Between groups
	NES	278,03***	0,986	Between groups
Middle v.	MB	1,50***	0,270	Within group
	RUE	5,76***	0,587	Between groups
	NES	166,96***	0,976	Between groups
Big v.	MB	2,36***	0,363	Within group
	RUE	11,95***	0,743	Between groups
	NES	227,56***	0,983	Between groups
Suburban v.	MB	2,76***	0,387	Within group
	NES	521,06***	0,992	Between groups
	RUE	3,76***	0,463	Within group

Source: Own calculation

The type of heterogeneity is especially evident between groups, which can be solved by differentiation of intercepts for different individuals with the constant slopes. Mentioned changes in specification of the model are called Fixed Effects Model. Another type of model that caused the problem of heterogeneity between groups is the Random Effects Model. Both types of models were used in the test of Granger causality in the small, middle and big villages' data sets. Finally, the estimation of FEM is used as a base for F-test, because the Hausman test verified that the parameters of REM model are not consistent. Analysis of variance verifies also the heterogeneity within group, especially in the panel data set of suburban villages. The aforementioned heterogeneity is solved by differentiation not only of intercepts but also slopes for different individuals. The character of panel data facilitates also the existence of heterogeneity in time. The variability is not verified in all variables of small and middle villages. Small time heterogeneity declared in the rate of unemployment in big villages and suburban villages can be omitted.

The results of the Granger causality test do not verify the relationship between migration balance and rate of unemployment in small villages. The statistical significance of parameters of lagged variable MB declares that there exists some persistence in the evolvement of migration balance in small villages. (see table 2)

**Table 2.** Granger Causality – Small Villages

Relationship	Variables	Parameters	F-value	
MB and RUE	$MB_t = f(RUE_{(t-n)}, MB_{(t-n)})$	$RUE_{(t-1)}$	0,155495	0,755926
		$RUE_{(t-2)}$	0,617485	
		$RUE_{(t-3)}$	-0,601338	
		$MB_{(t-1)}$	-0862979***	
		$MB_{(t-2)}$	-1,03121***	
		$MB_{(t-3)}$	-0,224597	
		Const.	-6,33592	
	$RUE_t = f(RUE_{(t-n)}, MB_{(t-n)})$	$RUE_{(t-1)}$	-0,674595***	1,14467
		$RUE_{(t-2)}$	<b>-0,674969***</b>	
		$RUE_{(t-3)}$	<b>-0,253243</b>	
		$MB_{(t-1)}$	-0,00281118	
		$MB_{(t-2)}$	<b>-0,103333</b>	
		$MB_{(t-3)}$	<b>-0,0313407</b>	
		Const.	-8,20920***	
NES and MB	$NES_t = f(NES_{(t-n)}, MB_{(t-n)})$		/0,889383	
	$MB_t = f(NES_{(t-n)}, MB_{(t-n)})$	-14,638***	2,59574*	

Source: Own calculation

In the category of middle villages, a one-way relationship between unemployment and migration balance was verified. The migration balance is caused by unemployment with the lag of three periods. (see table 3) In these villages the rate of unemployment decreases in the considered period, this positively influences migration balance. On the other hand, the model identified the interdependency between migration balance and number of economic subjects. The number of economic subjects increased in the considered period.

**Table 3.** Granger Causality – Middle Villages

Relationship	Variables	Parameters	F-value	
MB and RUE	$MB_t = f(RUE_{(t-n)}, MB_{(t-n)})$	$RUE_{(t-1)}$	-1,36146	4,042662***
		$RUE_{(t-2)}$	-1,52270**	
		$RUE_{(t-3)}$	-1,83201*	
		$MB_{(t-1)}$	-0,716685**	
		$MB_{(t-2)}$	-0,578642**	
		$MB_{(t-3)}$	-0,373424*	
		Const.	-12,1429	
	$RUE_t = f(RUE_{(t-n)}, MB_{(t-n)})$	$RUE_{(t-1)}$	-0,417700	0,170016
		$RUE_{(t-2)}$	<b>-0,558267</b>	
		$RUE_{(t-3)}$	<b>-0,734142</b>	
		$MB_{(t-1)}$	-0,150234	
		$MB_{(t-2)}$	<b>-0,199270</b>	
		$MB_{(t-3)}$	<b>-0,102134</b>	
		Const.	-7,72068*	
NES and MB	$NES_t = f(NES_{(t-n)}, MB_{(t-n)})$		/0,365958**	

$$MB_t = f(NES_{(t-n)}, MB_{(t-n)})$$

-14,638\*\*\*

4,385295\*\*\*

Source: Own calculation

The same relation and tendencies between migration balance and unemployment as in the above category is verified among big villages. However the lag in variables was shorter - only two years. (see table 4) The increase of unemployment two periods ago causes the depression of migration balance in the current period.

**Table 4.** Granger Causality – Big Villages

Relationship	Variables	Parameters	F-value	
MB and RUE	$MB_t = f(RUE_{(t-n)}, MB_{(t-n)})$	$RUE_{(t-1)}$	7.825*	2.771**
		$RUE_{(t-2)}$	-7.145*	
		$MB_{(t-1)}$	0.096	
		$MB_{(t-2)}$	-0.267*	
		Const.	-1.143	
	$RUE_t = f(RUE_{(t-n)}, MB_{(t-n)})$	$RUE_{(t-1)}$	0.918***	1.984
		$RUE_{(t-2)}$	-0.021	
		$MB_{(t-1)}$	0.006*	
		$MB_{(t-2)}$	-0.003	
		Const.	0.590***	
NES and MB	$NES_t = f(NES_{(t-n)}, MB_{(t-n)})$		1.454	
	$MB_t = f(NES_{(t-n)}, MB_{(t-n)})$		3.514***	

Source: Own calculation

Only among suburban villages is there a verified interdependency between unemployment and migration balance as well as between unemployment and number of economic subjects. The migration balance is caused by unemployment with the lag of three periods. In the case of unemployment, there is a statistical significance but only in the parameter of migration balance in the lag of two periods.

**Table 5.** Granger Causality – Suburban Villages

Relationship	Variables	Parameters	LR-value	
MB and RUE	$MB_t = f(RUE_{(t-n)}, MB_{(t-n)})$	$RUE_{(t-1)}$	-3,659***	11,873***
		$RUE_{(t-2)}$	-2,444*	
		$RUE_{(t-3)}$	3,169**	
		$MB_{(t-1)}$	-0,255	
		$MB_{(t-2)}$	0,314	
		$MB_{(t-3)}$	-0,639	
		Const.	-7,159	
	$RUE_t = f(RUE_{(t-n)}, MB_{(t-n)})$	$RUE_{(t-1)}$	-0,951***	6,456***
		$RUE_{(t-2)}$	0,481***	
		$RUE_{(t-3)}$	1,025***	
		$MB_{(t-1)}$	0,200	
		$MB_{(t-2)}$	-0,252***	
		$MB_{(t-3)}$	-0,049	
		Const.	-1,205*	
NES and MB	$NES_t = f(NES_{(t-n)}, MB_{(t-n)})$		6,191***	
	$MB_t = f(NES_{(t-n)}, MB_{(t-n)})$		10,703***	

Source: Own calculation



## 4 Conclusions

The Granger causality analysis identifies that the relationship between migration balance and unemployment differs among defined groups of villages. In the category of middle and big villages there is identified a one-way relationship between migration balance and unemployment. The migration balance is caused by changes in unemployment with different lagged periods that support Freeman's statement that people follow jobs. In the category of suburban villages there exists interdependency between these variables. In the case of small villages, there was no proven relationship. This may be explained by the significant incidence of cohabitation in these villages.

These results support Marthur and Song's conclusion about the regionally specific characteristics of relationship between employment and population.

## Acknowledgements

Research findings introduced in this paper originated from an institutional research intention MSM 6046070906 „Economics of resources of Czech agriculture and their efficient use in frame of multifunctional agri-food systems“.

## References

1. Aguayo, E., Guisan, M.: Employment and Population in European Union: Econometric Models and Causality Tests. <http://www.usc.es/~economet/aeadepdf/aeade80.pdf>.
2. Aruzo-Carod, J. M.: Determinants of population and jobs at a local level. *The Annals of Regional Science*, 2007, Vol. 41/1. Heidelberg, 2007. ISSN 0570-1864.
3. Freeman, D. G.: Sources of fluctuations in regional growth. *The Annals of Regional Science*, 2001, Vol. 35/2. Heidelberg, 2001. ISSN 0570-1864.
4. Green, W. H.: *Econometric Analysis*. Pearson Prentice Hall, New Jersey 2008. ISBN 978-0-13-513740-6.
5. Greenwood, M. J., Hunt G. L.: Migration and Interregional Employment Redistribution in the United States. *The American Economic Review*, 1984 Vol. 74/5. Nashville, 1984. ISSN 00028282.
6. Hsiao, Ch.: *Analysis of Panel Data*. Cambridge University Press, New York 2003. ISBN 978-0-521-52271-7.
7. Jackson, S. L.: *Research Methods and Statistics*. Wadsworth, Belmont, 2009. ISBN 978-0-495-51001-7.
8. Kennedy, P.: *A Guide to Econometrics*. Blackwell Publishing, Malden, 2008. ISBN 978-1-4051-8257-7.
9. Marthur V. J., Song F.: The dynamics of regional populations and employment growth. *Review of Urban and Regional Development Studies*, 1995, Vol. 7/1. ISSN 0917-0553.
10. Muth, R. F.: Migration: Chicken or Egg? *Southern Economic Journal*, 1971, Vol. 37. Chattanooga, 1971. ISSN 0038-4038.
11. Svatošová, L.: Human resources development in rural areas of the Czech Republic. *Agricultural Economics*, 2008, Vol. 54/2. ISSN 0139-570X.



# Same vision – different fulfillment (comparative study of a Czech and a German village)

Helena Hudečková<sup>1</sup>, Lenka Pancová<sup>1</sup>, Adéla Ševčíková<sup>1</sup>

<sup>1</sup>Department of Humanities, Faculty of Economics and Management,  
Czech University of Life Sciences Prague,  
Kamýcká 129, 165 21 Prague 6 Suchbát, Czech Republic  
{hudeckova, pancova, sevcikova}@pef.czu.cz

**Annotation:** The paper is focused at small rural municipalities. The authors analyze an exogenous support (the tools which are based on regional development sources) as well as endogenous sources of development (local initiatives and their strategies). The comparison deals with one village in Czechia and one village in Brandenburg region. This selection is based on similarities in demographic development and their current state, development of functions of these villages and their position in settlement structure, and also similarities within their visions for future development. It was considered that development of the German village would have a stronger exogenous accent, because the municipality was under heavy influence of regional reform, which implied a loss of independence and also an erosion of the local identity. The village has been firmly embedded in the German regional policy for the last 20 years. Contrary to this, development of the Czech village has started in 1990s with regaining independence, accompanied with a significant revival of local initiatives. However, external support from regional development sources is (in comparison with the German representative) negligible due to its short existence in the Czech Republic. Goal of the comparative study of these two villages with the similar structural features and with the common vision for development (but with different social context of actual development), is to unveil simultaneous effects of local and extra-local forces, which ensure that the endogenous sources are not used only for “inner-development”, but also for exchange and relations with external setting. The paper therefore aims to support validity of the neo-endogenous approach, which puts together endogenous and exogenous features in rural development. Empirical observation in the both localities is based on combination of different research techniques, such as documents study, observation and interviewing.

**Key words:** rural development, local identity, local initiatives, neoendogenous approach

**JEL classification:** H70

## 1 Introduction

The issue pursued in this article is based on the theories of regional development which are applicable to rural development. The inspiration is from those theories which link human resources not only with location (human resources are location-bound and non-transferable), but also with the community (human resources create institutions and normative culture, they have innovative capabilities and skills to transfer them within local networks). Such an approach is based primarily on the works of M. Granovetter and is represented by institutional direction, with respect to its focus on the socio-cultural environment of contact networking, regional and local rooting (e.g. authors like B. A. Lundvall, A. Malmberg, K. Morgan, J. Murdoch, and their works from the 1990s). At the end of the 20th century the resources mentioned are embodied in the international declarations. These declarations favoured the promotion of rural development – the Cork Declaration (1996), the Agenda 2000 (1999), the Götteborg Strategy (2001), the Budapest Declaration (2002), the Salzburg Declaration (2003).

We share the opinion of J. Murdoch, that endogenous and exogenous models of development do not have a dichotomous relationship [6] and we agree with the concept of the so-called neo-endogenous development [8], which refers to simultaneous action of both types of developmental forces, so that the development does not only occur "inside" (by the building

of the community through network enlargement, horizontal mergers), but also "outside" (by improving the position of sites in the broad social environment with vertical linkages).

This article analyses the exogenous sources of development (financial support for the projects of development of locality) and the endogenous sources of development (local initiatives and their pro-development strategies) in two small rural localities—one Czech and one German village. Their nationality and changes in administrative arrangements during the past 20 years give rise to the conclusion that the German village is strongly stimulated by exogenous sources in its development, while endogenous ones play a major role in the Czech village. The objects are similar in many basic structural and developmental characteristics and they can be studied in parallel. This article presents the main results of a comparative study of these two villages. The aim is to assess and exploit the richer experience of the German village in its involvement in regional policy for the development of the Czech village, where development has just started.

## 2 Data and Methodology

For reasons of comparison of the local development of localities, according to the chosen exogenous and endogenous resources, the selection of localities was conducted by means of the following criteria:

- Placement in the residential spatial structure (both villages are situated within 60 km of the state capital city, transport accessibility is very good).
- Demographic state and development (both villages have a population of fewer than 200 inhabitants, a low density population of 36 people per km<sup>2</sup>, a typical feature consists of the distinctive change of inhabitants in the second half of the 20th century, which was characterised by a sharp decline, followed by stabilisation, relevant to the population increase).
- Function of the settlement (both villages did not fulfil any agricultural function in the past, historically they are connected with non-agricultural production functions and other functions, they exploit their historical heritage for tourism).
- Economic potential (especially for tourism).
- Cultural heritage (expressed and confirmed by the protected status of both villages).
- Total progress and situation of both villages (decline in the second half of the 20th century, significant revitalisation in the 1990s, membership of LAG, membership of other initiatives of rural development).

Basic differences which impact, according to our expectations, development of both localities are:

- Administrative evolution and statement (the Czech village gained freedom in 1900, the Brandenburg village lost its freedom in 1900 and it was conquered, double linking)<sup>1</sup>
- Broader socio-political context (the Czech village participated in national programmes within the framework of regional policy in 1992 and in 2008 the Czech village participated in the EAFRD programme, therefore it is possible to mention the complex solution of local developmental issues; the Brandenburg village, after coalition with Germany in 1990, joined the functioning European and national regional policy).

Empirical observation in the field is supported by the study of documents at national and provincial levels (regarding regional policy and rural development), local level (chronicles, local newspapers, developmental studies, year-end reports, requests for subsidies, informative

---

<sup>1</sup> The former consists of a coalition with a larger rural municipality, the latter consists of a coalition with a small town of 4 330 inhabitants, which is its so-called settled part. This village was chosen for empirical observation through the studied period of abode of A. Sevcikove of Berlin's Humboldt University, assisted by the Brandenburg Ministry of Agricultural, Environmental Protection and Spatial Planning.

brochures). Field observation in both villages commenced with techniques of observation and interviews: in the Czech village, there was long-term uninvolved observation (from 2000) and interviews with a low level of standardisation (from three to six interviews annually, with participants in local life), in the German village, there was repeated uninvolved observation in 2003, 2008 and interviews with a low level of standardisation (in the period 2003 – 2009, a total of 10 interviews with participants in local life).

The study, which combines observation and interviews, relies on a common outline in order to reach the comparable analytical outputs about the similar and different characteristics in the evolution of both villages and the activities of local participants in local development. The historical context of the locality and the influence of contemporary regional policy were taken into consideration. In 2008, there was an approach towards influencing the chosen exogenous resources (subsidies in the frame of regional policy) and endogenous resources (local developmental initiatives and their actions) towards a statement on development in both localities. For that purpose, interviews with previous interviewees were introduced, if there was not sufficient information for the comparison.

### **3 Results**

#### **3.1 Brandenburg village**

German regional policy has been developing since the 1950s, firstly with the emergence of ordoliberalism and then with Keynesian and neo-liberal concepts gradually being applied. At the end of the 1970s, an institutional approach was recorded in regional policy [9]. The endogenous approach to regional development in Germany began to be taken into account relatively early, in comparison with European countries among themselves. The transition to an endogenous approach was evoked from the massive central planning of spatial development, implemented from the 1960s by Christaller's theory of central places<sup>2</sup>. The authors point out that the contemporary rural renaissance which is proclaimed in Germany should be treated with caution, because the German countryside is very fragile as a consequence of the afore-mentioned evolution [3, 5]. They add that the endogenous approach is urgent in the contemporary situation, because sub-central localities have lost their autonomy and the possibility to decide for themselves, which strongly influences the commitment of local participants in local development. The process of strongly criticised spatial reform continues and is interfering in new federal countries, including the village which is under observation by us.

This village was settled as a glass-manufacturing municipality at the beginning of the 18th century and, in the last third of the 19th century, achieved the greatest expansion (implementation of the railway, construction of commercial and residential buildings, social and cultural facilities, the highest number of residents). After World War II, the glass factory became a state company. The local school, pub and glass factory were closed and people were collectively relocated until 1980. The settlement became part of the military area. This fact had a positive effect on the preservation of the complex of rural industrial architecture, which has been listed since 1985. Revitalisation in the 1990s consisted of the construction of a new technical infrastructure (water pipeline, gas pipeline, canalisation), followed by (within approximately the last 10 years) a significant increase in the population. Since 2003, the surroundings of the village have been proclaimed a protected landscape area.

The rediscovery of the village in this area is explained as chance. A certain West German politician enquired of his local Deputy whether he knew "what a treasure" was situated in his

---

<sup>2</sup> Henkel evaluates this process as "political cannibalism" [2]. 16 000 German villages lost their autonomy as a consequence of the Act of 1965.

electoral district. Thereafter, in 1991, the Deputy who had been questioned initiated the establishment of an Association for the renewal of the area. Its members were locals as well as foreigners. According to this concept, from 1993, the reconstruction of the architectonic complex and substantial restoration took place over a ten-year period at the total cost of EUR 4 000 000. The district government (with a third of stocks), the ERDF (with a fifth of stocks), the district authorities (with a sixth of stocks), bank organisations (with an eighth of stocks), the Foundation and ABM<sup>3</sup> all participated through grants in the co-financing. In 2003 the administration of tourism development was professionalised. The next important step was to purchase all the real estate and resolve all the property right relationships in the administered area, in order to be able to decide fully on future development. All these technical matters took a relatively quick course.

The revitalisation of the village proceeded slowly. The first new residents arrived in 1994 but an immigration boom was only noticed after 2000. The immigration (especially of craftsmen needed for the implementation of the local development strategy) was conducted by the Association. On the basis of a motivational letter by an applicant, all the participants of the Association would discuss their moving in. A decision was reached, according to the principle of non-competition by new craftsmen to others who were already there.

Weaknesses in the technocratic function of the Association were demonstrated in 2008. These weaknesses resulted in the dissolution of the Association, on the basis of agreement by its members. The reasons were the excessive workload of its Chairman and also the debts of the Association. As a successor, we can consider the subject of another Association (operating from 2006) which devotes more time than the original Association to the professional functioning of the local museum and related cultural activities and events. It is a smaller participant in the view of the compact development of the community. Besides foundations and associations, there are other participants, whose functions are connected with some local residents. The participant with a broader spatial activity is the Local Action Group (comprising an area of more than 1900 km<sup>2</sup> and almost 100 000 residents.) The project related to our observation of this village is prepared within the scope of this LAG and the LEADER approach, with financing by the EAFRD. The market town, under which this village falls administratively, plays a minimal role in the development of the settlement. Co-operation on this level of a territorially administrative basis is evaluated most unfavourably, but it has been improving since 2007.

### **3.2 Czech village**

Regional policy began to be realised in the Czech Republic in the 1990s. It was in the context of increased regional differentiation as a consequence of economic transformation and restructuring. We can characterise the situation as a “postponed take-off”. Content analysis of their basis and innovation of documents about regional development agrees with the shift to neo-liberal approaches and the progressive implementation of the institutional resolution as a platform for rural development, which is today particularly noticeable in the Rural Development Programme 2007 – 2013. The highlighting of human capital, initiatives of individuals and groups, learning and co-operation through the application of the network principle are mostly present in its fourth axis – LEADER<sup>4</sup>.

The observed village has a rich history as a monasterial village which since the 15th century has been represented both as a significant place of pilgrimage and of the economy. After the abolition of the monastery (1785), its buildings have served for productive, cultural and social

---

<sup>3</sup> ABM is an Institute of Public Beneficial Jobs

<sup>4</sup> There is an analogy between the Czech Rural Development Programme and the Rural Development Programme of Brandenburg and Berlin. Orientation of its particular axes is analogous to the Czech one, including the LEADER approach.

purposes. During the second half of the 20th century, it was a forced labour camp, prison and training centre of the Ministry of the Interior. The village experienced its greatest boom in the 18th century. In 1850 the village reached the highest number of residents (603). Decay in the area and community during the second half of the 20th century was highlighted in 1985 by the loss of the status of municipality (in 1970s the school and pub were cancelled). The revitalisation during the 1990s was typified by the recovery of the autonomy of the municipality, the return of the monastery to the Church (as an educational building), a sharp increase in the population as a result of the decrease in average age, and an improvement in the educational structure, as well as the construction of a gas pipeline.

The above-mentioned recovery was initiated “from below”. A high internal potential for its own development is demonstrated by the village twice winning awards in “The Village of the Year” (1996, 1999). Activities for local development are concentrated around the main participant, which we can call the Association. It was established in 1992 as a foundation and, since 2001, it has operated as a non-profit organisation. It is aimed at the restoration of cultural monuments and the organisation of cultural and social events in the area. Its members are both permanent and temporary residents. The Association spent the first ten years with other supporters of the municipality on voluntary work to repair local structures of a mostly religious nature. The total value of these repairs is calculated at approximately 4,5 million Czech Crowns. The Association contributed to this amount by 40 % financially and 53 % in the value of completed work. This means that financial resources from grants and subsidies from the region and state comprise only 7 %. The financial resources which the Association devoted to the renovation of monuments were mainly derived from donations.

A transformation took place in the nature of the participation of local development, in the context of the change of the legal form of the Association towards a non-profit organisation. Voluntary work continues, but it is concentrated on cultural and social activities. The Association contributes to the rebuilding of properties which are nowadays under the administration of their owners (the municipality and the Church). Resources come mostly from the sale of objects of value, books and other articles issued by the Association, as well as from donations. In the period 2001 – 2008, this support amounted to approximately 1,7 million Czech Crowns. For the whole period under observation (1994 – 2008) the extent of financial resources invested by the Association in the restoration of local monuments remained relatively unchanged. This is almost 250 000 Czech Crowns annually. Subsidies from resources of the EAFRD in the framework of the Rural Development Programme began as late as 2009, in particular, 2,5 million Czech Crowns for 2009 and 2010<sup>5</sup>. The municipality is an applicant. From the second half of the 1990s, the recovery of the Czech village has progressed in parallel, from the viewpoint of its technical equipment as well as from the viewpoint of the strengthening of the community. New residents (young families with children) often commute locally for developmental activities.

We are able to characterise almost 20 years of the Association’s activities in this way. Enthusiasm and optimism at the beginning of the 1990s were exchanged for mild scepticism around 2005. That scepticism was influenced by certain problems connected with the establishment of the relationships of the agreement between the Association and the local parish, which is the owner of the majority of property denoting the cultural wealth of the village. Some founding members of the Association lost their powers because of their age. On the other hand, among the new members of the Association are those who dispose of strong social capital and who use it to the benefit of the municipality. A significant strategic point of this session of the Association is the co-operation with other participants in local

---

<sup>5</sup> During the period under observation, the village obtained other subsidies from the resources of the Czech Republic and at a national level, to the value of 4 million Czech Crowns. These resources are not taken into account in this comparison. The reason is that we do not have similar data for the German village.

development. We can assume that an important action in this direction, still in the request stage, will be the realisation of the municipal project of rebuilding the municipality building as a multi-purpose structure (office, information centre, conference centre and lecture hall with a children's corner, library, exhibition room and museum).

The Association and municipality are connected through the long-serving mayor. The municipal programme of village development is, through its alignment on the recovery and use of the cultural heritage and revitalisation of the community, in harmony with the Association's programme. The future aim of the municipality consists of the construction of technical infrastructure suitable for contemporary requests. Since the second half of the 1990s, the municipality has been successful in obtaining grants, both from the Czech regional policy programmes, and from the specific programmes of the offices of the Czech ministries and appropriate regions.

Further developmental initiatives began to be enacted in the village around the second half of the 1990s. One of the civic groups re-opened the former chalk mines, which are listed in the Land Register of the municipality as an outdoor museum. This civic group is not formed by local residents, but has its seat in the capital city. Some of its members (formed by a group of young people) have been granted Honorary Citizenship of the municipality. The civic group co-operates not only with other municipal participants, but also with other necessary partners from the viewpoint of operational activities. There is a second civic group, also an important participant, acting with the local college. Its main programme is aimed at educational activities in the field of ecological education<sup>6</sup>. The activities of all the above-mentioned local developmental agents, under municipal custody, significantly contribute not only to the restoration of local monuments, the construction of the technical and social infrastructure and facilities for the daily lives of the residents, but also to the recovery of the community. The fact that the village is situated in attractive countryside, with good transport accessibility, including integrated transport within the scope of the capital city of the Czech Republic, is advantageous for tourism.

## 4 Conclusions

At the beginning of the 1990s, both of the observed villages established their future development on the exploitation of the local cultural heritage via tourism. That heritage is the initial potential of an endogenous type of development. Elapsed progress in the second half of the 20th century almost signalled the downfall of both villages as a result of the rural exodus. Analysis carried out bears evidence of the different approaches towards development and experience, although the target orientation is the same. Various approaches and experiences will be considered by the evaluation of factors such as – local rootage (endogenous element), external support (exogenous element) – and then we will consider neo-rurality<sup>7</sup> with a neo-endogenous character.

In the case of the German village, it was the initiative caused by the regional political elite (there is an exogenous element from the viewpoint of the village) which launched modern development. Only some of the local residents became members of a large Association, which was the main participant in the development of the settlement. The Association was seated out of the village, motivating village development from the outside. Plus factors of this exogenous support were the significant ability to decrease debt and to invest heavily in the area, the skill to enforce the property integration of land and buildings within a certain

---

<sup>6</sup> Apart from the above-mentioned developmental activities, the local Roman Catholic Church participates significantly in the restoration and assessment of the cultural heritage. It is the owner of two out of the eight listed real estate monuments in the village and governs some others.

<sup>7</sup> New inhabitants of countryside, who respect rural cultural models, dispose with innovative abilities and participate on community life [4].



legislative framework, to negotiate for the connection of the village with the external area quickly and professionally. This exogenous influence was successful, due in particular to the strong social capital<sup>8</sup> of the chairman of the Association. During the first ten years of modern progress, a large, decisive body of resources for recovery was obtained from the resources of the German regional and cultural policies and the active employment policy. European resources served only as a supplement. The result is a diversified local economy, providing employment for residents, and a solid technical background for their everyday life. In the next five years, defects appeared, which are associated with an exogenous type of development. The Association demerged, not being integrated into the local community and with most members being from unidentified localities. The subsequent body adroitly utilised exogenous resources for development, again in particular within the framework of district, regional and cultural policies. Long-term future progress depends on the fact whether recent immigrants will express themselves as fully-valued neo-ruralists. This fact means that it is possible to build endogenous development. Signs of the inclination towards it are presented. Finally, we pose a question about the German village – will the immigrants take root themselves, so that next generation of local residents establish domicile development not only in favour of a tourist-attractive, museum-based village, but also on behalf of the community?

Development of the Czech village was provoked by rootage in the locality. This experience invoked the need of freedom for the municipality which was realised and further supported the enormous internal initiative towards the recovery of the local cultural heritage. In the first pentad of modern progress, this factor absolutely outweighed any external support. In the next five-year period, exogenous financial support from national resources began to play a role. In the third pentad, internal efforts declined, due to difficulties during negotiations between the owners and tenants of the main cultural heritage properties in the village. This was the main factor here, as well as the exogenous factor of an imperfect institutional framework. We can simultaneously evaluate the fact that participants in local development during this period practised their ability for gaining external financial support. The successful mastering of this practice was demonstrated in the contemporary period of progress by support obtained from European funds. The grounds for the fruitfulness of local development consist in the social capital of collective origin which comes from a harmony of interests, trust and the co-operation of rooted people. This capital is multiplied by new immigrants.

The German experience which the Czech village can use, first of all, most likely concerns the professionalization of tourism; rather, the preparation and support of the activities for professionalization. We assume that, in the Czech environment, the situation of space for exogenous impact on the development of the area will continually be improving, because the institutionalisation of Czech regional policy has numerous defects. As a concluding question for the Czech village, we enquire – does the next generation pass on the core message of their parents, relatives and neighbours in order to maintain, with the local neo-rustics, the independent, prosperous municipality, connected through tourism with its external surroundings?

---

<sup>8</sup> According to Putnam, social capital can be defined as “features of social organisation as trust, standards and networks which increase effectiveness of the society by facilitation of co-ordinated proceeding - it is a collective conception” [7]. An individual concept is prefaced by Bourdieu. The social capital of a person is given by the size of mobilisable contacts for his/her need, whereas these contacts have diverse quality according to symbolic capital of mutually known people [1].

## Acknowledgements

Research presented in this paper is the result of a research grant MSM 6046070906 “Economics of Czech agriculture resources and their efficient usage within the framework of multifunctional agri-food systems”.

## References

1. Bourdieu, P.: *La distinction: critique sociale du jugement*. Éditions de Minuit, Le Sens commun, 1979, Paris. ISBN 2707302759.
2. Henkel, G.: *Das Dorf im Jahre 2000*. Der Landkreis, 1987, Stuttgart, 1987.
3. Henkel, G.: *Der Ländliche Raum*. Teubner Stuttgart, 1999, Leipzig. ISBN 3-519-23430-0.
4. Hudečková, H.: *Ruralizace a její aktéři*. *Zemědělská ekonomika*, 1997, 43 (9). Praha, 1997. ISSN 0139-570X.
5. Kayser, B.: *La renaissance rurale (Sociologie de campagnes du monde occidental)*. Arman Colin Publishing, 1990, Paris.
6. Murdoch, J.: *Networks – a new paradigm of rural development?* *Journal of Rural Studies*, 2000. Elsevier B. V., Amsterdam, 2000. ISSN: 0743-0167.
7. Putnam, R. D.: *Making Democracy Work: Civic tradition in Modern Italy*. Princeton University Press, 1993. ISBN 0691078890.
8. Ray, C.: *Neo-endogenous rural development in the EU*. In: Cloke, M., Marsde, T., Mooney, P.: *Handbook of Rural Studies*. Sage. London. 2006. ISBN 0 7619 7332 X.
9. Toepel, K.: *Evaluation in der Regionalpolitik*. *Vierteljahrshefte zur Wirtschaftsforschung*, 2000, 69 (3). Berlin, 2000. ISSN 0340-1707.

# Cross-border Cooperation and Regional Development – Case Studies of Two Villages in the South Bohemia Region

Jakub Husák<sup>1</sup>

<sup>1</sup>Department of Humanities, Faculty of Economics and Management,  
Czech University of Life Sciences Prague,  
Kamýcká 129, 165 21 Prague 6 Suchbát, Czech Republic  
husak@pef.czu.cz

**Annotation:** Cross-border cooperation is still more important especially in context of European integration processes. Significance of cross-border cooperation has increased mainly in the 2007 – 2013 programming period. These facts are also reflected within the aims of regional policy of the European Community for the 2007 – 2013 programming period. One of the reasons for support of cross-border cooperation is to decrease regional disparities between central and peripheral regions of nation states. The paper is focused on the realised cross-border projects within the small villages in the South Bohemia Region. At the basis of theoretical approaches to the regional development and cross-border cooperation are explored particular cross-border projects and their influence on the regional development. The main aim of the paper is to compare impacts of two different particular cross-border projects (one of them was realised in the 2007 – 2013 programming period as a "small" project, has local character and could be classified as cultural, second project was realised in the 2004 – 2006 programming period as a "large" project, has rather non-local character of its implementation and could be classified as projects of tourism industry) on the development of two small villages in the South Bohemia Region. From the methodological point of view mainly secondary analysis and semistandardized interviews with the main local actors of the projects are used. As a result of the research were identified similar and dissimilar features of realised projects and also factors of success of cross-border projects were specified. These factors of success are mainly local character of the project, involvement of local actors and actual cross-border cooperation (not only formally declared as is often common).

**Key words:** cross-border cooperation, local actor, regional development, regional policy, the South Bohemia Region

**JEL classification:** R10

## 1 Introduction

Cross-border cooperation is still more important especially in context of globalisation and European integration processes. This fact is fundamental in increasing the role of peripheral border regions which were often marginalised in former times. Cross-border regions are territorial units which comprises contiguous sub-national units from two or more nation states. Cross-border regions are very different in terms of their set-up, roles and social bases, depending on the institutional context in which they are embedded and from this point of view is cross-border cooperation very various [6]. Cross-border cooperation has to be seen in general as an aggregate outcome of various relatively decentralised processes of institution building with strong involvement by non-local actors. So, the role of non-local actors is very important beside the key role of local actors. Cross-border initiatives cannot be assumed to have single and coherent objectives. Rather, a multiplicity of actors (mixture of local and non-local actors) operates in an institutional context of opportunities and constraints that is not predominantly of their own making [5]. Considering the character of cross-border cooperation are the actors involved very important, particularly whether local or non-local actors are dominant [7]. Attention should be also paid to the role of regional policy of the European Community in cross-border cooperation. Cross-border activities within the European Community are still limited in scope and mainly concern mutual projects and campaigns,

possibly with limited effects. “Hard” issues such as infrastructure, spatial planning and health care are dealt with elsewhere, while cross-border regions typically concentrate on “soft” issues such as identity, marketing, media, culture, services, and partnerships in the area of tourism, learning, and exchange of experiences [2]. The other authors also emphasize “soft” dimensions of regional development – particularly emotional well-being, happiness and satisfaction with life within the community [8]. From this perspective participation of local people in the local and regional development, their activities in cross-border cooperation and building cross-border social capital are crucial factors of successful implementation of the measures of the regional policy with regard also to the economic and environmental dimensions [1, 9]. Endogenous approach based on building of cross-border social capital, which is represented by the terms of trust, social norms, and strengthen co-operation and reciprocity is suitable for local and regional development [4].

## **2 Data and Methodology**

The paper is focused on the problems of cross-border cooperation and the regional policy of the European Community and the implementation of theoretical issues to the particular border region within the Czech Republic and chosen small villages. The South Bohemia Region was selected for this research. The reason for this selection is mainly its location and also the fact that the South Bohemia Region has been highly influenced by the accession of the Czech Republic to the European Community.

The main aim of this paper is to compare realisation and results of particular cross-border projects and their influence on regional development of the South Bohemia Region and mainly on the development of chosen small villages (Lažiště and Děbolín) from the success and failures factors point of view. The comparison is based mainly on the analysis of the realised cross-border projects supported by the regional policy of the European Community.

From the methodological point of view, mainly document study of the theoretical approaches to the regional policy, regional development and border regions is used for the literature review. The first step of empirical part is secondary analysis of databases of realised cross-border projects and a creation of a typology of realised cross-border projects (see bellow) in accordance with the priorities of cross-border cooperation within both programming periods (2004 – 2006 and 2007 – 2013 programming period), and on the basis of the databases of registered projects. The second step is the case studies of two chosen cross-border projects. The case studies consist of analysis of projects documentation and mainly semistandardized interviews with the main actors of the projects (manager of the project, mayor of the municipality etc.). The third step is a comparative analysis of realised projects from the success and failures factors point of view.

This paper is supported by the internal grant: “Education for rural areas as a part of regional development priorities” No. 11190-1312-3114 of the Internal Grant Agency of the Faculty of Economics and Management of the Czech University of Life Sciences in Prague.

## **3 Results**

There were analysed cross-border projects within the South Bohemia Region between the years 2004 and 2009. This period consists of two different programming periods of the EU regional policy. At first were analysed number of realised cross-border projects and the typology of projects was also created in accordance with the priorities of cross-border cooperation within both programming periods, and on the basis of the database of registered projects. Projects were classified as cultural and social, supporting the cultural and social development of the Region, including the creation of social capital and cross-border social networks. The other types are projects which encourage the tourism industry, development of

infrastructure, protect the environment and promote sustainable development and encourage educational systems within the Region. The typology of projects and the financial allocation is depicted in the Table 1.

**Table 1.** Typology of projects and financial allocation (2004 – 2009\*)

<b>Typology of projects</b>	<b>Number of projects</b>	<b>Financial allocation (CZK)</b>
Cultural and social	355	164 837 928
Tourism industry	116	160 471 152
Infrastructure	23	248 023 062
Environment	18	24 700 971
Others	33	51 967 105

\* up to 18 June 2009

Source: internal documents of Euroregions and other regional institutions, own processing

The most frequent projects realised within the both programming period were cultural and social projects followed by projects of tourism industry. Considering the financial allocation infrastructural projects were the most successful, but it is necessary to reflect their special and different character in comparison with the other types of projects (mainly the financial capital intensity). At the basis of databases of realised cross-border projects and with respect to frequency and financial allocation were chosen two different projects for case studies. The chosen projects represent cultural and social projects and projects of tourism industry (infrastructural projects were excluded for the reasons mentioned above), projects realised within the 2004 – 2006 programming period and 2007 – 2013 programming period, cross-border cooperation with Austria and Bavaria and also “large” and “small” projects.

### **3.1 Case study 1 – Visitor centre of textile Lažiště**

#### **Locality of implementation**

The first chosen project “Visitor centre of textile Lažiště” could be characterised as a large project of tourism industry, the project represents cross-border cooperation with Bavaria and was supported by INTERREG IIIA within the 2004 – 2006 programming period. The project is situated to the small rural village Lažiště. Lažiště belongs to the border district Prachatice (LAU 1). The number of inhabitants of the municipality Lažiště is 293 and the rate of unemployment is 15,4 % (April 2010). Considering the development potential mainly tourism industry is important due to the unique timbered architecture and other historical monuments. Lažiště has also statute of village monument zone. The main problem of the development of Lažiště is the rate of unemployment and its difficult traffic availability – mainly by the public means of transport. On the other hand the comparative advantage is good quality environment as a result of historical development of the peripheral districts of the South Bohemia Region.

#### **Visitor centre of textile Lažiště**

The basic idea of visitors’ centres stems from the theory of experienced tourism. Experienced tourism should bring personal subjective experiences, which lead to psychical change of individuals. Experienced tourism is also suitable for promotion of traditional culture, crafts industry and historical heritage. The main aim of visitors’ centres is to increase incomes from tourism to the locality and extend stay of tourists within the locality. Visitors’ centres based on interactive exposition devoted to local traditions or cultural heritage. Existence of specific local tradition is the basic prerequisite of successful realisation of visitors’ centres. This presumption emerges as a main problem of realisation and utilisation of the Visitor centre of textile within the municipality Lažiště. The first idea of visitor centre within the municipality

Lažiště becomes from the year 2004. The first initiator was cottager from Prague – so the first idea does not come from the locality and this actor could be classified as non-local. The other actors are the Regional authority of the South Bohemia Region, Technical University of Liberec and Centre for community work within the South Bohemia Region as a manager of the project. Also these three actors could be classified as non-local. Another actor is the mayor of the municipality Lažiště (applicant of the project) as an only local actor participating in the project. At the basis of above described mixture of actors was created project (in the year 2004), which was supported by the initiative INTERREG IIIA. The financial allocation was 1 312 257 CZK and the other 20 % were financed by the municipality Lažiště. The Visitor centre of textile has been situated to the building of former school in Lažiště. The idea of cross-border cooperation was to build up network of visitors' centres at the borders of the Czech Republic and Bavaria, but this idea has not been fulfilled. There exist only two visitors' centres within the South Bohemia Region and no one in Bavaria.

Positive effects of the project are possible to divide into two groups – common positive impacts and potential positive impacts. Between the common positive impacts belong reconstruction of the building of former school, building of common room for the municipality, additional incomes for the municipal budget (from accommodation) and indirect support of local entrepreneurs (mainly in catering industry). Despite the above mentioned positive impacts have not been all expectations fulfilled yet. Unfulfilled expectations are reflected in potential positive impacts. The main potential positive impact is functioning of the municipality as a “microdestination” – it means that local inhabitants would be directly interested in the incomes of the visitor centre of textile (not through the municipal budget). This potential impact clashes with passivity of local people and insufficient promotion of the visitor centre of textile by the municipality. These are two of the problems of the realised project. The other problems are unsuccessful effort to find operator of the visitor centre of textile, problematic traffic availability by the public means of transport and mainly missing cross-border network of visitors' centres. From the general point of view seem to be the basic problems non-specific tradition of the textile production within the locality, non-local origin of the project and majority of non-local actors. These factors lead to passivity of local people, who are not identified with the project.

### **3.2 Case study 2 – Czech – Austria creative workshop Děbolín**

#### **Locality of implementation**

The second chosen project “Czech – Austria creative workshop Děbolín” could be characterised as a small cultural and social project, the project represents cross-border cooperation with Austria and was supported by the Fund of the small projects within the 2007 – 2013 programming period. The project is situated to the small rural village Děbolín (officially administrative part of the town Jindřichův Hradec, which is spatially separated from the town – the distance is approximately 4 km). Děbolín belongs to the border district Jindřichův Hradec (LAU 1). The number of inhabitants of the municipality Děbolín is 220 and the rate of unemployment is 5,5 % (Jindřichův Hradec, April 2010). Considering the development potential mainly tourism industry is important due to the closeness to the historical city Jindřichův Hradec with a lot of historical monuments. The main advantage of Děbolín is good traffic availability – through Děbolín pass the main road from Jindřichův Hradec to Prague. Děbolín has also own railway station. On the other hand closeness to the city Jindřichův Hradec could be understood also as a disadvantage because Jindřichův Hradec is more competitiveness for tourists and visitors than Děbolín.

#### **Czech – Austria creative workshop Děbolín**

Project “Czech – Austria creative workshop Děbolín” is one of the seasonal projects of the Pottery manufacture of Romana Hulíková in Děbolín. The pottery manufacture has been

situated to Děbolín in old reconstructed farm building since 1996. The pottery manufacture offer also thematic accommodation and a small gift shop of local ceramic products. The strategy of the Pottery manufacture is „not to massively export pottery production outside the locality and region, but attract customers and tourists to the locality” [3]. The first creative workshop (not cross-border) was realised in the year 2004. This workshop was focused on the work with children and young people. The main aim of workshops was to demonstrate traditional handicraft ceramic production to young people and more generally to support and conserve local ceramic production. After the few creative workshops attention was paid also to cross-border cooperation and originated idea of cross-border creative workshop. The main problem was to find partner from Austria. Finally was the main initiator association HUKI from Breitensee, which is also specialised on handicraft production (non-local actor). Social networks were very important for the finding of cross-border partner because the association HUKI was contacted by local resident from Děbolín who commute to work to Breitensee (local actor). The main local actor and applicant is specially constituted non-profit-making organisation called Friends of pottery manufacture of Romana Hulíková. This organisation acts also as a manager of the project. The last but also very important actor is the member of parish committee of the municipal council of Jindřichův Hradec. The member of parish committee comes from Děbolín – so could be classified as a local actor. This actor provides mainly political and administrative support. At the basis of above described mixture of actors was created project (in the year 2008), which was supported by the Fund of small projects. The financial allocation was 135 750 CZK and the other 15 % were financed by the applicant (Friends of pottery manufacture of Romana Hulíková). The idea of cross-border cooperation was to organize two creative workshops (the first in Děbolín and the second in Breitensee). Young people and children with their parents from the other sides of borders were invited to the workshops to familiarize with local traditional handicraft production in the Czech Republic and also in Austria.

Positive effects of the project are possible to divide into two groups – positive impacts for the main actors and positive impacts for Děbolín. The most important positive impact for the main actors is link-up of cross-border cooperation with association HUKI and also with a lot of participants of creative workshops from the both sides of borders. This intensive cooperation has led to ensuing common projects realised till these days. Common promotional materials in Czech and German languages have been also prepared. The main positive impacts for Děbolín are overcoming of historical reminiscences resulting from displacement of Děbolín after the Second World War, emphasis of interest of Jindřichův Hradec in the development of its administrative district Děbolín and extension of the stay of tourists within the locality which leads to additional incomes for local entrepreneurs. Also is possible to identify some problems regarded the realisation of the project. These are mainly the necessity of financing the project in advance, administrative difficulty for the small association and insufficient inveteracy of local people as a result of displacement of Děbolín after the Second World War. From the general point of view seems to be a problem also small group of active local people. These people are not natives of Děbolín but usually have come during last 15 years. On the other hand increasing number of active local people (natives included) could be regarded as a positive impact.

### **3.3 Comparison of case studies**

Comparative analysis is based on comparison of similarities and dissimilarities of the projects resulting to identification of success and failures factors and recommendation for other cross-border projects.

#### **Similarities**

The first similarity of the projects is attitude of local people (especially natives) to the both realised cross-border projects. Local people and mainly natives are quite passive and they are not interested in development activities. The main actors of the projects and the most active people in the localities are non-residents, cottagers and newcomers. This is probably consequence of historical development of border part of the South Bohemia Region and its displacement after the Second World War. The second common feature of the projects is their modified applicability within the other localities with similar characteristics. Character of the projects is not strictly linked with particular locality (e.g. networks of visitors' centres).

### Dissimilarities

The first dissimilarity of the projects is applied approach from the perspectives of endogenous and exogenous model of regional development. For the first project (Visitor centre of textile Lažiště) is typical "top – down" approach. But considering the particular components of the project it is used mixture of endogenous (aim of the project) and exogenous (implementation, the idea and the main actors of the project) development. For the second project (Czech – Austria creative workshop Děbolín) is typical "bottom – up" approach not only from the perspectives of the aim of the project but also from the perspectives of the main actors and implementation of the project within the locality. So, the second project could be classified as project of endogenous development. The second dissimilarity of the projects is their relation to cross-border cooperation and social and economic development. The first project (Visitor centre of textile Lažiště) is more oriented to the development of the locality and cross-border cooperation is only marginal. Marginal (only formally declared) cross-border cooperation is the basic problem of the realisation of the project. The second project (Czech – Austria creative workshop Děbolín) is characterized by intensive cross-border cooperation using the cross-border social networks. This project also contributes to creation and strengthening of cross-border social networks. From this point of view is more successful than the first project. The third dissimilarity of the projects consists in the main actors of the projects. Majority of the main actors of the first project (Visitor centre of textile Lažiště) could be classified as non-local actors. Contrary the main actors of the second project (Czech – Austria creative workshop Děbolín) are mainly local (Table 2). This is another important fact which leads to different success of the projects (also from this point of view is the second project more successful).

**Table 2.** Map of the main actors

<b>Type of the actor</b>	<b>Case study 1 – Visitor centre of textile Lažiště</b>	<b>Case study 2 – Czech – Austria creative workshop Děbolín</b>
Local	- Mayor of Lažiště	- Friends of pottery manufacture of Romana Hulíková - Pottery manufacture of Romana Hulíková - Member of Parish committee (living in Děbolín) - Commuter from Děbolín
Non-local	- Centre for community work within the South Bohemia Region – manager of the project - Technical University of Liberec	- Association HUKI – Breitensee



	- Regional authority of the South Bohemia Region
Non-local/local	- Cottager in Lažiště (comes from Prague)

## 4 Conclusions

The subject of the analysis of realised cross-border projects were projects pertaining to the 2004 – 2006 and 2007 – 2013 programming periods, realised within the South Bohemia Region in the small rural villages Lažiště and Děbolín. From the case studies presented above result some more general features of development cross-border projects. The first of them is the role of cross-border cooperation within the realised projects. Missing actual cross-border cooperation (e.g. the first chosen project of Visitor centre of textile Lažiště with only formally declared cross-border cooperation) is one of the identified failures factors. It does not mean that this project brings nothing to the development of the locality, but its potential is not fully used. The second general feature of analysed projects is the predominant model of regional development (endogenous or exogenous). Implementation of the project from the outside of the locality (e.g. the first chosen project of Visitor centre of textile Lažiště with lack of the local actors) is the second of the identified failures factors. Despite the fact that the second project (Czech – Austria creative workshop Děbolín) could be classified as a “small” project and was not prepared by experts (like the first project), its contribution to the development of the locality has been more significant than the contribution of the first project. From this point of view seems to be endogenous approach to the regional development more useful than exogenous approach. From the case studies presented above result also some important success factors of the cross-border projects as recommendation for the other applicants and more efficient cross-border cooperation. These success factors are local origin of the project, activity and participation of local actors and actual cross-border cooperation (not only formally declared).

## References

1. Falk, I., Kilpatrick, S.: What is Social Capital? A Study of Interaction in a Rural Community. *Sociologia Ruralis* 40 (1): 87 – 110. 2000. ISSN 0038-0199.
2. Hall, P.: Opportunities for Democracy in Cross-border Regions? Lessons from the Oresund Region. *Regional Studies* 42 (3): 423 – 435. 2008. ISSN 0034-3404.
3. Kučerová, E., Ševčíková, A.: Non-agricultural economy in the Czech Republic. In: Gorlach, K., Kovách, I. (eds.) *Local Food Production, Non-Agricultural Economies and Knowledge Dynamics in Rural Sustainable Development (the Czech, Hungarian and Polish cases)*. Working Papers (7) 2006/5. Budapest 2006, Institute for Political Science Hungarian Academy of Science. ISBN 963 7372 33 4.
4. Lee, J., Arnason, A., Nightingale, A. Shucksmith, M.: Networking: Social Capital and Identities in European Rural Development. *Sociologia Ruralis* 45 (4): 269 – 283. 2005. ISSN 0038-0199.
5. Perkamn, M.: Building Governance Institutions Across European Borders. *Regional Studies* 33 (7): 657 – 667. 1999. ISSN 0034-3404.
6. Perkamn, M.: Construction of New Territorial Scales: A Framework and Case Study of the EUREGIO Cross-border Region. *Regional Studies* 41 (2): 253 – 266. 2007. ISSN 0034-3404.

7. Perkamn, M.: Cross-Border Regions in Europe: Significance and Drivers of Regional Cross-Border Co-operation. *European Urban and Regional Studies* 10 (2): 153 – 171. 2003. ISSN 0969-7764.
8. Pospěch, P., Delín, M., Spěšná, D.: Quality of life in Czech rural areas. *Agricultural Economics – Czech*, 55 (6): 284 – 295. 2009. ISSN 0139-570X.
9. Shucksmith, M.: Endogenous Development, Social Capital and Social Inclusion: Perspectives from LEADER in the UK. *Sociologia Ruralis* 40 (2): 208 – 218. 2000. ISSN 0038-0199.

# The Method for the Selection of Regions with Concentrated State Aid

Igor Krejčí<sup>1</sup>, Andrea Hornická<sup>1</sup>

<sup>1</sup> Department of Systems Engineering, Faculty of Economics and Management,  
Czech University of Life Sciences,  
Kamýcká 129, 165 21 Prague 6 Suchbát, Czech Republic  
{krejcii, hornicka}@pef.czu.cz

**Annotation:** The paper deals with the analysis of a method used by the Czech Government and the Ministry for Regional Development to select regions with concentrated state aid. This method is compared with several different basic methods of multi-criteria decision-making (MCDM). The following analysis is based on a mathematical algorithm of an established MCDM method and does not consider validity of any selected socio-economic criteria.

The paper focuses on the normalization of criteria values. The normalization of data is one of many possible approaches that enable the comparison of indicators with different units of measurement or non comparable value intervals. Both the strengths and weaknesses of MCDM method for regions with concentrated state aid are presented. The established method is the most intuitive “Weighted Sum Approach” (WSA). For the purposes of Czech districts evaluation the normalization in WSA is modified in a way which decreases sensitivity on the lowest criteria values of a dominated variant. This enables to satisfy the need of the comparison of all Czech districts, with some districts being dominated with very low criteria values. Even though the normalization method has been chosen correctly, the procedure to normalise the whole set of criteria decreased the quality of output. For previous period, some criteria were not normalised before their aggregation and the normalization was applied only to the aggregated indicator. Therefore, the evaluation and classification of districts could be distorted. Due to the international crisis, these regions were updated and, subject to a criteria change, the procedure was modified in a correct way.

The paper includes a simple proposal of the examined method modification that will prevent reversion to previous incorrect normalisation. Data used for all calculations were obtained from the Ministry for Regional Development. They were used for calculations of periods 2007 – 2009 and 2010 – 2013.

**Key words:** Weighted Sum Approach, TOPSIS Method, Multi-Criteria Decision-Making, Regions with Concentrated State Aid.

**JEL classification:** C44, C63, R58

## 1 Introduction

Regions with concentrated state aid can be divided into following subcategories, structurally affected, economically weak and regions with highly excessive unemployment. Their common characteristics are negative features of structural changes, lower economic level and unemployment exceeded state average. From general point of view, they are less developed in many socioeconomic indicators. Regarding demands for a balanced development of republic [6], these regions are chosen on the basis of selected socio-economic characteristics. The aid allocation aims to reduce negative disparities among the regions. For the time period of years 2007 – 2009 it concerned mainly the support from European funds (e.g., Operational programme Enterprise and Innovation, priority axis 2 –Development of Firms, provides funding of activities in concerned regions). After the up-date for the time period 2010 – 2013 [8] a program from national sources is gradually being opened – the relief of CZK 50 million Czech Crowns is prepared for year 2010.

In paper will be analyzed a method for evaluation of Czech districts. Results of evaluation are used by Ministry for Regional Development as a basis for government decision-making.

Following paper investigates a method for analyzing selected characteristics and arrangements of regions in Czech Republic. The method is compared with basic methods for multi-criteria decision-making with cardinal information (Weighted Sum Approach, TOPSIS). Such comparison focuses only on mentioned case, for comparison of MCDM methods see e.g. [10] or [11].

The analysis focuses on computation algorithm and values normalization. The manner of criteria selection or development policies in these regions are not focused by this paper.

## 2 Data and Methodology

Currently used method is explained in Appendix no. 2 of the Regional Development Strategy of the Czech Republic for the time Period 2004 – 2006 [1]. However, the described approach does not contain enough information about criteria values normalization. That is why it was necessary to analyze fundamental data for calculation of final evaluation. These data were provided on demand by the Ministry for Regional Development of the Czech Republic.

The objective of a selected method is not only the selection of the best (or worst) variant, but their order. As opposed to the period 2004 – 2006, for first two subcategories the same criteria are used and the distribution takes place consequently upon order arrangement. Regions with highly excessive unemployment are selected from remaining regions, where the level of unemployment exceeds the Czech Republic average by 25% [7]. Municipalities with an extended scope of activities which are not included in already selected districts are additionally chosen in the same manner.

For current time period following criteria has been chosen: 1) Average tax income from physical entities to municipal treasury, 2) number of entrepreneurs per one thousand inhabitants, 3) purchasing power and 4) overall evaluation of unemployment. In respect to the aim of the evaluation - i.e. finding regions with unfavorable characteristics - the first three criteria are minimization. The overall evaluation of unemployment consists of two partial indicators – unemployment and the number of applicants per one work place (in the data of the Ministry of Regional Development a partial weight of 0.9 and 0.1 from the sum is given, although the use of the weight of 0.8 and 0.2 in the calculation is apparent). Besides the purchasing power, all criteria are considered as the average of 2006 – 2008. The purchasing power criterion was quantified by a private company Incoma GfK [7] on the basis of official data and statistical research for years 2005 and 2009. The weights of individual criteria are presented in Table 1. The changes of criteria against the periods of 2004 – 2006 and 2007 – 2009 are given by the cancellation of research by the Czech Statistical Office. For more details see [1] and [7].

**Table 1.** Criteria and their weights

<b>Overall unemployment evaluation</b>	<b>Tax income</b>	<b>Number of private entrepreneurs</b>	<b>Purchasing power</b>
0.4	0.2	0.2	0.2
<b>Unemployment level</b>	<b>Number of applicants per one work place</b>		
0.8	0.2		

Source: The Strategy of regional development of the Czech Republic [7], Appendix no. 2 of the Strategy of Regional Development Strategy of Czech Republic: Types and limitations of regions with concentrated state aid [7], the Ministry for Regional Development

The originally used algorithm is almost the same as the common Weighted Sum Approach (WSA, or SAW – Simple Additive Weighting) [2]. The difference is in criteria normalization, i.e. in the transfer of the values of criteria with different units and weights of these values to comparable ones. The normalization for the Weighted Sum Approach method [2] is based on the following formula:

$$r_{ij} = \frac{y_{ij} - D_j}{H_j - D_j} \tag{1}$$

$D_j$  presents the lowest (basal) obtained value in criterion  $j$ ,  $H_j$  stands for the highest value,  $y_{ij}$  is the element of criterion matrix  $\mathbf{Y}$  – an original value, which an  $i$ th variant reaches in a  $j$ th criterion,  $r_{ij} \in \langle 0, 1 \rangle$  is a normalized value of the  $j$ th criterion for an  $i$ th variant. However, this type of normalization is rather susceptible to basal criteria values. As a result, it is possible to add a variant that will be assessed as the last one in a line, but it may affect the order of all preceding variants. The ministry reduced this susceptibility using another type of normalization – the ratio of an obtained value to an average in the whole republic. For maximization criteria:

$$r_{ij} = \frac{y_{ij}}{\bar{y}_j} \tag{2}$$

For minimization criteria, conversely:

$$r_{ij} = \frac{\bar{y}_j}{y_{ij}} \tag{3}$$

Upon this normalisation the variants are arranged on the basis of the weighted sum of normalised values obtained in the criteria.

For the previous periods there appeared an error in the overall calculation of unemployment. For time period 2007 – 2009 (originally for the whole period of 2007 – 2013) this indicator consisted of unemployment, long-term unemployment and pressure for work places (i.e. (applicants – job vacancies available)/work force). For the sum of this overall indicator the weighted sum was again employed, using the given weights; however, no normalisation was used and the ratio to the average was used only for the result of this approach - overall evaluation of unemployment necessary for final district arrangement. The weighted sum for the overall evaluation was carried out with the use of indicators with obviously different units. This caused the deformation of selected weights, where uniting both calculations and using the multiplication of the overall criterion weight and partial criteria weights does not present increase in calculation demandingness.

Such an approach will guarantee that the sum of the weights will still equal one. At the same time it is not necessary to use two successive calculations, but just one. Although the normalization for the period of 2010 – 2013 is correct, it would be convenient to cancel a redundant double sum. This will prevent the repetition of the error from the previous period in further periods. The weights for the period of 2010 – 2013 would then correspond to Table 2.

**Table 2.** Modified criteria and their weights

<b>Unemployment level</b>	<b>Number of applicants per one work place</b>	<b>Tax income</b>	<b>Number of private entrepreneurs</b>	<b>Purchasing power</b>
0.32	0.08	0.2	0.2	0.2

For the comparison purposes the regional data were analyzed using the TOPSIS method (Technique for Order Preference by Similarity to Ideal Solution) [2], [4]. It analyses variants on the basis of a distance from an ideal value of criterion  $H_j$  and basal value of  $D_j$ . During the normalisation it uses the formula which transfers the columns of the criterion matrix to the vectors of a unit distance:

$$r_{ij} = \frac{y_{ij}}{\left( \sum_{i=1}^p (y_{ij})^2 \right)^{1/2}} \quad (4)$$

The variants are arranged according to a falling indicator of a relative distance from a basal variant:

$$c_i = \frac{d_i^-}{d_i^+ + d_i^-} \quad (5)$$

where respective variables in the formula present a distance from an ideal variant:

$$d_i^+ = \left( \sum_{j=1}^k (w_{ij} - H_j)^2 \right)^{1/2} \quad (6)$$

and a distance from a basal variant:

$$d_i^- = \left( \sum_{j=1}^k (w_{ij} - D_j)^2 \right)^{1/2} \quad (7)$$

The variable  $w_{ij}$  is a normalised value  $r_{ij}$  multiplied by a corresponding weight, constant  $p$  is the number of variants and constant  $k$  is the number of criteria. For the needs of the TOPSIS,  $H_j$  and  $D_j$  are calculated from the matrix  $W$ , which consists of  $w_{ij}$ .

If some criteria are maximizing and some are minimizing, it is not suitable to use a commonly applied formula for this method to transform minimizing criteria to maximizing ones [2], [4]:

$$y'_{ij} = \max_{i=1}^m (y_{ij}) - y_{ij} \quad (8)$$

This transformation is usually being interpreted as savings, or by how much in this criterion this variant is better than the worst variant. This, however, change a relative distance to an ideal variant, which may even cause opposite results. Therefore, according to the [3] the use of the following formula is the most convenient:

$$y'_{ij} = 2\bar{y}_{ij} - y_{ij} \quad (9)$$

### 3 Results

The criterion matrix has 77 variants/rows (represents all districts in the Czech Republic) and for the comparison calculations five criteria/columns because the overall evaluation of unemployment was divided into two criteria with weights based on Table 2.

Although in the original method the data were erroneously normalised. It did not affect the selection of regions for the period of 2007 – 2009 (only the order changed, but the set of selected regions as a total did not change).

For the purpose of comparison several calculations were carried out. A current method was compared with a classical WSA, where the normalisation based on (1) was applied. To support the stability of the solution, both approaches were applied to the table where the variant with the lowest obtained criteria values (Prague) was removed. The TOPSIS method

was calculated twice, with transformation criteria according to Formula (8) and consequently using formula (9). The results are presented in Table 3.

Table 3. District order

	<b>Original</b>	<b>Original II</b>	<b>WSA</b>	<b>WSA II</b>	<b>TOPSIS</b>	<b>TOPSIS II</b>	<b>Original III</b>
1	Karviná	Karviná	Karviná	Karviná	Karviná	Karviná	Karviná
2	Děčín	Most	Most	Bruntál	Bruntál	Bruntál	Most
3	Bruntál	Bruntál	Bruntál	Most	Most	Most	Bruntál
4	Most	Děčín	Hodonín	Hodonín	Děčín	Děčín	Hodonín
5	Teplice	Teplice	Děčín	Děčín	Teplice	Teplice	Děčín
6	Jeseník	Hodonín	Teplice	Teplice	Hodonín	Hodonín	Chomutov
7	Hodonín	Jeseník	Chomutov	Chomutov	Chomutov	Jeseník	Nový Jičín
8	Přerov	Přerov	Třebíč	Třebíč	Šumperk	Šumperk	Znojmo
9	Nový Jičín	Tachov	Znojmo	Znojmo	Znojmo	Tachov	Šumperk
10	Tachov	Nový Jičín	Šumperk	Šumperk	Tachov	Chomutov	Teplice
11	Třebíč	Šumperk	Přerov	Přerov	Třebíč	Znojmo	Ústí nad Labem
12	Šumperk	Chomutov	Nový Jičín	Nový Jičín	Přerov	Ústí nad Labem	Tachov
13	Znojmo	Znojmo	Tachov	<i>Svitavy</i>	Sokolov	<i>Česká Lípa</i>	Přerov
14	Chomutov	Třebíč	<i>Svitavy</i>	Tachov	Ústí nad Labem	Sokolov	<i>Česká Lípa</i>
15	Sokolov	Sokolov	Sokolov	Blansko	Nový Jičín	Přerov	Jeseník
16	Ústí nad Labem	Ústí nad Labem	Blansko	Sokolov	<i>Svitavy</i>	Nový Jičín	Sokolov
17	Blansko	<i>Česká Lípa</i>	Ústí nad Labem	<i>Kroměříž</i>	Blansko	Třebíč	<i>Svitavy</i>
		Blansko (18)	Jeseník (21)	Ústí nad Labem (18)	Jeseník (21)	Blansko (21)	Třebíč (19)
				Jeseník (23)			Blansko (23)

Source: Column Original – Resolution of Czech government no. 141/2010 on the definition of regions with concentrated state aid for years 2010 – 2013 [8] completed with a respective calculation, other columns – own calculation.

The column Original illustrates structurally affected and economically weak regions, i.e. the first two categories of regions with concentrated state aid, as they are used in reality. Original II illustrates first 17 variants upon the removal of Prague. The WSA presents the Weighted Sum Approach with the normalisation based on formula (1). The WSA II illustrates the order of variants upon the removal of Prague. The order in column TOPSIS is given by the application of the algorithm and the minimization criteria transformation based on formula (8). Formula (9) was used for column TOPSIS II. Original III illustrates the order of

districts upon the removal of the lowest weight criterion (the number of applicant per one work place).

Districts denoted in bold are those that were originally not on the position till the seventeenth bar. Conversely, original regions with concentrated state aid, which other approaches transferred to more remote positions, are at the end of the table and their order is in the brackets following their names.

All districts, which by using other methods enter the seventeenth bar, are districts presently selected for the category of Regions with highly above-average unemployment. From districts which dropped to lower position it is only Blansko which would, on the contrary, not enter the highly excessive unemployment category, and not even as an administration district of municipality with the extended scope of activities.

In contrast to a previous period, the order of districts in period 2010 – 2013 is much more stable. There was not proved the higher stability of used normalisation as opposed to normalisation based on formula (1). The average absolute change in the order from Original to Original II is the same as an average absolute change from the WSA to the WSA II. A maximum change is 7 and stands for a presupposed more stable normalisation based on formula (2) and (3).

For the period 2007 – 2010 there was confirmed a high susceptibility to basal values for the WSA and the WSA II (e.g. Ostrava-City dropped from position 23 to position 40, while for the original method this district was selected on position 13. In contrast, for the normalisation based on formula (2) and (3) the stability of the solution was confirmed. See [5] for more details. On the whole, a higher stability for a current period (independent of the used method) may be given by the decrease in the number of criteria, it signals however a sharper boundary for the denotation of problem regions.

Column Original III is applied to testing whether it is functional to use the criterion “number of applicants per a work place” with a weight 2.5 times smaller than the second smallest weight. A distinct change in the order in this column unambiguously suggests the importance of this criterion irrespective of a low weight.

## 4 Conclusions

With regard to the intention to compare all districts whose criteria levels differ subsequently in some cases, it is convenient to apply algorithm, which will not be susceptible to extreme basal values. Therefore the application of other than classical normalisation of criteria values (1) for the WSA appears to be the right choice. The TOPSIS method as a representative of alternative methods results in almost the same districts on first 17 positions as the method used by Ministry.

There is plenty of MCDM based of different points of view e.g. [11]. The calculation algorithms presented in this article belong among the simplest ones. The use of any other method than the used one will very probably cause different order, even though its algorithm will work on a logically supported base, for more about this topic see [10]. The advantage of herein presented methods is, besides relatively simple calculations, also an easy interpretation of results and easy comprehension of the whole procedure. For this decision-making situation the method selected by the ministry is sufficient enough.

The economical crisis caused not only the update of regions with concentrated state aid, but also, within this up-date, it caused the correction of the applied method. However, the definition of partial criteria without the denotation of weights multiplication seems to be an open path back to the original error. Till now the erroneously applied normalisation has had



no impact on the overall correctness of results. It would be worth regretting, though, if the return to this error depreciated the results of generally correctly defined algorithm.

## References

1. Annex no. 2 On Regional Development Strategy of the Czech Republic - Příloha č. 2 ke Strategii regionálního rozvoje ČR: Typy a vymezení regionů se soustředěnou podporou státu, [online] 2000 [cit. 8. 10. 2009] WWW: <http://www.mmr.cz/Regionalni-politika/Koncepce-Strategie/Archiv-koncepci-a-strategii---regionalni-politika/Strategie-regionalniho-rozvoje-CR-z-roku-2000>.
2. Fiala, P.: *Modely a metody rozhodování*, Prague: Oeconomica. 2006. 292 p. ISBN 80-245-0622-X.
3. Houška, M., Dömeová, L.: Cost and Benefit Criteria in Methods Based on Distances from Ideal and Negative Ideal Variants. *Proceedings of Mathematical and Computer Modelling in Science and Engineering 2003*, Prague: ČVUT. 2003. p. 150 – 154, ISBN 80-7015-912-X.
4. Hwang, C. L., Yoon: *Multiple Attribute Decision Making - Methods and Applications, A State-of-the-Art Survey*. New York: Springer-Verlag. 1981. 259 p. ISBN 0-387-10558-1.
5. Krejčí, I. Voříšková, A., Svobodová, R.: Metoda vymezení regionů se soustředěnou podporou státu. *Proceedings of MendelNet 2009 Evropská vědecká konference posluchačů doktorského studia*. Brno: MZL Brno. 2009. ISBN 978-80-7375-351-1.
6. Law on regional development support no. 248/2000 - Zákon o podpoře regionálního rozvoje č. 248/2000 Sb.. In: *Statute-book of the Czech republic / Sbíрка zákonů Česká republika*, 73, 2000, p. 3549 – 3554.
7. *Regional Development Strategy of the Czech Republic for the Period 2007-2013 - Strategie regionálního rozvoje české republiky 2007-2013*, [online] 2006 [cit. 10. 10. 2009] WWW: <http://www.mmr.cz/Regionalni-politika/Koncepce-Strategie/Strategie-regionalniho-rozvoje-Ceske-republiky-na>.
8. Resolution of the Government of the Czech republic no. 141/2010 on the definition of regions with concentrated state aid for years 2010 – 2013 - Usnesení vlády České republiky č. 141/2010 o vymezení regionů se soustředěnou podporou státu na roky 2010 – 2013. [online] 2010 [cit. 4. 5. 2010] WWW: [http://kormoran.vlada.cz/usneseni/usneseni\\_webtest.nsf/web/cs?Open&2010&02-22](http://kormoran.vlada.cz/usneseni/usneseni_webtest.nsf/web/cs?Open&2010&02-22).
9. Resolution of the Government of the Czech republic no. 560/2006 on the Regional Development Strategy of the Czech Republic - Usnesení vlády České republiky č. 560/2006 o Strategii regionálního rozvoje České republiky. [online] 2006 [cit. 11. 10. 2009] WWW: <http://racek.vlada.cz/usneseni/usneseni-webtest.nts/web/cs?open&2006&05-17>.
10. Stewart, T. J.: A critical survey on the status of multiple criteria decision making theory and practice, *Omega* 20 (5 – 6). Amsterdam: ELSEVIER, 1992. p. 569 – 586. ISSN: 0305-0483.
11. Zanakis, S. H., Solomon, A., Wishart, N. Dublish, S.: Multi-attribute decision making: A simulation comparison of select methods, *European Journal of Operational Research* 107 (3). Amsterdam: ELSEVIER. 1998. p 507 – 529. ISSN 0377-2217.



# The Meaning of Legitimacy in the Local Political Process

Michal Kubálek<sup>1</sup>

<sup>1</sup>Department of Humanities, Faculty of Economics and Management,  
Czech University of Life Sciences Prague,  
Kamýcká 129, 165 21 Prague 6 Suchbát, Czech Republic  
kubalek@pef.czu.cz

**Annotation:** The principle aim of my article is to describe various concepts of legitimacy and their theoretical framework and to evaluate the possibility of their application in the local political process. The legitimacy of local political institutions can be perceived as one of the conditions of their stability and efficiency in relation to the rural development. The approaches and concepts of legitimacy of Max Weber, Luhmann, Tyler and Zimmerman and Zeitz are compared in the first part of article. To apply these classifications to local political institutions entails some theoretical and methodological problems, e.g. to distinguish legitimacy relating to communal politician from personal trust, ill-defined indicators of legitimacy, etc. Attempts to describe the single classification of the legitimacy of local institutions appear to be highly unproductive. On the contrary analysing various examples of legitimizing local magistrates and councils indicates that the communal legitimacy can be highly confused and can be based upon various sources of legitimation. One of the possible local legitimacy assessment is concept of the „systemic“ and „sectoral“ legitimacy. This approach also offers the identification of government’s instruments for enhancing legitimacy. Another concept of legitimacy can be derived from case studies of Czech local political process. This pattern of legitimacy can be mainly detected in a some kind of „self-legitimizing“ narration of communal politicians. Using theoretical approaches to the issue of „political narratives“ (e.g. [12] et al.) it’s possible to denominate it „narrative legitimacy“.

**Key words:** legitimacy, local politics, political narrative, legality

**JEL classification:** H 790

## 1 Introduction

One of the questions closely connected to regional and rural development is whether institutions are relevant in it (do institutions matter?). The answer differs greatly according to the basic theoretical framework through which we approach this theme. Even though the investigating of institutions by Tönnies and Weber has a long tradition, the connection to the theories of regional and rural development only occurred later with the development of the institutional economy. However, it is mainly during the last few years with the publicizing of significant works involved in trust [Knack and Keefer 1997, 13, 4] and social capital [Putnam 1993, Beugelsdijk and van Schaik 2005], that it has been possible to speak of the gradual recognition of the fact that institutions (mainly local ones) have the same significance for economies and regional development as other traditional factors – human resources, capital, business and technology [11, pp. 1-6]. When investigating the tasks of local institutions in regional and rural development, scientists are mainly interested in their stability, efficiency and effectiveness. And, one of the important factors that conditions the stability and effectiveness of local governments is their legitimacy.

The legitimacy of political and decision-making institutions is an important component of the government and of decision-making on a nation-wide level, and in this sense, it is a traditional subject of political science. The question remains, however, in what way various theoretical concepts of legitimacy can be transferred to a local level of political decision-making, and how to make it successfully operational on this level.

The basis of the modern concept of legitimacy is presented by the philosophy of Max Weber. The dividing of legitimacy or legitimate authority into three types according to the sources, to which these given types of legitimacy refer, i.e. according to the method of self-explanation and reasoning for its claim, is known and often inflected [15, pp. 63-64]. However, Max Weber also outlined another type of reasoning for legitimacy which is founded on the value-based rational conviction in the absolute validity of a given order [15, p. 55] by way of the expression of certain values or policies, and, to a certain degree, he also differentiated the sources on which the reasoning for legitimacy relies from the methods which they relate to the authority of governing. In this case, according to Weber, the stability of a political order can be guaranteed either purely mentally – and this would mean either affectionately (emotionally), through value-based rational behaviour (faith in the rightfulness of an order) or religiously – or through the expectation that specific interests will be fulfilled. Weber's concept of authority thus has two aspects: legitimacy, which is a certain pretence made by a government [and a reasoning for this pretence], and further the emotional relationship to authority or expectation of profit of the part of the governed [1, p. 59].

Weber's theory and typology of legitimacy was subject to a number of critical objections. According to some critics (Antony de Jasay, Obiora Okafor) it is practically impossible to differentiate the conduct of human obedience toward authority, which is ensured by coercion, from obedience caused by faith in the legitimate claim of an authority to make decisions [1, pp. 56-58], [9, p. 31]. Through the development of this criticism, it is then possible to state that the entire concept of legitimacy is not significant, and it is in actuality deduced from the conduct which it is trying to explain. Obiora Okafor puts the concepts founded on Weber's approach into the so-called descriptive theories of legitimacy, and states that their disadvantages include the fact that when they are used in reference to a genocidal regime that has the support of its citizens, such regime must also then be considered legitimate. According to him, the normative theory of legitimacy may not be founded solely on the faith of the governed in justification, but also on some external criteria, whether it be God's Law, the system of moral values, human rights, etc. In his works, Okafor recognizes the problem of the disparity between competing normative pretences, and he proposes to proceed with so-called "pragmatic normativity". The foundation of normative legitimacy may be a certain combination of will of the world community and the changing moral consensus between respective national elites [9, pp. 32-36]. If this concept strongly reflects the perspective of a theorist involved in the legitimacy of Third World countries, then Okafor's distinction of the three levels of investigating legitimacy – the level of authority to govern (right to public office), the level of justification of the current government to govern in a certain manner, and the level of justification of a political system as a whole - is very useful in terms of methodology.

According Jürgen Habermas the simple rationality of procedures is not a basis for legitimacy, as these procedures require legitimization on their own. Habermas sees a rational discourse on standards and procedures as a possible source of legitimacy. These standards may be proven as legitimate if they express generalized pretences, or if they are the result of a compromise (which must be based on the balance of powers and relate to non-generalized pretences) [5, pp. 127-129, 141-143]. Habermas's theories can also be classified with normative concepts.

As a significant type of legitimacy in modern times, it is almost always a certainty to mention democratic legitimacy. While classic democratic legitimacy is given by the projection of the will of the people – and as such, this concept is often criticized by the fact that the government which is the expression of the people's will may aim towards tyranny and catastrophe, in a pluralistic concept where the basis is a structured society, legitimacy is given by the faith of the people in the rightfulness of democratic procedures and electoral selection

of governments, but this is of course founded on the expectation that these procedures and their results have certain desirable results for the society [1, pp. 73-74]. Contrary to Weber's concepts, they do not view a pluralist government as an activity of autonomous and quite independent institutions or individuals, but for them, the state and government are rather a function of the society, and the essence of the government is to be responsive toward the society and social groups. From this concept, emphasis then arises which is placed on the effectiveness of governments in modern theories of legitimacy. As typical example, it is possible to mention the concept of S.M. Lipset. [8, pp. 63-70]. The close relationship between legitimacy and effectiveness is also implied by the results of discussions on legitimacy from a psychological perspective (i.e. an analysis of the reasons why the governed attribute legitimacy to the respective system) [14, pp. 324-325]. According to Tom Tyler, from this view, it is possible to define two main models of legitimacy: instrumental resource-based legitimacy and relational legitimacy founded on identification. Instrumental legitimacy is based on the instrumental experiences of the society with authorities [14, p. 325]. This means that the governed evaluate authority according to sources acquired in the past, expected conduct in the future and according to the "fairness" of the administration – the basis is thus the past and future exchange of various types of assets between the governing and the governed. Relational legitimacy has its basis in the worries of the governed about their identity. The conduct of authorities and manipulation with various social groups and individuals provides information on their status, and the status thereby influences the social identity and self-evaluation of the governed. Social identity is then tied to the willingness to be subservient to authorities. The evaluation of authority is thus closely tied to the consequences of its conduct with regard to the social relationship of the governed to the authority itself.

The current concept is then summarized by Grzegorz Kolesniak in his work. He differentiates various definitions of legitimacy (Beetham, Stilman, Suchman, Fraser) according to whether they are predominantly oriented on certain rules and orders, or on the performance of the government [6, pp. 1-3]. While both elements appear in a number of definitions, Kolesniak states that for the first concept of legitimacy, voter turnout may serve as an indicator, and the quantified evaluation of governmental performance for the other. It is interesting to note that while Kolesniak's differentiation reminds of Okafor's distinction between normative and descriptive concepts, in view of the proposed indicators, which decisively reflect only the relationship of the governed toward governing and not the consistency of local standards with "pragmatic normativity", it can be claimed that Kolesniak stands only on the ground of descriptive theories.

An interesting area of the study is the analysis of legitimacy of non-state institutions e.g. companies and various organizations. Here, legitimacy is understood as the certain competence of a company or organization in the eyes of the public. The reaction of the public to the legitimacy of organizations is of course not loyalty, but it is the generalized conviction that the conduct of respective organizations is desired, correct and reasonable within the given social conditions [16, p. 420]. Even in this case, it is possible, on the basis of ongoing discussions, to determine certain types of legitimacy – their characterizations are included in the studies of, for example Monika Zimmerman and Gerald Zeitz [16, pp. 420-426]. The first category is the so-called "socio-political regulatory legitimacy". It is based on the laws, regulations and standards created by a government, professional associations and organizations, etc. The second category presents a so-called "socio-political normative legitimacy". It is based on the social and moral standards and values which are relevant for a given organization in the social environment in which the organization is found. The result is thus the conviction that the given organization is acting responsibly, ethically and "fairly". The third category is then the so-called "cognitive legitimacy", which is based on the common

convictions and opinions relating to everyday activities which are adherent to the roles which are expected from the given organization.

## 2 Data and Methodology

The methodological question we are now faced with is to what level are the various theoretical concepts of legitimacy usable for municipal political institutions and “governments”. The first question asks which concepts of legitimacy have a purpose for the general level. The next problem that arises is the suitable operationalization of local legitimacy.

At first glance, we would see the utilization of normative concepts of legitimacy. A municipality is bound through standards (laws) external to it, which are in their majority sanctionable and enforceable, and it is more or less possible to analyze without problem the consistency of the conduct of a municipality with valid laws and public notices, to utilize potential court verdicts, etc. The problem is of course that such a conceived local legitimacy is very mechanical and that it does not provide any other space for investigation into local political conduct. In addition, external enforceability means that from this point of view and in the long term, it is possible to label all local governments as legitimate. A more interesting normative alternative may be to utilize the aforementioned concept (Zeitz and Zimmerman) of “socio-political normative legitimacy”, but this of course presents the certain problem in the identification of those social and moral standards which are common for the given municipal environment, and in every case, this means there is a need for an extensive qualitative investigation.

The suitability of descriptive concepts for local environment is also confirmed by the fact that some objections of normative theorists can be dropped - a dictatorial regime can hardly be established locally. Greater complications can occur with the examination itself. To meet the needs of research on the communal scale, Grzegorz Kolesniak divides legitimacy into the so-called “systemic” legitimacy, which he identifies with the support within the entire local population, and the “sectoral” legitimacy, given by the support between certain groups or sectors of local population [6, pp. 5-8]. For his research of local legitimacy in the Canadian province of Ontario, he then chose the quantitative approach when, as the main indicator of systemic legitimacy, he used the voter turnout in dependence on the size of the municipality, and as an indicator of sectoral legitimacy among the owners of small businesses, he used a questionnaire-based investigation, evaluating the performance of local government [6, pp. 9-17]. Problems, however, arise here too. Voter turnout is a very unsuitable indicator of legitimacy as it depends on many other factors - the election system, the functioning of the entire political system, the question at what stage of the political cycle the communal election occurs, let alone the quite random factors such as, for example, the weather. The quantitative evaluation of the performance of local government also has its disadvantages - the potential connection of legitimacy with local social relationships, value represented by the local government, status of individual groups within the local municipality, etc. – is completely left aside. A suitable tool to dispute this one-sided orientation on the “performance” is, for example, Tyler’s aforementioned concept of legitimacy.

Contrary to that, a very suitable tool for the examination of communal legitimacy is Okafor’s differentiation of three levels of examining legitimacy. It is apparent that the justification of the political unit as a whole can be basically left aside (only when a drastic de-legitimization of the political system appears, it is necessary to consider the impact on the communal legitimacy). The justification to rule in a certain manner can be considered for the research but, in view of the fact that the possibilities of local governments are more limited by the law, it is obvious that the main level for examining communal legitimacy is the justification to

hold a political office. This fully complies with personalization, which is a significant feature of local politics (in dependence of the size of the municipality).

Another problem when we examine the legitimacy of local political institutions is its difficult differentiation from other categories, mainly from the often discussed concept of trust (e.g. [13, pp. 1-68], [4, pp. 3-48]). With reference to the simple concept of Mattei Dogan, the difference is given by the fact that a citizen behaves loyally toward a representative of legitimate authority even if the citizen feels absolutely no trust toward the person [3, p. 116]. However, this difference is not quite without problems. Dogan puts on opposite sides the distrust toward a person (e.g. toward the current president) and toward the legitimacy of the current establishment. Of course, it is possible to imagine distrust toward the entire political system, and then it is rather difficult to differentiate the legitimacy of the entire political system from the trust toward the given establishment. Although it is possible to state that the governed obey authorities even if they do not trust them, then we have a problem with determining whether such obedience is given by the legitimacy or is enforced. In the case of local political institutions, we then find a similar problem because, as stated above, and especially in the categories of smaller municipalities, politics are strongly personalized and the problem how to differentiate trust from legitimacy (e.g. in the case of a mayor) appears here once more.

It is thus obvious that, from the methodological point of view, the suitable procedure when examining the legitimacy of local government is not to insist on exact analytical delimitation of legitimacy but to examine individual cases of legitimization reasoning within the local political process, or the ways of relationships of the loyalty and support toward communal political institutions. The examination of legitimacy under local conditions thus requires case qualitative studies and overall caution when operating with various theoretical concepts. A more suitable and less mechanical approach is represented by the descriptive concepts of legitimacy, primarily reflecting the relationship to the local government; in all cases, qualitatively conceived research is the necessary tool. The main level of examination is then represented by legitimacy related to persons (i.e. their justification to hold offices in the local government).

### **3 Results**

With regard to the qualitative research of local legitimacy, it has been so far represented in the Czech environment by a relatively small number of studies. Lenka Buštková presents an interesting example of legitimacy on the local scale in her study dealing with local political networks. Here, she analyzed, among other things, the social ties and legitimacy of the post-November mayors of the small town where she did her research. For the needs of the study, she characterized her own typology of local legitimacy. She begins primarily with Weber's concept of legitimacy, but up to a certain point, she simplifies it to two alternatives. She names the legitimacy based on the adherence to rational rules "modern" while she calls "traditional" the legitimacy resulting from the way of the mayor's conduct in the local community, his local social ties, the knowledge of his biography and family life [2, p. 30]. According to Buštková, the difference between the traditional and modern legitimacy also reflects Tönnies's well-known concept of "Gemeinschaft" and "Gesellschaft." Buštková then assigns the mayors of the examined small town to her typologies of legitimacy. In both cases, the described legitimacy relates to the person, which is different when compared to Weber's concept of rational legitimacy. However, an even more important fact is that the entire typology is derived from the narrative of both mayors – from how they perceive their surroundings, whether they mainly include into their social contacts their friends, or whether these contacts rather result from labour and official relationships, whether they talk about persons rather in stories or take the narrative to an institutional level [2, p. 31].

According to Lenka Bušíková, the concept of traditional legitimacy on the local scale approaches in a way the relation legitimacy in Tyler's conception. However, the other critical point is not the justification based on the expectations of sources but basically the normative (or regulatory) legitimacy. Therefore, the question is the suitability of ascertaining legitimacy of the normative type from interviews with persons involved.

An example where we can adversely speak of instrumental legitimacy on the communal scale is the result of a remarkable research by Jarmila Premusová from 1996-1998. Her research was devoted to social and space characteristics of border regions of Moravia and Silesia, specifically to municipalities from the Krnov and Hlučín districts. In her research report, Premusová documents how the displacement of population and the new settlement of these municipalities created a basis for special social relationships [10, pp. 30-44]. During the majority time of their post-war development, these municipalities depended on state subsidies of various types and the residents gradually got used to taking such supply as granted. At the same time, the residents considered various forms of state contributions, as well as the land as some kind of common property necessary to re-allocate within the community in a hierarchic way when the possibilities of each resident were determined by his position within the given community. The greatest part went to local representatives and the population took their share as a certain reward for being able to secure and maintain the flow of sources to the community. In other words, in this case the main source of the justification to hold a local office was considered the ability to achieve such position within the formal and informal power relationships, which made the continued transfer of sources possible. The fact that this entire model of relationships within the local community was accompanied not only by continuous secrecy and silence toward "strangers", as well as by a strong distrust of the community members toward each other, is also interesting. Premusová describes the informal methods of social control through which the residents watched one another to find out whether someone exceeds this unofficial limit of re-allocation [10, pp. 30-44]. Therefore, it is possible to speak of a certain local "culture of distrust." At the same time, here we have an example when legitimacy and trust on the local scale quite sharply differ – in general, the representatives of the community enjoy legitimacy (in this case, a rather classical instrumental legitimacy in Tyler's concept) as long as they succeed in obtaining for the community the inflow of assets but, at the same time, they enjoy no special trust and it is necessary to check whether they do not claim too much, just as it is necessary to check any other resident.

As the last interesting example of local legitimacy it is possible to mention the result of the research of local political participants in a smaller municipality in the Trutnov district, whose authors are Eva Kučerová and Michal Kubálek [7]. When talking with the mayor of the municipality, the authors of the project asked him how what his idea of a good communal politician was, what abilities such politician should have, etc. In the long speech that followed, the mayor depicted himself up to a considerable level, and thus he also "legitimizing" himself through such talk. In this case, there were more sources of such legitimacy as the mayor freely combined various reasons of his justification. He emphasized that politics "are not done" in the municipality, that a local politician should, first of all, have a good knowledge of people and local relationships and, at the same time, he should be a good and experienced organizer (regardless his qualification), and he should be also able to obtain financial means for the municipality. Here it is difficult to speak of any basic source of legitimacy as several of them are mixed together regardless the formal typologies and these sources are basically given by a flow of a self-legitimizing narrative. Therefore, an interesting result of this research is the possibility to think of certain 'narrative legitimacy.' Rather than various typologies of legitimacy, a suitable theoretical framework for its examination would



be the concept of “political narrativity”.<sup>1</sup> This way it would also be possible to pay attention to such components of the legitimizing narration such as the relationship to political reality, presentation of events or persons, its time consecution and the application of causality.

## 4 Conclusions

In closing, it is thus possible to state the following on the basis of the aforementioned:

The basic general local legitimacy is the legitimacy relying on legality (called by different terms in different typologies). An advantage of this concept is the relatively easy operationalization. However, this is only a basic and mechanically-conceived legitimization framework; the identification of this normatively conceived legitimacy with the legitimacy of local government provides relatively few possibilities to do a deeper examination of the communal process.

Caution is necessary when applying various theoretical typologies of legitimacy to the local political level. Descriptive concepts of legitimacy represent a more suitable framework when the most important level of examining legitimacy is the authorization to hold office in the local government (i.e. legitimacy related primarily to persons).

Despite the risk of a more difficult differentiation between legitimacy and trust (especially in relation to persons) it is possible to state that a significantly more suitable tool for ascertaining communal legitimacy is the qualitative research applied in case studies.

It is possible to judge from the existing results that local legitimacy relies on more sources, that the borders between individual types from different typologies are freely crossed. As this legitimacy shows most significantly and can be best analyzed in the self-explaining and self-justifying narratives of local involved persons, with certain caution it is possible to speak of a certain “narrative legitimacy”. To specify and analytically delimitate this concept, it is possible to use the theoretical framework of “political narration.” However, this is a matter of further research.

## References

1. Barker, R.: Political Legitimacy and the State. Clarendon Press, 1999 Oxford. ISBN 0-19-827495-5.
2. Bušířková, L.: Známosti osobností lokální politiky. Sociologický ústav AV ČR Praha 1999. ISBN 80-85950-66-9
3. Dogan, M.: Legitimacy of establishment and trust toward institutions. Politologická revue 2/1998. Praha 1998. ISSN 1211-0353.
4. Fukuyama, F.: Trust: the social virtues and the creation of prosperity. Penguin books, 1995 London. ISBN 0-14-025943-0.
5. Habermas, J.: Problémy legitimacy v pozdním kapitalismu. Filosofía, 2000 Praha. ISBN 80-7007-130-3.
6. Kolesniak, G.: Legitimacy and Municipal Governance in Ontario. Master of Public Policy Thesis, Simon Fraser University 2007 Burnaby.
7. Kubálek, M., Kučerová, E.: Lokální politika – aktéři, jednání a strategie: případová studie venkovské obce. Final report of an internal grant of PEF ČZU č.11190/1312/11341, Praha 2004.

---

<sup>1</sup> To the concept of the “political narration” and possible theoretical approaches, see e.g. [Shenhav 2006: 245-254].

8. Lipset, S. M.: *Political Man: The Social Base of Politics*, The John Hopkins University Press, 1981 Baltimore. ISBN 0-8018-2522-9.
9. Okafor, O. Ch.: *The Concept of Legitimate Governance in the Contemporary Municipal and International Legal Systems: An Interdisciplinary Analysis*. Master of Laws Thesis, The University of British Columbia, 1995 Vancouver.
10. Premusová, J.: *Sociological and Space Research of Selected Regions at the Czech-Polish Border*. Final report of GAČR grant No. 403/96/0978, 1999 Praha.
11. Rodríguez-Pose, A.: *Do institutions matter for regional development in the EU?* Working Paper of Instituto Madrileño de Estudios Avanzados (IMDEA) Ciencias Sociales, Madrid 2010.
12. Shenhav, S.: *Political Narratives and Political Reality*. *International Political Science Review*, Vol. 27, Number 3. London 2006 ISSN 1532-7957.
13. Sztompka, P.: *Trust: A Sociological Theory*. Cambridge University Press, 1999 Cambridge. ISBN 0-521-59144-9.
14. Tyler, T.: *The Psychology of Legitimacy: A Relational Perspective on Voluntary Deference to Authorities*. *Personality and Social Psychology Review*, Vol. 1, No. 4. 1997 ISSN 1532-7957.
15. Weber, M.: *Autorita, etika a společnost*. Mladá fronta, 1997 Praha. ISBN 80-204-0611-5.
16. Zimmerman, M., Zeitz, G.: *Beyond Survival: Achieving New Venture Growth by Building Legitimacy*. *Academy of Management Review*, Vol. 27, Issue 3. 2002 ISSN 930-3807.

# EU subsidised projects in the frame of the National Development Plan and the New Hungary Development Plan in the Hajdúszoboszló and Karcag local labour system

Oláh Judith<sup>1</sup>, Miklós Pakurár<sup>1</sup>

<sup>1</sup>University of Debrecen, Centre for Agricultural and Applied Economic Sciences,  
Boszormenyi 138, 4032, Hungary  
olahjudit@agr.unideb.hu

**Annotation:** RuralJobs is a collaborative research project partly funded under the European Commission Research and Development 7<sup>th</sup> Framework Program (FP7). It involves partner institutions from eight Member States. University of Debrecen from Hungary is the coordinator. Projects subsidised by the EU were analysed in two labour markets of the North Great Plain region in Hungary. Karcag and Hajdúszoboszló local labour system (LLSs) served as case study areas to characterise two types of rural employment areas. Karcag LLS as predominantly rural, remote and developing and Hajdúszoboszló LLS as predominantly rural, accessible, developing areas were chosen. The labour market situation of the areas have been assessed by professional consulting firms and researchers, often people with different organisational background form a group in which they have to make compromise to proceed. So the point of view, the aims, field of education is different that results in numerous suggestions. Projects subsidised by the EU have been collected in the area of Hajdúszoboszló LLS and Karcag LLS using the website of the Hungarian National Development Agency. The objective of the strategy chapter of the National Development Plan (NDP) is to designate the development policy objectives and priorities for the 2004-2006-period that can be funded from the Structural Funds. EU subsidised projects in the frame of the National Development Plan and the New Hungary Development Plan (NHDP) were popular in the Hajdúszoboszló LLS and Karcag LLS. More and more organisations have recognised the advantage of using EU funds and the competition has increased.

**Key words:** local labour system, EU, RuralJobs, North Great Plain Region

**JEL classification:** R58

## 1 Introduction

In 1998 the Swedish government launched its largest ecological subsidization programme to date, the Local Investment Programme (LIP). By having two political objectives; to step up the pace at which Sweden transforms into an ecologically sustainable society and to reduce unemployment, Forslund, et. al [5].

In the frame of RuralJobs project which aim is to identify new sources of employment to promote the wealth-generating capacity of rural communities, Deliverable 5.1.1 is about current employment patterns and opportunities for, and constraints on, rural economic diversification in two labour markets of the North Great Plain region in Hungary [6].

Radvánszki and Sütő [7] defined local labour systems (LLS) in Hungary that can be also called local labour markets. They elaborated 139 LLSs in Hungary from which two LLSs were chosen.

The selected regions for the case study can be defined as ‘predominantly rural - remote - developing’ in the case of Karcag LLS and local administrative unit (LAU1) (NUTS 3) (Table 1.) and ‘predominantly rural - accessible - developing’ region in the case of Hajdúszoboszló LLS and LAU1 (Table 2.).

Karcag LLS and LAU1 is entirely within the NUTS3 region of Jász-Nagykun-Szolnok, while Hajdúszoboszló LLS and LAU1 is within the NUTS3 region of Hajdú-Bihar. According to the HU census the two LLSs are defined as ‘predominantly rural’ by OECD [4] as, i.e. more

than 75% of the population live in rural communities, with a community being defined as rural if its population density is below 150 inhabitants per square kilometre.

The purpose of this paper is to analyse of distribution of EU subsidised projects in the frame of the National Development Plan (NDP) and the New Hungary Development Plan (NHDP) in the Karcag LLS and in the Hajdúszoboszló LLS 2004-2006. The aim of the NDP was to increase economic competitiveness, to improve human resources, to strengthen environmental protection, to develop infrastructure, and to decrease the gap between regions. We would like to know which EU subsidised projects were the most attractive programme in the Karcag LLS and in the Hajdúszoboszló LLS 2004-2006. The differences is between the two region is the accessibility. The Karcag LLS and LAU1 is a 'predominantly rural - remote - developing' region and the Hajdúszoboszló LLS and LAU1 a 'predominantly rural - accessible - developing' region.

**Table 1.** Karcag LLS and LAU1 a 'predominantly rural - remote - developing' region Source: The table was constructed based on the data of Hungarian Central Statistical Office 2010 and the ViaMichelin Route Planer <http://www.viamichelin.com/>

LAU2s of the Karcagi LAU1	LAU2s of the Karcagi LLS	Territory (ha)		Population		Density 2007	Accessibility (minutes from Szolnok)
		2 000	2 007	2 000	2 007		
Kenderes		11 124	11 124	5 388	5 109	46	32
Kisújszállás		20 527	20 527	13 079	12 224	60	39
Berekfürdő	Berekfürdő	218	1 857	218	1 119	60	60
Karcag	Karcag	38 501	36 863	22 975	21 824	59	56
Kunmadaras	Kunmadaras	15 364	15 364	6 187	5 894	38	50
Sum		87 734	87 742	49 847	46 170	53	

**Table 2.** Hajdúszoboszló LLS and LAU1 a 'predominantly rural - accessible - developing' region Source: The table was constructed based on the data of Hungarian Central Statistical Office 2010 and the ViaMichelin Route Planer <http://www.viamichelin.com/>

LAU2s of the Hajdúszoboszló LAU1	LAU2s of the Hajdúszoboszló LLS	Territory (ha)		Population		Density 2007	Accessibility (minutes from Debrecen)
		2 000	2 007	2 000	2 007		
Ebes		7 727	7 727	4 602	4 601	60	14
Hajdúszovát		5 801	5 801	3 237	3 194	55	24
Hajdúszoboszló	Hajdúszoboszló	23 870	23 870	24 114	23 800	100	21
Nagyhegyes	Nagyhegyes	13 276	13 276	2 729	2 758	21	20
	Nádudvar	24 114	24 114	9 308	9 338	39	40
Sum		76 788	76 795	45 990	43 691	57	

## 2 Data and Methodology

Data of projects subsidised by the EU were collected in the area of Hajdúszoboszló LLS and Karcag LLS using the website of the Hungarian National Development Agency. The objective of the strategy chapter of the National Development Plan (NDP) is to designate the development policy objectives and priorities for the 2004-2006-period that can be funded from the Structural Funds.

Database summary of projects is based on the Standardised Monitoring and Information System which was developed to help the realization of the projects. Raw data derived from the MATÉRIA ® Hungarian administrative geo-informatics database which is composed from the Central Statistical Office's T-STAR database, data from censuses and database of the Ministry of Local Government.

## 3 Results

National Development Plan has to be developed in every country where the GDP per capita is under the 75% of EU average. Hungary and every accessing country fall into this category [1], [2].

The objective of the strategy chapter of the National Development Plan is to designate the development policy objectives and priorities for the 2004-2006-period that can be funded from the Structural Funds [3]. The most important objective of the New Hungary Development Plan relates to raising the level of employment and to foster growth in the period of 2007-2013. Six priority areas were designated in the NHDP: the economy, transport, initiatives targeting social renewal, environmental protection and energy, regional development and tasks relating to state reform. "A new regional development plan was drawn up for the period 2000-06, which aimed to end the backwardness of the county with enforced economic development. The priorities are innovation-focused renewal with an orientation towards export and support of research and development, mainly in small and medium-size enterprises." [8].

**EU subsidised projects in the frame of the National Development Plan (NDP) and the New Hungary Development Plan (NHDP) in the Hajdúszoboszló LLS.** Reflecting the agricultural nature of the region the most (25 projects) NDP projects were funded by the Agriculture and Rural Development Operational Programme (Table 3). The Economic Competitiveness Operational Programme subsidised similar number of projects in the region however the Regional Development Operational Programme (1 projects), Environment Protection and Infrastructure Operational Programme (1 projects), and Human Resource Development Operational Programme (4 projects) supported significantly less projects. Generally the Hajdúszoboszló LAU1 activity to submit a project proposal was lower than the national average and the efficiency was also lower in Hajdúszoboszló LAU1 region. There was huge gap between this LAU1 region and the national average since 36% of the proposals won in the Hajdúszoboszló LAU1 and 45% of the project proposals were successful nationally.

**Table 3.** Distribution of projects by operational programmes, Hajdúszoboszló LAU1, National Development Plan, 2004-2006. Source: from the database of National Development Agency <http://www.nfu.hu> [1]

Operational programme	Submitted projects Hajdúszoboszló LAU1	Submitted projects, national LAU1 average	Subsidised projects Hajdúszoboszló LAU1	Subsidised projects national LAU1 average
ROP	19	12	1	3
AVOP	40	63	25	38
GVOP	67	122	21	49
KIOP	2	2	1	1
HEFOP	15	43	4	19
Sum:	143	242	52	110

Regional Development Operational Programme (ROP), Agriculture and Rural Development Operational Programme (AVOP), Economic Competitiveness Operational Programme (GVOP), Environment Protection and Infrastructure Operational Programme (KIOP), and Human Resource Development Operational Programme (HEFOP)

From 2007 the objectives of the development plan was modified in the same time the ratio of the number of successful project proposals increased by 4% in the Hajdúszoboszló LAU1 from 36% to 40% which is close to the country average (45%). People of the region have realised the advantage of the EU funds and they have submitted relatively more project proposals in this period (75% of the national average) than they did in the previous one (59% of the national average). The Economic Development Operational Programme has been one of the most popular operational programmes similarly to the previous period and the North Great Plain Operational Programme was likewise preferred in the Hajdúszoboszló LAU1 region. Less project proposals were submitted and won under the aegis of Environment and Energy Operational Programme, Social Infrastructure Operational Programme, and Social Renewal Operational Programme. Only one project was planned to receive fund from the State Reform Operational Programme but it failed.

The remarkable accession in the determination of the population to apply for EU funds unfolded during the field reports with the stakeholders of the region. The local government of Nagyhegyes (LAU2) intensified their EU fundraising capacity by using more and more professional private entrepreneurs to write project proposals and to make the whole project management. The mayor of the settlement hired a professional person to manage projects for the community however the project proposals and the project management of different projects they dealt with demanded more time than the hired man could manage and they had to rely on professional outsiders. According to the mayor of the village decreased administrative pressure on the applicants (e.g.: enormous paperwork) may lead to better allocation of EU funds leaving more money in distant rural communities and less for professional project managing companies living in big cities of the area.

**Table 4.** Distribution of projects by operational programmes Hajdúszoboszló LAU1, New Hungary Development Plan from 2007. Source: from the database of National Development Agency <http://www.nfu.hu> [1]

Operational programme	Submitted projects Hajdúszoboszló LAU1	Submitted projects, national (LAU1) average	Subsidised projects Hajdúszoboszló LAU1	Subsidised projects national (LAU1) average
GOP	42	70	17	41
KEOP	10	12	6	5
TIOP	1	12	1	2
ÁROP	1	3	0	2
ÉAOP	51	13	18	4
TÁMOP	5	37	2	13
Sum:	110	147	44	67

Economic Development Operational Programme (GOP), Environment and Energy Operational Programme (KEOP), Social Infrastructure Operational Programme (TIOP), State Reform Operational Programme (ÁROP), North Great Plain Operational Programme (ÉAOP), and Social Renewal Operational Programme (TÁMOP)

Nádudvar submitted by 2.3 more project proposals than the national LAU2 average in the years of 2004-2006 (Table 5.). Alike to the Hajdúszoboszló LAU1 the most proposals were funded by the Agriculture and Rural Development Operational Programme and the Economic Competitiveness Operational Programme. It is important to mention that agriculture is an integral part of the town's economy that is reflected in the numerous (18) submitted projects to the Agriculture and Rural Development Operational Programme but only one third of them was subsidised. The ratio of successful projects of Nádudvar (43%) was lower than the national average (50%) nevertheless the number of funded projects were double in Nádudvar (12 projects) than the national average (6 projects).

**Table 5.** Distribution of projects by operational programmes Nádudvar LAU2, National Development Plan, 2004-2006. Source: from the database of National Development Agency <http://www.nfu.hu> [1]

Operational programme	Submitted projects Nádudvar LAU2	Submitted projects, national (LAU2) average	Subsidised projects Nádudvar LAU2	Subsidised projects national (LAU2) average
AVOP	18	3	6	2
GVOP	6	7	2	3
KIOP	1	0	1	0
HEFOP	5	2	4	1
Sum:	30	12	13	6

Agriculture and Rural Development Operational Programme (AVOP), Economic Competitiveness Operational Programme (GVOP), Environment Protection and Infrastructure Operational Programme (KIOP), and Human Resource Development Operational Programme (HEFOP)

In the next period Nádudvar submitted again 2.3 times more project proposals than the country LAU2 average and the ratio of winning projects (44%) were similar to the previous period (Table 6.). The advantage of Nádudvar increased in time as the settlement has won nine projects three times of the national LAU2 average. Comparing the ratio of the winning

projects increasing efficiency has been realised in Nádudvar since its ratio of submitted/subsidised project was 44%, 11% higher than the country LAU2 average. The majority of the projects were funded by the Economic Development Operational Programme and North Great Plain Operational Programme.

**Table 6.** Distribution of projects by operational programmes Nádudvar LAU2, New Hungary Development Plan from 2007. Source: from the database of National Development Agency <http://www.nfu.hu> [1]

Operational programme	Submitted projects Nádudvar LAU2	Submitted projects, national (LAU2) average	Subsidised projects Nádudvar LAU2	Subsidised projects national (LAU2) average
GOP	8	4	5	2
KEOP	2	1	1	0
TIOP	2	1	0	0
ÉAOP	12	1	4	0
TÁMOP	1	2	1	1
Sum:	25	9	11	3

Economic Development Operational Programme (GOP), Environment and Energy Operational Programme (KEOP), Social Infrastructure Operational Programme (TIOP), State Reform Operational Programme (ÁROP), North Great Plain Operational Programme (ÉAOP), and Social Renewal Operational Programme (TÁMOP)

Evaluating the project activities of the Hajdúszoboszló LLS in the frame of NDP and NHDP it was found that the number of submitted projects was low in the Hajdúszoboszló LAU1 however the ratio of winning projects increased. Contrary high number of projects was submitted with a relatively high and stable ratio of successful projects.

**EU subsidised projects in the frame of the National Development Plan (NDP) and the New Hungary Development Plan (NHDP) in the Karcag LLS.** Agriculture and Rural Development Operational Programme was the most attractive programme in Karcag LAU1 from 2004 to 2006. 80% of the funded projects received subsidies from Agriculture and Rural Development Operational Programme and Economic Competitiveness Operational Programme. Karcag LAU1 was far more successful in fund raising (53%) than the Hungarian LAU1 average (45%). Also the number of funded projects was fewer than the national LAU1 average due to the low number of submitted projects. The high ratio of winning projects is partly due to the existence of the Research Institute of the University of Debrecen (Table 7.).

During the period of 2007-2009 the proportion of the winning projects was 45%, lower than the previous period, close to the national average (Table 8.). Most applications (53) arrived to the North Great Plain Operational Programme and to the Economic Development Operational Programme other programmes attracted far less attention.

Subsidies received by the Hajdúszoboszló LLS and Karcag LLS through the National Development Plan and New Hungary National Development Plan was calculated and the result is presented in Figure 4. The subsidy per inhabitant values differed greatly amongst settlements. The majority of the settlements received less fund than the national average. Only two villages received more subsidies than the country average, Berekfürdő and Kunmadaras.



**Table 7.** Distribution of projects by operational programmes Karcag LAU1, National Development Plan, 2004-2006. Source: from the database of National Development Agency <http://www.nfu.hu> [1]

Operational programme	Submitted projects Karcag LAU1	Submitted projects, national (LAU1) average	Subsidised projects Karcag LAU1	Subsidised projects national (LAU1) average
ROP	9	12	2	3
AVOP	58	63	40	38
GVOP	49	122	19	49
KIOP	1	2	0	1
HEFOP	22	43	13	19
Sum:	139	242	74	110

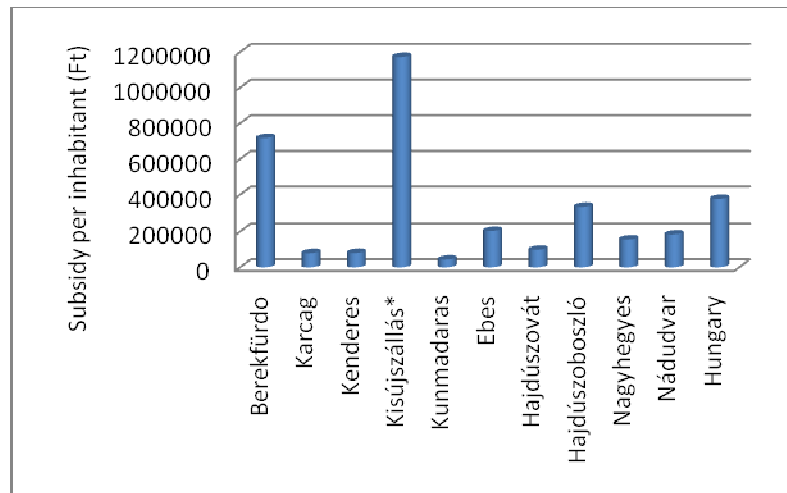
Regional Development Operational Programme (ROP), Agriculture and Rural Development Operational Programme (AVOP), Economic Competitiveness Operational Programme (GVOP), Environment Protection and Infrastructure Operational Programme (KIOP), and Human Resource Development Operational Programme (HEFOP)

**Table 8.** Distribution of projects by operational programmes Karcag LAU1, New Hungary Development Plan from 2007. Source: from the database of National Development Agency <http://www.nfu.hu> [1]

Operational programme	Submitted projects Karcag LAU1	Submitted projects, national (LAU1) average	Subsidised projects Karcag LAU1	Subsidised projects national (LAU1) average
GOP	21	70	12	41
KEOP	5	12	4	5
TIOP	2	12	1	2
ÁROP	1	3	1	2
ÉAOP	53	13	21	4
KÖZOP	1	1	1	1
TÁMOP	15	37	4	13
Sum:	98	148	44	68

Economic Development Operational Programme (GOP), Environment and Energy Operational Programme (KEOP), Social Infrastructure Operational Programme (TIOP), State Reform Operational Programme (ÁROP), North Great Plain Operational Programme (ÉAOP), Transport Operational Programme (KÖZOP), and Social Renewal Operational Programme (TÁMOP)

With a population of 961 Berekfürdő won funds for two projects: for utilisation of renewable energy sources (Environment and Energy Operational Programme) and for improvement of health and thermal tourism (North Great Plain Operational Programme). Kisújszállás (marked with \* in Figure 1) received funds for 45 projects, the activity was outstanding, and however the reason of the huge per capita subsidy was the fund given for road construction. 87% of the subsidies received for the road construction to build a bypass road to divert the intensive traffic from the settlement.



**Figure 1.** EU subsidies in Hajdúszoboszló LLS an Karcag LLS, 2004-2006 (National Development Plan) and from 2007 (New Hungary National Development Plan).

Source: from the database of National Development Agency <http://www.nfu.hu> [1]

## 4 Conclusions

Summarising the activity and efficiency of the Hajdúszoboszló LAU1 region toward NDP and NHDP projects since 2004 it can be stated that the number of submitted projects has increased and the community has become better competitors for EU funds. Applicants of the LAU1 region preferred economic development agricultural development and regional development topics.

Nádudvar settlement has been more efficient in fund raising then the LAU2 national average due to the capability to submit more projects than the average and while the ratio of winning projects of the town remained the same, relatively high level, it decreased in other settlements.

Agriculture and Rural Development Operational Programme was the most attractive programme in Karcag LAU1 from 2004 to 2006.

EU subsidised projects in the frame of the National Development Plan and the New Hungary Development Plan were popular in the Hajdúszoboszló LLS and Karcag LLS. More and more organisations have recognised the advantage of using EU funds and the competition has increased.

## Acknowledgements

The authors would like to thank the Seventh Framework Programme.

## References

1. Database of National Development Agency. <http://www.nfu.hu>.
2. National Development Agency. <http://www.nfu.hu>.
3. National Development Plan. <https://orszaginfo.magyarorszag.hu/informaciok/gazdasag/nft.html>.
4. OECD: Creating rural indicators for shaping territorial policy. [www.oecd.org/data.oecd/42/16/15181756.doc](http://www.oecd.org/data.oecd/42/16/15181756.doc)
5. Forslund Johanna, Samakovlis Eva, Johansson Maria Vredin: Is it wise to combine environmental and labour market policies? An analysis of a Swedish subsidy programme Ecological Economics Volume 65, Issue 3, 15 April 2008, pp 547-558.

6. Pakurár M. et al.: University of Debrecen Faculty of Applied Economies and Rural Development. The Karcag and Hajdúszoboszló LLS (Hungary): current employment patterns and opportunities for, and constraints on, rural economic diversification. <http://www.ruraljobs.org>, 2010.
7. Radvánszki Á., Sütő A.: „Hol a határ?” (Where is the border?) Falu Város Régió, 2007/3, pp 45-54. Budapest, 2007.
8. Zsugyel J.: Restructuring of the economy of BAZ County, Hungary. Transactions of the institution of mining and metallurgy section a-mining technology, 2002, vol. 111., pp A197-A200. England. ISSN: 0371-7844.



# Analysis On The Objective Indicators Of Life Quality In Hajdú-Bihar Country

Anett Sörös<sup>1</sup>, Adrián Nagy<sup>1</sup>, Károly Pető<sup>1</sup>

<sup>1</sup>University of Debrecen, Faculty of Applied Economics and Rural Development  
4032 Debrecen Böszörmény út 138. Hungary  
{soresanett, nagy.adrian, peto}@agr.unideb.hu

**Annotation:** On what grounds can our life, the development and the situation of our narrow environment or the country be assessed? Is the final conclusion drawn unconsciously on the basis of findings in certain areas with a mathematical formula? Or a single “indicator” is chosen (e.g. money, number of friends, professional accolades) to help us in the assessment of the situation? These questions arise when we evaluate the quality of life. We might agree that it is much easier to answer the question “Why do we measure the quality of life” than the one “How do we measure it?”. Let us start with answering the easier question. Life quality is to be measured because life is much more than simple surviving. On one hand, the improvement of people’s health is judged in terms of their lifespan; on the other hand in terms of the improvement of their life quality (e.g. how their pain is eased, how their ability to work improves). Today policy-making governments have started to realize that the reserves of economic and social policies preaching slogans like “job creation”, “GDP growth” and “motorway construction” are running out. More and more people feel that to make citizens satisfied and to gain their votes something else will also be needed than before. But what does this mean? To answer the question many call the notion of life quality and happiness to help and try to find the way out by the reinterpretation of thoughts and ideas well-known for centuries for the XXI. century.

**Key words:** indicators, rural development, life quality, Hungary

**JEL classification:** R10

## 1 Introduction

On what grounds can our life, the development and the situation of our narrow environment or country be assessed? Is the final conclusion drawn unconsciously on the basis of findings in certain fields by the help of a mathematical formula? Or a single “indicator” is selected (e.g. money, number of friends, professional accolades) to help us in the assessment of the situation? These are the questions which arise when the quality of life is evaluated. We might agree that it is much easier to answer the question “Why do we measure the quality of life?” than the one “How do we measure it?”.

Let us start with answering the easier question. The quality of life is to be measured because life is much more than simple surviving. On one hand, the improvement of people’s health is judged in terms of their lifespan; on the other hand, in terms of the improvement of their life quality (e.g. how their aches and pains are eased, how their ability to work improves).

Today policy-making governments have started to realize that the reserves of economic and social policies preaching slogans like “job creation”, “GDP growth” and “motorway construction” are running out. More and more people feel that to make citizens contented and to gain their votes something else will also be needed than before. But what does this mean? To answer the question many call the notion of life quality and happiness to help and try to find the way out by the reinterpretation of thoughts and ideas well-known for centuries for the

XXI century. The way, out which views the events of the world through the life quality of people, distinguishing good and bad accordingly.

The way out, which leads governments responsible for the realization of “public good” towards realizing life quality-centred economic and social policies. In the past years interest in the analysis of life quality gradually increased and the idea of life quality-centred planning has already emerged in Hungarian public administration as well. [4]

## **2 Assessment of the quality of life**

There are subjective and objective sides in life quality researches. The two significant life quality research models are the Scandinavian, starting with the availability of resources and their possession, therefore laying emphasis on objective factors; and the American, which rather finds subjective perception and evaluation important. A kind of mixture of these two is the life quality approach by Erik Allart. Following Maslow’s model, he also created a hierarchy of needs and distinguished 3 levels:

„Having, loving, being” (material–environmental and social needs and needs for personal development as well). Moreover, he differentiated objective factors and the related subjective attitudes on all the three levels. In the present study the level of “having” is the most relevant, so objective and subjective indicators will be highlighted at this level:

Objective: objective measurement of the standard of living and environmental conditions  
Subjective: contentment with the standard of living, the feeling of contentment [7].

Inglehart and Klingemann claim that the communist past of certain countries or their democratic conditions looking back to previous traditions are significant factors in the assessment of the subjective quality of life.

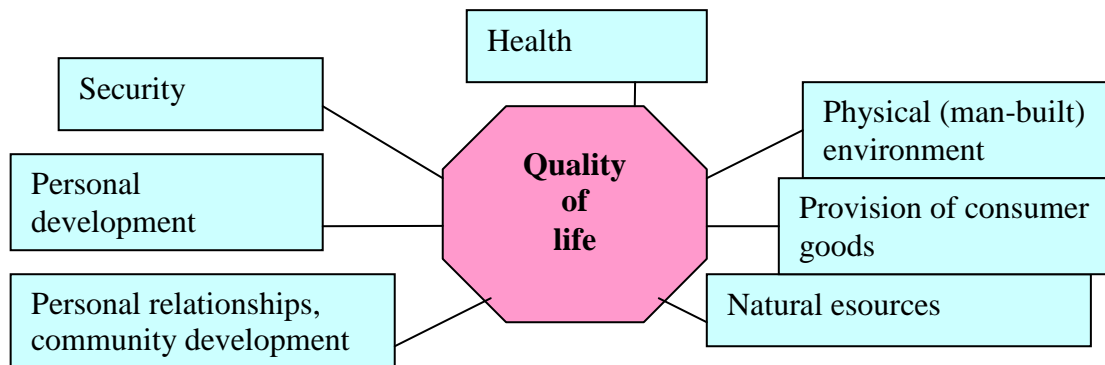
In former socialist countries the evaluation of individual welfare is lower than in traditional democracies; moreover, it is often far below the level of present communistic systems. Veenhoven [9] finds the reasons in the fact that the more equal distribution of happiness is rather characteristic of those countries where income differences are low and social security is high. Lengyel and Hegedűs [6] suggest that the economics crisis and the ensuing political transformation exerted a negative influence in itself on citizens’ well-being in post-socialist countries. This situation has been further aggravated by – immediately or at least quickly occurring – disappointments in the fulfilment of expectations related to the transformation, decreasing social security and its concomitant uncertainty of existence [3].

### **2.1 Factors influencing the quality of life**

The precise determination of our quality of life and life standard is a complicated task. However, the following figure (Figure 1.) attempts to summarize those areas (based on existing research findings) which exert the greatest influences on our life standard.

The first highlighted area is health. Unfortunately, Hungary lags behind the European Union in this respect as well. In the past three decades, the health of Hungarian population deteriorated significantly and showed an outstandingly unfavourable picture in international comparative terms. Physical or man-built environment primarily includes infrastructure and housing circumstances. The relevant viewpoints in their assessment are the accessibility of residences, the reliability and headway of transport modes, the quality of road networks, public lighting, coverage of telephone network and shopping facilities. Personal relationships and security must also be mentioned, as these two factors are closely linked. Personal relationships primarily refer to the family and security provided by it. However, priority will

be given to individuals' secure livelihood as well. Families' secure livelihood is determined by their accumulated wealth and the fact whether stable job opportunities are available for family members in the vicinity of their residences, in accordance with their qualifications and skills and naturally by the public security of their residential area.



**Figure 1.** Factors influencing the quality of life (Source: Author's own work)

## 2.2 Contentment with the quality of life in Hungary

In Hungary the rate of contented people lags well behind the average measured in all the EU member states (78%) by the Eubarometer. [2]

Almost all the Hungarian respondents claim that the state of economy (97%) and employment is definitely poor (96%). Somewhat fewer people think that the state of world economy (77%) and European economy (76%) are far from being ideal. Three quarters of the respondents worry about the state of environment as well.

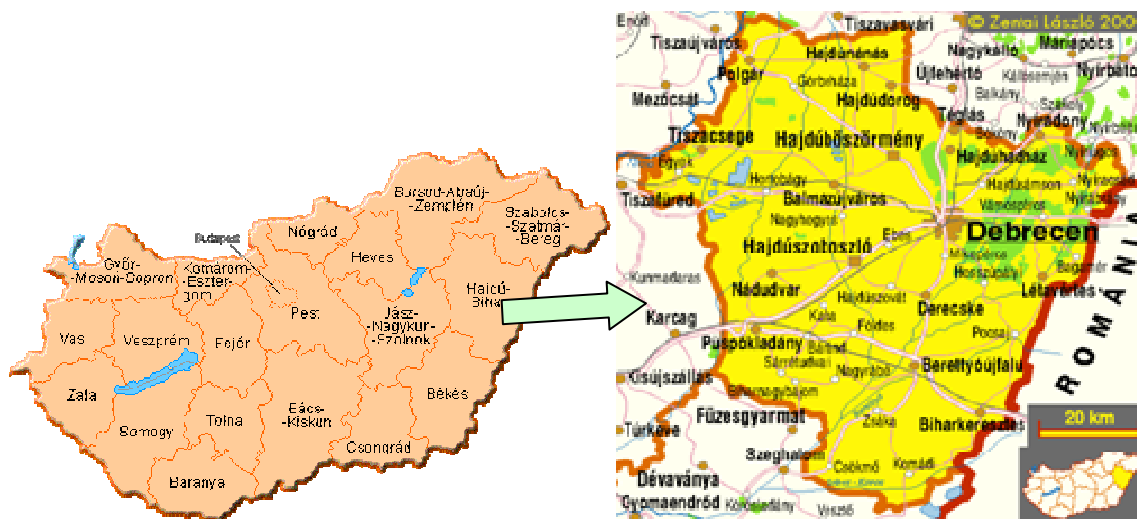
Young people of 15-24 are included in the largest range (67%) who can feel well in their current situation. The least happy are people of 40-54, 70% of them think that their current circumstances are far from being ideal. This means that on average, approximately the double of the current domestic income would be needed for families to have no worries – by their own admission. Average respondents are rather contented with their jobs than with their income, whereas contentment with their life standard is between the two. As for general subjective contentment, although its average value is positive, merely 50% of the population is contented. Naturally it does not mean that we are unhappy. 4 respondents out of 5 claim that they are rather happy. This may suggest that the picture is not so pessimistic as it is revealed by questions about living conditions. [7]

## 3 Location of the studied county

Hajdú-Bihar County is located in the northern frontier of the North-Great Plain Region, including 82 settlements, with its population living in 21 towns and 61 townships. (Figure 2)

To expedite efficient operation, the settlements of the country have formed 9 small regions. Their natural endowments are rich; they are invaluable in respect of nature protection, recreation and environmental protection.

The county plays a leading role in the Eastern-Hungarian region. Its country town is Debrecen, having been the centre of scientific and cultural life in the Great Hungarian Plain and the East Tisza Region for centuries. The provincial capital is the economic, intellectual and cultural centre of the Eastern region as well as a favoured destination for tourists.



**Figure 2.** Hajdú-Bihar County in Hungary (Source: [5])

Browsing central statistical data and databases of questionnaire surveys it immediately becomes evident that data in the region show some kind of improvement; however, they do not reveal a decrease in inequality. As it is well-known, inequality may be one of the primary reasons of discontentment. Hajdú-Bihar County is a good example for territorial inequality, as several disadvantageous and cumulatively disadvantageous small regions and settlements are located here. However, economically and socially speaking, a number of settlements feature the characteristics of developed towns.

## 4 Objective indicators studied in Hajdú-Bihar County

In the analysis of life standard and living conditions, objective indicators include primarily earnings, labour-market status, the availability of consumer goods and other similar material indicators. In general, GDP per capita and various indices, mainly those formed from national economic indicators may also be analysed.

The present study investigates merely objective indicators, as subjective ones (which may be mainly determined by questionnaires) will be published as part of a doctoral dissertation in a future study.

### 4.1 The varying number of population

In Europe the major reason of critical demographic conditions is not the diminution but the ageing of population. Consequently, the burden of maintenance grows gradually and cyclically.

Demographic processes followed a similar trend in Hajdú-Bihar as well. According to data in 2007, 543802 people live in the county. The number of population was diminishing in the past 10 years. This downward tendency is not merely characteristic of Hajdú-Bihar County, but unfortunately of the whole country.

An ageing society means a key problem for social security schemes and age exerts a significant influence on the quality of life as well. The Eurobarometer concludes that people over 50 are the most contented with their quality of life.



## 4.2 Labour market

Out of the objective indicators of life quality, our study focuses primarily on the labour market, as it is a major problem in our county and also in Hungary. Recalling the data of the Eurobarometer 72 (2009) survey it can be stated that unemployment is the primary problem for Hungarian population. Access to jobs and adequate employment is essential for contentment and positive life quality.

**Table 1.** General features of the labour market (Source: [1])

County	Rate of unemployment	Unemployed people	Employed people	Inactive people	Rate of employment	Rate of activity
Hajdú-Bihar	13.39 %	26680	172538	212191	41.9%	48.4%

The summary of the general features of the labour market in Hajdú-Bihar County are demonstrated on Table 1. This will bring us to the next point, the analysis of some indicators as compared to other counties.

Table 1 also presents one of the most crucial problems on the labour market: the high rate of inactive population. This category includes people with a partial incapacity for work who suffer from some kind of physical or mental deficiencies or whose opportunities to find employment decreased radically after medical rehabilitation. A focal problem is that equal opportunities are not ensured for disabled pupils/students in education and training either. In Hajdú-Bihar County the rate of people with a partial incapacity for work is approximately 8-10% in the group of registered unemployed people, whereas the rate of appropriate jobs for them is merely 1-2%, mostly in the social sphere. Support opportunities are further restricted by their low willingness for training and the fact that they need special forms of cooperation from the employment organization. These people have to cope not only with the loss of income as a result of their unemployment, but with social inclusion and their disabilities as well. This everyday struggle may induce the negative assessment of their life quality.

## 4.3 Income

GDP is the most often used macro-economic indicator in each country and international business organization. A good example for this is that economic, social and territorial cohesion policies (i.e. The Structural Funds) are used for the classification of regions receiving EU co-financing on the basis of GDP per capita.

It is highly recommendable to remember that in some regions the formation of GDP per capital might be affected by commuters. The inflow of workers can raise production to a level which would be impossible to reach by local active population. Consequently, GDP per capital can be overestimated in areas attracting labour force and in those ones where labour outflows, underestimated.

**Table 2.** Formation of basic wages and earnings in 2010 (Source: Authors' own work)

	Basic wages (HUF/person/month)				Earnings (HUF/person/month)			
	physical	intellectual	man	woman	physical	intellectual	man	woman
<b>Hajdú-Bihar County</b>	98865	183747	142622	135041	118320	227844	177028	162612
<b>Hungary</b>	108519	226530	176907	157373	132415	275025	218041	188147

The study of the GDP's distribution among national economic sectors reveals that agriculture plays a much larger role in gross domestic production, than nationally. [8]

Income and material goods determine the quality of life predominantly. Without money it is difficult to satisfy our demands. As the well-known saying goes: "Money does not make you happy, but it is good to have some!"

## 5 Conclusions and recommendations

All the above mentioned suggest that politics and social sciences should really focus on the harmonic, long-term improvement of life quality and the development of personalities capable of creating real human relationships and evolving communities.

The rate of unemployment in Hajdú-Bihar County is several percent higher than the value of the national tendency. The reason lies in the fact that both Hungarian and foreign capital is channelled here in a lower than average quantity, therefore the number of unemployed people is the highest here and in the northern counties, resulting in considerable social problems. To cut the number of unemployed people and to stimulate the activity of inactive labour force the following measures are to be taken:

- incentives for job-hunt,
- development of job-hunting services,
- improvement of employability for disadvantaged people,
- incentives for access to employment,
- preservation of employment activity,
- development of an integrated employment and social service-provider system,
- support for life-long learning.

As already mentioned before, the high rate of inactive people is a crucial problem. Besides the deficiencies of their qualifications, the key reasons of the underemployment in the roma population are the following:

- Drawbacks in settlements (the majority of romas live in small settlements)
- Lifestyle strategies originating from the poverty trap (welfare policy supports often exceed the volume of earnings, there is no motivation to work)
- Newly established enterprises primarily prefer qualified workforce
- Employment discrimination is continuously present, but difficult to prove.

The above analysis suggests the clear and evident priority that roma children should graduate from secondary schools to have opportunities in the labour market. Another solution could be to link the payment of family allowance to children's school attendance or to spend part of the allowance to cover the costs of schooling or to receive some allowances in kind (transport, catering, hostel accommodation in senior classes).

The majority of families living under the minimum subsistence level cannot cover their maintenance costs for housing. These costs include the rents of tenement flats, public charges, water, electricity, gas and district heating charges but these fail to cover the actual running expenses. The Law on Social Welfare states that the amount of support shall be a contribution to the preservation of dwelling conditions. In practice, this amount is excessively low. A national, guaranteed and uniform system of housing allowance should be introduced in the framework of the Law on Social Welfare.

The alleviation of employment stress in rural areas, the expansion of income potentials can merely be realized through strengthening rural economic potentials which may improve

employment by creating jobs outside agriculture in rural areas. Highly important tools in achieving these goals include the promotion of non-agricultural activities by households engaged in agriculture, incentives for rural micro-enterprises, the development of rural and agro-tourism, traditional arts and crafts.

Furthermore, the competitiveness of the investigated county is to be enhanced, local economy is to be invigorated, local communities should be prepared for the acquisition of EU and other available funds which expedite the support of sustainable social, environmental and economic development.

## References

1. ÁFSZ: Állami Foglalkoztatási Szolgálat. 2009.  
[http://www.afsz.hu/engine.aspx?page=full\\_AFSZ\\_KOZOS\\_Statisztika](http://www.afsz.hu/engine.aspx?page=full_AFSZ_KOZOS_Statisztika)
2. Eurobarometer 72. 2009.  
[http://ec.europa.eu/public\\_opinion/archives/eb/eb72/eb72\\_hu\\_hu\\_nat.pdf](http://ec.europa.eu/public_opinion/archives/eb/eb72/eb72_hu_hu_nat.pdf).
3. Inglehart, R., Klingemann, H. D.: Genes, Culture, Democracy and Happiness. In: Diener, E. – Suh, E. M. (eds.): Subjective Well-Being across Cultures. Cambridge MA, MIT Press, 2000, pp. 165-183.
4. Kovács B., Horkay N., Michalkó G.: A turizmussal összefüggő életminőség-index kidolgozásának alapjai. Turizmus Bulletin X. évf. 3. Szám, 2006.
5. KSH: Központi Statisztikai Hivatal. 2010.  
<http://portal.ksh.hu/pls/ksh/docs/hun/xftp/gyor/nep/nep21002.pdf>.
6. Lengyel Gy., Hegedűs R.: A szubjektív jólét objektív tényezői nemzetközi összehasonlításban. In: Lengyel György (szerk.): Indikátorok és elemzések. Műhelytanulmányok a társadalmi jelzőszámok témaköréből. Budapest, BKÁE, 2002.
7. Utasi Á. (szerk.): Az életminőség feltételei. MTA Politikai Tudományok Intézete. Budapest, 2007, pp. 251-276.
8. Fenyves V., Nagy A., Dajnoki K., Pető K.: Development potentials for extension in the Northplain Region, In: Challenges of Education and Innovation: MACE 2009 Conference. Berlin, 2010, Németország, 2010.01.13-2010.01.14.  
<http://mace-events.org/greenweek2010/6353-MACE.html>.
9. Veenhoven, R.: Happiness. The Psychologist, March 2003.



# **Information Management and Quantitative Methods**



# ICT Support for Agritourism

Zdeněk Havlíček<sup>1</sup>, Václav Lohr<sup>1</sup>, Petr Benda<sup>1</sup>

<sup>1</sup>Department of Information Technologies, Faculty of Economics and Management,  
Czech University of Life Sciences Prague,  
Kamýcká 129, 165 21 Prague 6 Suchbát, Czech Republic  
havlicek@pef.czu.cz

**Annotation:** Worldwide, tourism is regarded as the industry of the future. Agritourism represents a unique symbiosis of agriculture and tourism. Agritourism is a specific form of local tourism. It allows anyone who is interested to stay on agricultural farms and get acquainted with the practical life in the countryside. Further development of agritourism can be expected over the next several years.

An extensive analysis of the state of agritourism in the Czech Republic discovered that information on agritourism facilities is very diverse and confusing, lacking a specialized portal for agritourism. There are several thousand agritourism facilities in the Czech Republic, but most of them either do not have quality web sites, or have none at all.

Many people have already switched their preference from traditional holidays by the sea to agritourism. Using new information and communication technologies (ICT) the awareness of agritourism opportunities can be greatly improved. It should be ensured that entrepreneurs in agritourism (mainly farmers) are aware that their own small farms can be presented on the web easily and with minimum cost, e.g. using the Web Content Management System (WCMS).

A new portal solution has been designed, which will promote greater information sharing among the partners in the field of agritourism. The so-called long tail effect for small farmers is expected. This site should allow an easy option for the clients searching for suitable premises. It should also allow operators (farmers) to easily input data into the portal database on accommodation, offered services and general information on the area, etc.

**Key words:** agritourism, maps portal, mashup, WCMS, WordPress

**JEL classification:** Q12

## 1 Introduction

Worldwide, tourism is regarded as the industry of the future. Tourism in the European Union is one of the largest economic activities with great potential for further growth.

Agritourism is a unique symbiosis of agriculture and tourism. At the same time, it provides the farm with additional income which can be quite significant. Agritourism is a specific form of local tourism. It allows anyone to get acquainted with the practical life in the countryside. Visitors can participate in or learn the traditional rural activities. They can also use some of the frequently offered additional services (horse riding, fishing, cycling, etc.).

The terms as rural tourism, agritourism are often used simultaneously. Sharon Phillip et al. [5] clarify different definitions of agritourism using a specific typology for defining agritourism.

At present, rural tourism in the Czech Republic is offered by more than a thousand businesses with a total capacity of several tens of thousands of beds. The further development of agritourism can be expected within the next several years. Many people already prefer agritourism to traditional holidays by the sea. The awareness of agritourism can be greatly improved by the use of new information and communication technologies (ICT) opportunities.

Simultaneously, a www environment can be created to assist the involvement of small farms in the market for alternative tourist opportunities.

## 2 Data and Methodology

The aim of this paper is to analyze the current state of the usage of ICT in the field of agritourism in the Czech Republic. Selected micro-regions were examined to determine what information is available on the web (region portals, sub-catalogues). The study also investigated how farms promote their activities in practice (web sites, regional press, etc).

Within the selected regions information was collected on individual farms and similar establishments, which are involved in agritourism (farms, ranches, houses, riding schools, open-air museums, etc.). Based on the results of the analysis a new interactive mapping portal was designed. It uses the web 2.0 technology to support the development of agritourism. Synthetic recommendations will be presented for web site creation.

## 3 Results

The results of our study can be divided into three parts:

- The state of ICT in agritourism
- Proposition of new portal for agritourism
- Recommendations for web sites creation

### 3.1 The state of ICT in agritourism

In 2009, the situation in the usage of new ICT in agritourism was evaluated by a specific methodology for evaluating the web presentations of agritourism facilities (the questionnaire survey covered several regions – total 365 agritourism facilities) [2, 4].

The results can be presented at four levels: national, regional, micro-regions and agritourism facilities, i.e. farm.

**National level.** There are a great many portals in the Czech Republic that are specialised in tourism. The Czech Tourism government agency's portal: [www.czechtourism.com](http://www.czechtourism.com), provides information on tourism opportunities in the Czech Republic in several languages. However, when entering the word "agritourism", 172 references are shown. These data are from the portal [www.kudyznudy.cz](http://www.kudyznudy.cz) which is also operated by the Czech Tourism Agency. The Union for Rural Tourism operates a portal [www.prazdninynavenkove.cz](http://www.prazdninynavenkove.cz). International agritourism specialized portals such as the French [www.bienvenue-a-la-ferme.com](http://www.bienvenue-a-la-ferme.com), bring far more comprehensive views of agritourism opportunities in the country. However, as yet there is no portal specialized in agritourism in the Czech Republic.

**Regional level.** The Czech Republic is divided into 13 regions and the Capital City of Prague. A lot of interesting information on the activities in these regions is available on [www.risy.cz](http://www.risy.cz) portal - Regional Information Service (RIS), which is administered by the Centre for the Regional Development of the Czech Republic. Each region has its official website, but none of them deals with agritourism directly. For instance, one does not find a single mention or reference dealing with agritourism on the Central Bohemian portal [www.kr-stredocesky.cz](http://www.kr-stredocesky.cz). All the visitor to this portal can learn about is the general concept of the further development of tourism in Central Bohemia.

**Micro-regions level.** Micro-regions are communities that are associated for a particular purpose. The level of agritourism in the micro-regions varies, and its support is also very different from one to the next. There are a number of web sites, which are narrowly focused



on specific issues of individual regions, such as the [www.posazavi.com](http://www.posazavi.com), which includes links to many interesting tourist options in the Posazavi area. The situation in micro-regions is well documented in the first-hand reports by five respondents from selected regions of the Czech Republic [3].

**Agritourism facilities.** There are several thousand agritourism facilities in the Czech Republic. Roughly 2/3 of these facilities have their own web sites (e.g in the Rakovnik area it was found that only 9 farms of 14 had their own web sites).

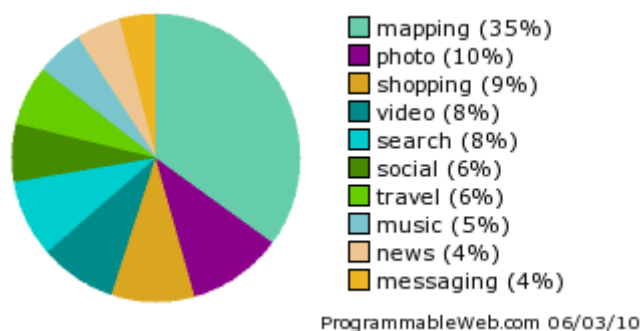
Our previous study [2] has determined that 33% of sites fail to meet the overall requirements with respect to their contents and design. Almost 70% of sites are difficult to find by means of search engines. Two thirds of the sites have serious deficiencies regarding their accessibility.

### 3.2 Portal proposition

The current ICT makes possible to establish a non-commercial agritourism portal as a communication platform both for the interested people (potential clients) and for operators of agritourism. The proposed portal ([agroturistika.czu.cz](http://agroturistika.czu.cz)) will centrally concentrate all available information in this field, including links to other useful sites. The new technologies called web 2.0 will be tested and implemented. Programming output consists of a mashup that uses or combines data or functionality from many external sources to create a new service. Technologies that have been used include maps (list of Maps API, Google Maps, Google Static Maps), photos (Panoramio API), geolocation services (Google Gears) and certain internet news (Wordpress Plugin, Yahoo Pipes, Google News RSS).

„Mashups may easily combine huge amounts of data sources and functionalities of existing as well as future web applications and services.”[1] A function orientated approach divides mashups into data converters, and modules related to visualization, communication and security.

The current structure of mashup types that are used worldwide is described by the following chart [6].



**Figure1.** Types of mashup

We expect that it will be possible to use the so-called long tail effect. This will promote agritourism as such, both by easier map navigation to search for agritourism farms (facilities, etc) in the region of interest and by better awareness of the existence of individual farms. See Figure 2.

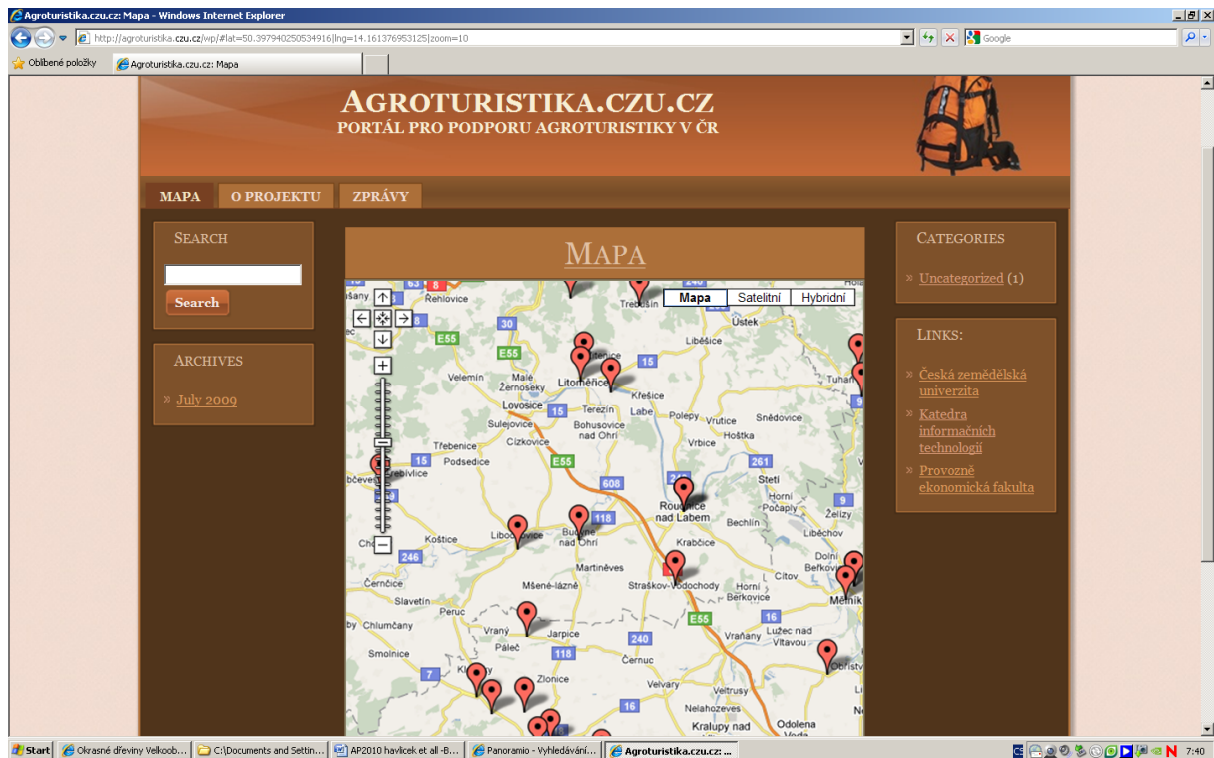


Figure 2. Screenshot of agroturistika.czu.cz portal

Each interested farmer will have an opportunity to add data on their own facility to a database on the basis of a multi-user system. Their data will be verified by the system administrator and then included in the map portal. The link from the map will lead directly to the farm web site – Figure 3.

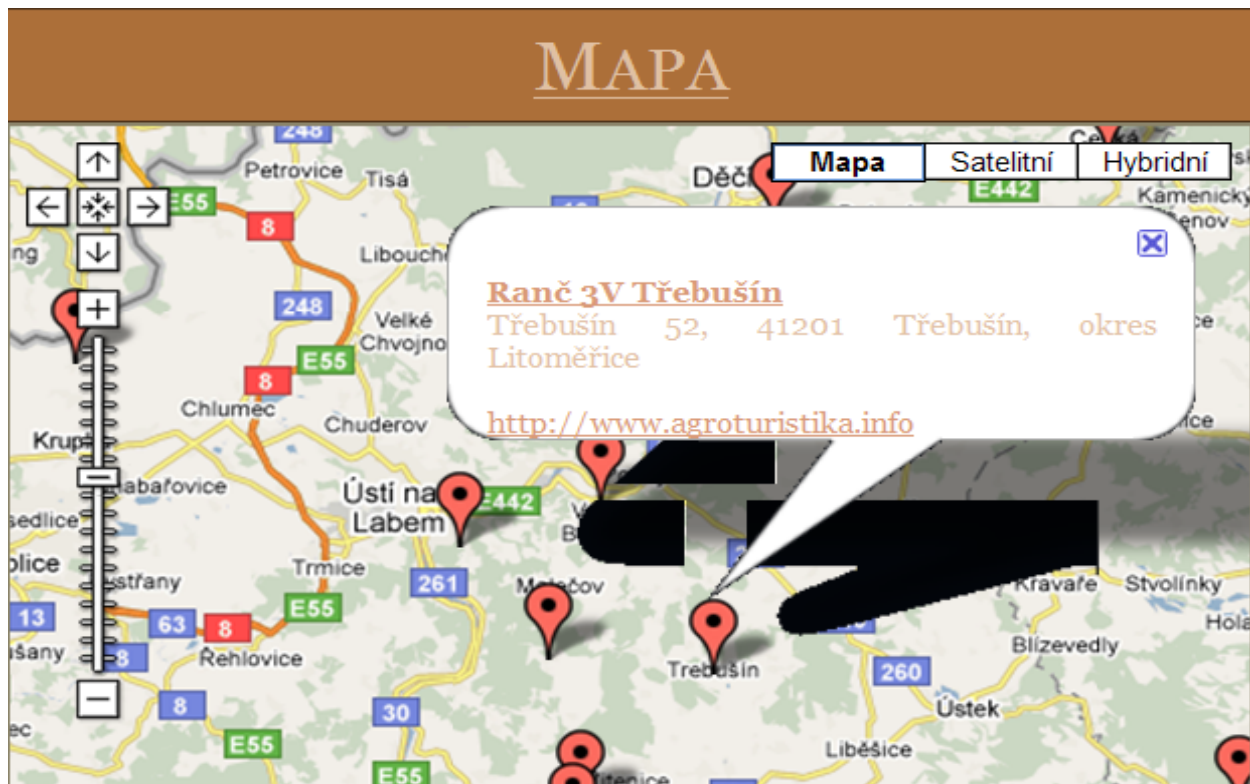


Figure 3. Screenshot of agroturistika.czu.cz map

### **3.3 Recommendation for web sites creation**

It is important to ensure that entrepreneurs in agritourism (mainly farmers) are aware that their own small farms can be presented on the web easily and with minimum cost. We tested usage of different Web Content Management Systems (WCMS) which allow relatively easy creation of a website.

As a synthetic result of previous study and many practical usage of WCMS in distance MSc study programmes we propose three main recommendations:

- ▶ Use efficient, easy-to-learn and user-friendly WCMS software.
- ▶ Web sites created for agritourism should be focused on target groups (language versions).
- ▶ New SEO (Search Engine Optimization) methods and improved accessibility for handicapped people should be used.

#### **WCMS - Web Content Management System**

Web Content Management System is software which is used as a web application for creating and managing the content of web sites. Its main capabilities are editable content, document management and user management. WCMS allows the use of different templates and supports differentiation in user viewpoints.

There are many types and forms of WCMS. One of the best WCMS programs for fast creation and easy maintenance of web sites is WordPress [8]. This software has a number of professional reviews and it is used by thousands of web masters. It is free under the GNU General Public License. This software seems to be very useful for creation of farm websites. With WordPress, it is possible to manage everything from a simple personal web site (blog) to a commercial web site with hundreds of web pages.

Our experience with distance MSc students has demonstrated that creation of a web site by non-IT specialists is easy. We have prepared for the students a video support for basic work with Wordpress (installation on server, choice of template etc.). The students can easily create useful web sites. Examples of their work are shown in Figures 4 and 5.

#### **Web site aimed at target group (foreign language versions)**

Although there are many agritourism objects aimed at foreign clients, most of the evaluated web sites are only in the Czech language. The usage of multilingual versions is important not only in terms of the direct presentations for possible clients, but also for web search engines. In terms of functionality of a web site it is necessary to translate not only the created content, but also the entire web interface. This may seem to be complicated, but WCMS can generate the multilingual interface automatically. A foreign language version of the custom content can either be created manually, or generated automatically by the online translation tool. The translation thus created might not be too precise, but it allows visitors to understand the content of the web site. The site administrators can set an automatic translation into many other languages.



Figure 4. Screenshot of a student's work

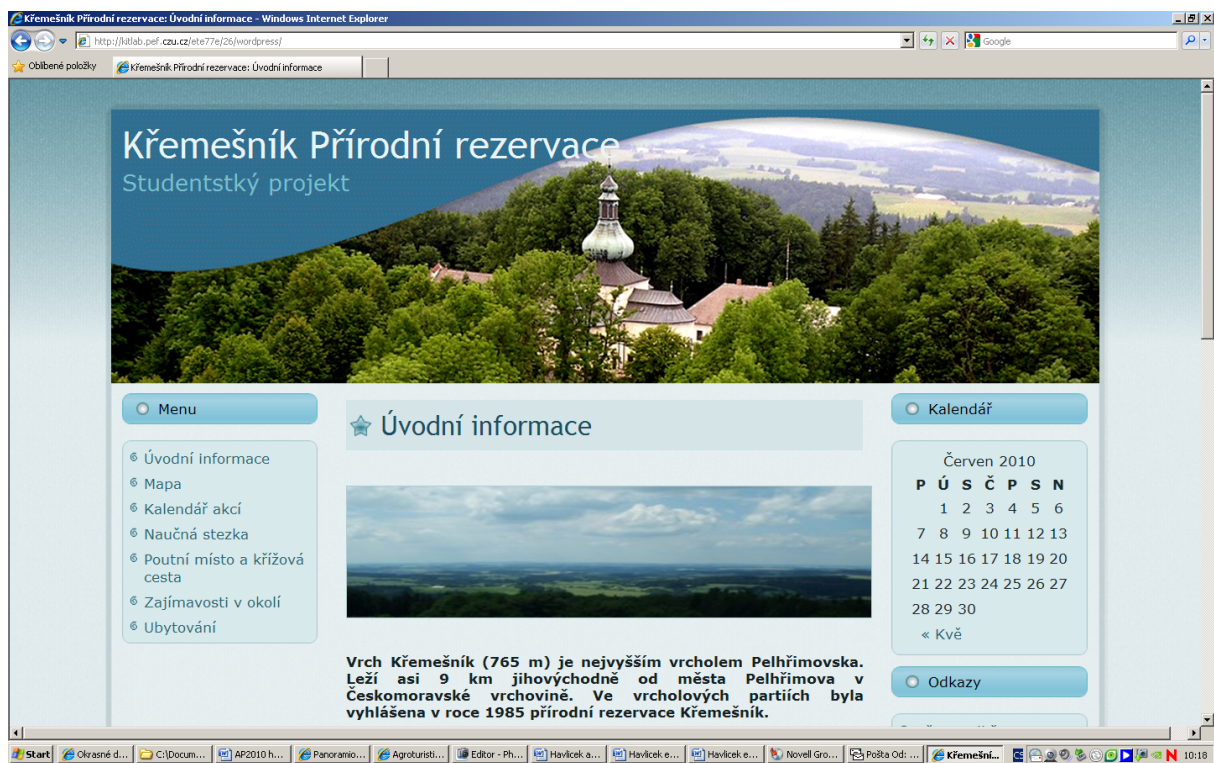


Figure 5. Screenshot of a student's work

## **The usage of new method of SEO (Search Engine Optimization) and accessibility**

It is very difficult to find farms' web sites using the classical search engines, such as Google. We therefore recommend using the SEO (Search Engine Optimization) technology, which optimizes existing web pages for the search engines.

There are many steps that can improve the web site performance and make the web site more visible for users on the Internet. We recommend some important SEO steps and methods. It is necessary to create unique, accurate page titles, improve the structure of the URL, assure easy navigation of the site, etc.

The use of WCMS is very helpful for the SEO improvement in this market. Most competitors do not use SEO as yet. When an evaluated web site was redesigned with the use of WCMS WordPress, it reached the top of the list of Google search engine results for the keyword "agritourism" within only a few weeks.

Web accessibility is one of the features a website's quality. In our research we evaluated the elemental accessibility by automatic testing using the online tool WAVE, which is available at <http://wave.webaim.org/>. WAVE also permits pages to be displayed in text-only mode, allowing the screen readers to see the content. Thus it was possible to test if the web page in this mode still offered its users full and well structured information.

## **4 Conclusions**

Agritourism, as one of the options for alternative business in the countryside, is gaining increasing popularity worldwide. This trend is gradually making headway in the Czech Republic.

At present, the promotion of agritourism, as well as information on farms and facilities, is very diverse and confusing. A new portal solution has been designed, which will promote greater information sharing among the partners in the field of agritourism. This portal should allow an easy option for clients searching for suitable premises. It should also allow operators (farmers) to easily input data into the portal database on accommodation, services offered and general information on the area, etc.

On the basis of the data obtained through our research it can be expected that the number of agritourism farms will grow in the Czech Republic, and that they will continuously achieve a better standard and, apart from the local visitors, their guests will also include foreign visitors not only from Europe but from around the world. This expectation should be supported by efficient and professional use of ICT.

## **Acknowledgements**

This paper was elaborated within the framework of the solution VZ MSM 6046070906 "Economics sources of Czech agriculture and their efficient use in the context of multifunctional agri-food systems".

## **References**

1. Ardielli, J., et al.: Modern tools for development of interactive web map applications for visualization spatial data on the internet. In Acta Montanistica Slovaca [online]. Special Issue 1/2009. Košice: Berg Fac Technical Univ Košice. 2009 [cit. 2010-08-19]. <<http://actamont.tuke.sk/index.html>>. ISSN 1335-1788.

2. Havlíček, Z., Benda, P., Lohr, V.: Agritourism Web Presentation Evaluation. 2009, Praha: Agrarian Perspectives XVIII, PEF CULS Prague, s.727 -731. ISBN 978-80-213-1965-3.
3. Havlíček, Z., Benda, P., Lohr, V.: ICT and Agritourism in Czech Republic. Debrecen: AVA Congress 4, Agroinform Kiadó, s. 800-807. ISBN 978-963-502-897-9.
4. Kosíková, M.: Webové prezentace agroturistických objektů a jejich hodnocení. PEF CULS Prague 2010. Diploma thesis.
5. Sharon, Phillip; Colin, Hunter; Kirsty, Blackstock: A typology for defining agritourism. Tourism Management, Volume 31, Issue 6, 2010, Pages 754-758. ISSN 0261-5177.
6. ProgrammableWeb [online]. 2010-06-03 [cit. 2010-06-03], Mashup Dashboard, <<http://www.programmableweb.com/mashups>>.
7. SYMBIO [online], SYMBIO Digital, 2010 [cit. 2010-05-18]. Mashup (web application hybrid). URL <<http://www.symbio.cz/slovník/mashup-web-application-hybrid.html>>
8. WordPress [online], WordPress.org. 2010 [cit. 2010-05-12]. WordPress - about. URL <<http://wordpress.org/about>>.

# Methodological instrument for complex regional development evaluation and regional categorization

Tomáš Hlavsa<sup>1</sup>

<sup>1</sup>Department of Statistics, Faculty of Economics and Management,  
Czech University of Life Sciences Prague,  
Kamýcká 129, 165 21 Prague 6 Suchbát, Czech Republic  
hlavsa@pef.czu.cz

**Annotation:** Regions in the Czech Republic, the same as in most European countries, show a considerable difference rate from points of view demographic, social and economic as well as from point of view of infrastructure. Regional policy is among other focused on regional disparities decreasing. Policy evaluation is than based on observation of selected indicators. This one-dimensional point of view is very important to complete with multivariate analysis. It enables complex action of many indicators together.

The paper deals with a proposal of the methodological instrument of regions comparison which enable ranking of regions and their categorization in light of state and changes of selected regional indicators over time. This methodology is based on multivariate statistical analysis using composite indicators. The aim is to create methodology which is easy for potential user, which is applicable for all selected variables and which reflects regional disparities.

In the paper are explored different methodologies for aggregating indicators into a composite indicator acceptable for regional development. Author stress the need for multivariate analysis prior to the aggregation of the individual indicators. Using multivariate point of view on regional development is possible to detect relations among indicators and regions. Finally utilization of this methodology is verified on evaluation of regional development of Czech regions based on selected indicators from Czech regional development strategy 2007 - 2013. Identification and a subsequent analysis of the state and change regional differences and a determination of a certain sequence of regions is beneficial for definition of trouble shooting regions and better support targeting.

**Key words:** Region, regional development, multivariate statistical analysis, composite indicators, weight, categorization.

**JEL classification:** C43, R11

## 1 Introduction

Regional policy of a state and European Union represents the reaction on existing interregional differences which have arisen as a result of historical development. According to different causes of inception of disparities we can generally distinguish different types of problematic regions e.g. regions with insufficient quantity of natural resources, regions with declining industries, distant and rural regions. The structural policy of European Union focuses on those regions, its target is to reduce their backwardness and provide balanced and sustainable development through development programs and projects. Financial resources flow to operating programs from the public budget of European Union, the support is based on economic and social solidarity of all European member states. Because of this fact, there is a big pressure on qualitative evaluation effects embedding financial resources for development of regions and the valorization of regional differences generated. On basis of those differences there are less developed regions in which it is suitable to direct the support identified. With spatial aspect of regional development is engaged in [1]. For the identification of less developed or backward regions there are different standards exploited, these are often based on a one-dimensional point of view (e.g. level of 75 % GDP) [2]. As illustrated, GDP is an important indicator; nevertheless it is not the only important indicator

for the evaluation of development and the level of regions [5, 7]. The multidimensional point of view on the regional development appears to be more appropriate. The use of multi-criteria framework is a very efficient tool to implement a multi/inter-disciplinary approach [6]. It is asserted through so called composite indicator. There are more sub-indicators concentrated in it which are connected and also influence each other [8, 9]. With the consideration of an important role of the regional and structural policy it is important to accentuate on the elaboration of the system of development of regional evaluation and regional disparity. Approaches to the formation of the composite indicator are not unified and it essentially depends on purpose which they are going to accomplish. This work is the contribution to problems of the summary indicator's creation and less developed countries identification. On the basis of chosen method of composite indicator there are regions categorized from the static point of view as well as the dynamic point of view.

## 2 Data and Methodology

The valuation with the help of particular instruments of descriptive statistics is the starting point, but it is not fully sufficient. One-dimensional methods which expertise every single indicator separately provide information about the state and the development of these indicators which is very valuable information in terms of the development of regions, but fractional.

It is important to use such indicators for the regional development by the help it would be possible to accomplish complex characteristics. Composite indicators provide that. These indicators are able to describe complex conceptions such as prosperity, effectivity and sustainability. They can be easier interpreted than the whole complex of fragmentary indicators and enables fast comparison of regions from a given aspect. Their construction is naturally more complicated and that is why it is very important to pay attention to following analysis to prevent wrong interpretation.

The main aim of this article is proposal of metodological instrument for complex evaluation of development of regions in the Czech Republic, the comparison of the level of the development of regions and on its basis the categorization of regions. For its achievement there has been set a few partial aims:

A) The selection of suitable method of construction of composite indicator (CI), these requirements are thought:

- the method of calculation is easy and understandable even for non-statistician,
- the resulting value of indicator is easily interpreted,
- the indicator shows largely the regional differences,
- it is applicable to all thematic topics of Strategy of regional development (SRD; to be able to create one complex summary indicator for all topics together).

B) The valuation of region's position for the year 2007 and for the change in the years 2003-2007 with the regard for results of composite indicator of chosen method, the example is illustrated on selected economic indicators on the level of the districts of the Czech Republic (NUTS 3) excluding the capital city Prague. The city Prague is featured by specific position compared to other 13 districts, it only consists of city and for period of time before the year 2007 it was restricted from the structural funds. The work is focused on the modelling of multidimensional statistic methods whose analytical apparatus enables complex analyses mutual incidence relevant indicators.



## Methodology

The models of the aggregate indicators have been applied on chosen indicators of the theme of SRD Economics of regions. The indicators have been chosen on the basis of expert decision, 7 experts participated (4 from the sphere of research, 2 from the sphere of the regional development of regional authorities and 1 from the Ministry for regional development) and on the basis of the statistic methods of the cluster and the correlation analyses. The selection itself is not the content of this article. These indicators have been chosen:

GDP per capita, share of employed in construction, unemployment rate, average wage, registered job applicants, share of traders and research and development expenditure. The resources of indicators for the years 2003-2007 have been the regional yearbooks of The Czech Statistical office.

### *Selected methods of composite indicators*

Different authors such as Freundenberg [4], Saisana [8] or Svatošová [9] have outlined a range of composite indicator calculation. Also Grupp and Schubert [3] stress to use composite indicators for international comparison, namely based on composite innovation indicator.

**Table 1.** Synopsis of compared composite indicators methods

Name	Method of calculation	Formula number
Ranking	$CI_i = \sum_{j=1}^m q_{ij}$	(1)
Ratio	$CI_i = \frac{\sum_{j=1}^m y_{ij}}{m}, \text{ where } y_{ij} = \frac{x_{ij}}{\bar{x}_{.j}}$	(2)
Standardization	$CI_i = \frac{\sum_{j=1}^m y_{ij}}{m}, \text{ where } y_{ij} = \frac{x_{ij} - \bar{x}_{.j}}{s_j}$	(3)
Range	$CI_i = \frac{\sum_{j=1}^m y_{ij}}{m}, \text{ where } y_{ij} = \frac{x_{ij} - \text{extr}(x_{.j})}{R(x_{.j})}$	(4)

Note:  $q$  is the sequence of regions, index  $i$  represents region;  $i = 1, \dots, 13$  and index  $j$  variable;  $j = 1, \dots, m$ ; where  $m$  is number of variables;  $x_{ij}$  is original variable;  $\bar{x}_{.j}$  is arithmetical average;  $\text{extr}(x_{.j})$  refer to minimal value of selected variable (in case that high value of the variable indicates positive state) or maximal value (if high value indicates negative state);  $R(x_{.j})$  is range.

In the case of the ranking method there has been the order of regions for each indicator created. The first rank has been allocated to the best value of an indicator; the 13th rank has been allocated to the worst value. The identical heights have been valued by the average order. The region, whose sum of orders of indicators was the lowest, was found in the best position. The region whose total order of indicators was the lowest had the best position. As for the ratio method in the situation where lower value of the indicator indicates better state, the value  $y_{ij}$  expressed as reverse value of observed proportion. Standardized scores  $y_{ij}$  are in standardized method computed according to (3), if higher value of variable presents positive state. If higher value presents negative state (for example unemployment rate), are modified  $y_{ij}$  values included to composite indicator with negative sign.

### 3 Results

#### A) The selection of the calculation of the aggregate indicator for the evaluation of districts in the Czech Republic

The goal in this section is to choose such method which is in the intentions of signalized requirements under partial aim A. There were given points to each method depended on the fulfillment of given requirements. The range had three levels: the method which doesn't comply with the result in terms of requirements obtained 0 points, the method which complies but there are some reservations given, two points were given to the method which obtains given requirement without reserve. The classification of points has been accomplished by the author of the work.

**Table 2.** Composite indicator method selection according to proposed conditions

Criterion\CI method	Ranking	Ratio	Standardization	Range
Simplicity	2	2	0	1
Interpretation	1	2	1	1
Differences reflection	0	1	1	1
Applicability	2	1	2	2
Total	5	6	4	5

Note: point scale is as follows: 2 = comply with requirement without reserve, 1 = comply under reservations, 0 = not acceptable.

#### **Simplicity**

The criterion of simplicity reflects the evaluation of severity of the composite indicator's calculation. To meet the requirements without reserve, the user without knowledge of statistics should be able to calculate the result, it means only with the knowledge of calculation of mean. The ranking and the ratio method fulfill that. The range method can be accepted with the reservation. The method works with variation range, which is not a well known concept for a common user. Standardization method contains the variance in its result which is often used, it is possible to calculate the variance in MS excel, but its interpretation and understanding can cause the common user difficulties and that is why the standardization method is not in this evaluation considered as easy and understandable.

#### **Interpretation**

The possibilities of a sufficient commentation of the results of composite indicators are different in particular method. The ratio method is considered to be the most appropriate. We can easily comment which results are higher than average (which is higher than 1) and which results are below the average. We can even say by how many percent or how many times is the result of a certain region higher or lower than the average. Standardization and range methods are acceptable with the reservations. With the exception of standardization method where there is the mean value zero, when using range method, we do not calculate with the mean and at the first sight (if we do not compute by ourself) it is not possible to deduce which regions are higher than average and which are below the average. It is hard to relate results of other regions to the zero mean when using standardization method, especially when calculating the proportion. The interpretation of ranking method is not complicated; however there is information about primary values lost.

#### **Differences reflection**

When calculation the regional differences it is important to intercept and qualify these differences as well as possible. The results of ranking method depict the differences in results

out of focus that is why we consider this method not suitable. All other methods are suitable with reservations, because each of them in a certain way lowers the degree of disparity and the influence of distant values. The result of ratio method depends on the distant indicator's values, because they distort the height of the mean and also the value of the composite indicator. Standardization method is a bit more resistant against extreme values than ratio method. Range method is even less sensitive to those values than standardization method.

### **Applicability**

All compared approaches were found to be applicable to data in the regional development, all methods enable to summarize the data in different units and to create final aggregate indicator. When calculating ratio method there can not be zero in the denominator which may be limitative.

According to adjusted requirements for the aggregate indicator was chosen **ratio method**, which has obtained the highest number of points in the selection phase (table 2).

## **B) The evaluation of region's position using chosen methods of composite indicator and subsequent categorization of regions from the point of view of ranked indicators into the composite indicator**

### *Position evaluation*

The ratio method has been chosen as a method of composite indicator. The (PCA) select has been chosen for the calculation of weights. The ratio method has still got the reserve in one of the criteria of selection - the reflection of the differentiation. For this particular reason the author suggests the modification of ratio method. It consists of the substitution of the mean by the value of median. Median is a robust characteristic of central location, its usage in the calculation enables more expressive differentiation of the resulting value of composite indicator. Median of each indicator is not defaced in the calculation by distant observations as much as it is in the case of mean. It enables more outstanding differentiation of composite indicator.

The ratio method can be characterized by the formula (2). In terms of the modification changes the formula for  $y_{ij}$  (2) into (8).

$$y_{ij} = \frac{x_{ij}}{\tilde{x}_{.j}} \quad (8)$$

Note:  $y$  is modified value, index  $i$  refer to region, index  $j$  to variable;  $i = 1, \dots, 13$ ;  $j = 1, \dots, m$ ; where  $m$  is number of variables;  $x_{ij}$  is original values of the variable;  $\tilde{x}_{.j}$  is median of the variable.

In the situation where there is a lower value of indicator indicator of better condition, there is recounted quantity  $y_{ij}$  expressed as a reversed value of ration in the formula (8).

As it is obvious from the table 3, Středočeský region achieved the best results in all tracked years. It is alternately followed by Jihočeský and Plzeňský region. In 2007 these regions embodied better results in variables GDP, unemployment rate, number of job applicants. Their composite indicator was markedly above the value 1 which indicated the average value. The ladder is closed by Moravskoslezský region, Karlovarský and Ústecký region which showed worse results in mentioned variables. Ústecký and Moravskoslezský regions embodied above-average results in the average wage. Ústecký and Moravskoslezský regions are mainly focused on the engineering and on the production with low value added. According to strategically regional documents for years 2007 - 2013, both regions are supposed to focus on the entrepreneurial activity, the exploitation of brown fields and on the better cooperation of institutions of science and research with firms. Both regions are

characterized by high unemployment which has been also caused by worse qualifying structure; the regions have been trying to solve this problem by staff retraining. The biggest progress is perceptible between the years 2003 and 2007 in Středočeský region, Jihočeský and Moravskoslezský regions. In terms of the tracked indicators, the smallest progress was accomplished in Zlínský region, Královéhradecký and Karlovarský regions.

**Table 3.** Composite indicators in years 2003 – 2007

Region	2007		2006		2005		2004		2003		Change 2003 – 2007*	
	CI	rank	CI	rank	CI	rank	CI	rank	CI	rank	CI	rank
Středočeský (STČ)	1,74	1	1,57	1	1,55	1	1,60	1	1,50	1	1,03	1
Jihočeský (JHČ)	1,25	3	1,16	4	1,13	3	1,28	3	1,16	3	1,01	2
Plzeňský (PLK)	1,47	2	1,46	2	1,25	2	1,44	2	1,18	2	1,00	8
Karlovarský (KVK)	0,81	12	0,79	12	0,83	11	0,89	11	0,93	9	0,99	13
Ústecký (ULK)	0,81	13	0,79	13	0,81	12	0,87	12	0,94	8	1,00	9
Liberecký (LBK)	1,05	8	1,04	7	1,10	5	1,19	4	1,07	6	1,01	6
Královéhradecký (HKK)	1,06	7	1,04	8	1,12	4	1,11	5	1,10	5	0,98	12
Pardubický (PAK)	1,24	4	1,23	3	1,05	6	1,10	6	1,11	4	1,01	4
Vysočina (VYS)	1,09	5	1,09	5	1,05	7	1,04	7	1,04	7	0,99	10
Jihomoravský (JHM)	1,02	9	0,97	10	0,94	8	0,95	9	0,93	11	1,00	7
Olomoucký (OLK)	0,90	10	0,86	11	0,86	10	0,90	10	0,90	12	1,00	5
Zlínský (ZLK)	1,09	6	1,04	6	0,93	9	0,95	8	0,93	10	0,98	11
Moravskoslezský (MSK)	0,86	11	1,03	9	0,79	13	0,84	13	0,86	13	1,02	3

Source: ČSÚ, Regions, Towns, ..., 2003 – 2007; own elaboration

\*CI for change between 2003 – 2007 based on average change indicator

### *Categorization of valuated regions based on selected indicators*

The position of the regions depicting the combination of the stage in certain year and change in the certain period (table 3) can be digestedly characterized by so call **Diagram of the regional development** (figure 1). The regions in the quadrants leaders, stagnant and catching up can be considered as those with good developing potential. Dashed line for composite indicator in the year 2007 and also for composite indicator of change between the years 2003 and 2007 represents the mean value from the composite indicators of observed regions. The best results embody those leaders where there has been the positive development provided in the years 2003-2007 as well as above-average height of composite indicator for the year 2007. These are regions Středočeský, Pardubický and Jihočeský. The above-average height of composite indicator for the year 2007 and below-average improvement in the period 2003-2007 were characteristic for regions Plzeňský, the stagnant quadrant. Olomoucký, Moravskoslezský and Liberecký regions can be considered as the Catching up with encouraging development even though in the light of the state of the regions we usually locate them to the worse group of regions. In the light of the change they made huge improvement in the period 2003-2007. The quadrant Losing contains regions which usually reach below-average values in terms of single years, but even in terms of a change of tracked time series, the regions remain to be under-average. Distribution of regions into particular quadrants is mostly influenced by indicators with higher weight, i. e. GDP, unemployment rate and registered job applicants.

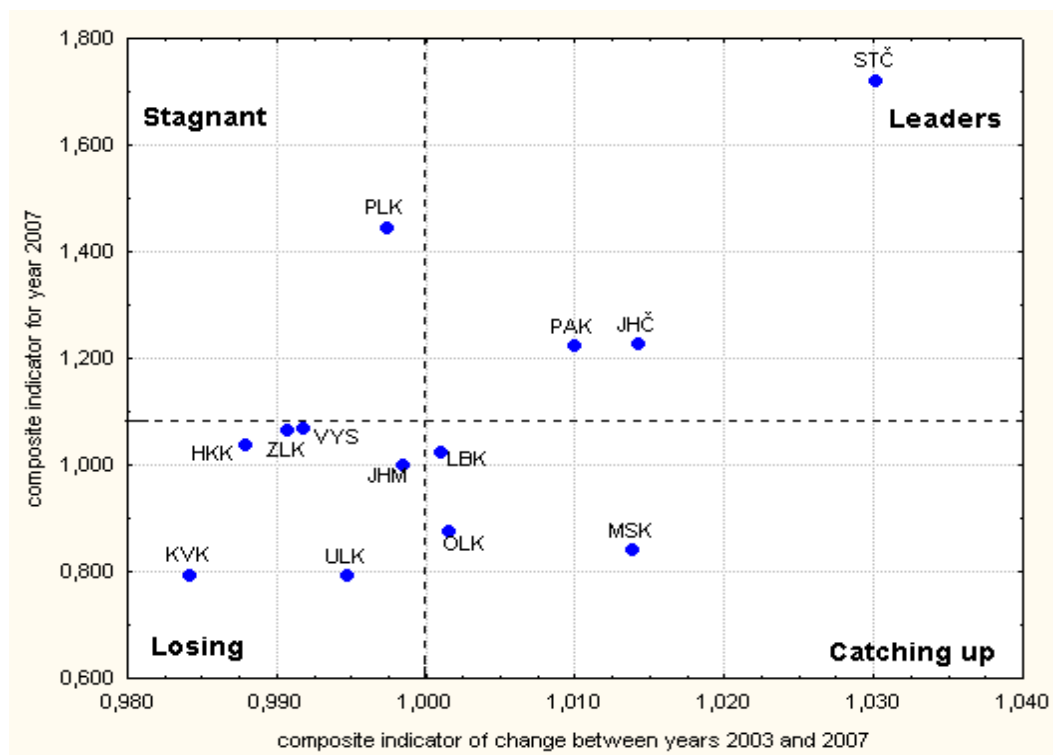


Figure 1. Regional development diagram

Source: own elaboration

Note: dashed lines mean average value of composite indicators (for year 2007 is it 1,086; for change between 2003 and 2007 is it 1,002)

## 4 Conclusions

There has been a methodical instrument for the evaluation of regional development suggested in this work. It has been verified on selected indicators of the economic regions sphere. The suitable method for the evaluation of position of the regions has been chosen, the method has been modified by author to suit even better the primary requirements. For the values of composite indicators for the year 2007 and the change in the years 2003 – 2007 was diagram of regional development created, which has enabled the categorization of the regions.

The utilization of the methodological instrument for the complex evaluation of the regional development is universal and isn't limited by the type of a region. The methodology can be used as a compact complex for the complex valuation, but also in parts, for example where there will be weights included in its calculation. With regard to existing studies and here mentioned results, further research in the field of disparity analysis among regions and complex valuation could orient on the continuity of regional position observation on the basis of the composite indicator and the verification of diminishing differences among the regions, and the continuity in the research of suitable method of composite indicator applied in the regional development.

## References

1. Buchta, S., Rentková, Z.: Spatial aspects of the Sectoral Operational Programme – Agriculture and Rural Development – implementation in the Slovak Republic. Agricultural economics, 53, Nr. 5. Praha, 2007. ISSN 0139-570X.
2. EC. Pokyny k regionální podpoře na období 2007 – 2013. Úřední věstník Evropské unie (2006/C 54/08), Brusel, European Commission, [on-line]. c2006, [cit. 2010-05-20].

Available from: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2006:054:0013:0044:CS:PDF>.

3. Grupp, H., Schubert, T.: Review and new evidence on composite innovation indicators for evaluating national performance. *Research Policy*, 39, Nr. 1. Amsterdam, 2010. ISSN 0048-7333.
4. Freudenberg, M.: Composite Indicators of Country Performance. OECD Science, Technology and Industry Working Papers 2003/16 [on-line]. c2003, [cit. 2010-05-17]. Available from: [http://www.oilis.oecd.org/oilis/2003doc.nsf/linkto/dsti-doc\(2003\)16](http://www.oilis.oecd.org/oilis/2003doc.nsf/linkto/dsti-doc(2003)16).
5. Martín-Guzmán, P., Gil, M.: Official statistics for measuring well-being at national and regional level in EU: Some comments from users. *Časopis Statistika*, Nr. 1. Praha, 2009. ISSN 0322-788x.
6. Munda, G.: Social multi-criteria evaluation: Methodological foundations and operational consequences. *European Journal of Operational Research*, 158, Nr. 3. Amsterdam, 2004. ISSN 0377-2217.
7. Nardo, M. et al.: Handbook on Constructing Composite Indicators. Brusel: Joint Research Centre, European Commission, 2008, ISBN 978-92-64-04345-9, [on-line]. c2008, [cit. 2009-10-17]. Available from: <http://browse.oecdbookshop.org/oecd/pdfs/browseit/3008251E.PDF>.
8. Saisana, M. et al.: State of the Art Report on Composite Indicators for the Knowledge-based Economy. 2005 [on-line]. c2005, [cit.2009-05-28] Available from: <http://www.uni-trier.de/fileadmin/fb4/projekte/SurveyStatisticsNet/KEI-WP5-D5.1.pdf>.
9. Svatošová, L.: Methodological starting points of regional development analyses. *Agricultural economics*, 51, Nr. 2. Praha, 2005. ISSN 0139-570X.

# Knowledge maps in decision making using GIS support

Dana Klimešová<sup>1,2</sup>, Helena Brožová<sup>3</sup>

<sup>1</sup>Department of Information Engineering, Faculty of Economics and Management,  
Czech University of Life Sciences Prague,  
Kamýčká 129, 165 21 Prague 6 Suchbát, Czech Republic

<sup>2</sup>Institute of Information Theory and Automation,  
Czech Academy of Sciences of the Czech Republic, Prague, Czech Republic  
klimesova@pef.czu.cz

<sup>3</sup>Department of Systems Engineering, Faculty of Economics and Management,  
Czech University of Life Sciences Prague,  
Kamýčká 129, 165 21 Prague 6 Suchbát, Czech Republic  
brozova@pef.czu.cz

**Annotation:** Decision-making is a process in which decision-makers apply their explicit and tacit knowledge to select the best solution among several alternatives. In many decision-making situations geography plays a very important role. Many spatial problems are complex and require the use of analysis and models and an interdisciplinary and group approach to their solution. Spatial problems are often semi-structured or ill-defined because all of their aspects cannot be measured or modeled. Essential tool for solving of these problems is a geographic information system (GIS). GIS allows us to view, understand, interpret, and visualize geographical data in many ways that shows relationships, patterns, and trends in the form of maps, globes, reports, and charts. GIS helps to solve problems by data which are quickly looked and easily shared.

GIS, maps and models represent special forms of (data, information and) knowledge formalization. The knowledge map is a visual interception of knowledge with the aim of its storage, sharing and development for decision-making. The mathematical model and its solution also support information and knowledge formalization and sharing among group members. GIS can be viewed in three ways - the database view, the map view, and the model view. GIS application can be one of the three types - data sorting and storing, analysis and processing data, decision-making and knowledge creation. Our aim is to formalize correspondence between these items.

In this paper we will discuss decision-making process using GIS, various forms of knowledge maps in GIS and models in GIS. We will show selected examples of knowledge maps in GIS application.

**Key words:** Knowledge map, decision-making, GIS.

**JEL classification:** D80

## 1 Introduction

The effective enterprise in the field of agriculture needs interdisciplinary practice across the economics and management together with applied information technologies. Essential tool for solving of these problems is a geographic information system (GIS).

Decision-making problems are more and more complex. Therefore often a group of decision-makers is involved into decision process. Many decision problems can also be characterized as spatial problems which are complex and require the use of analysis and models and an interdisciplinary and group approach to their solution. Spatial problems are often semi-structured or ill-defined because all of their aspects cannot be measured or modeled.

GIS, maps and models represent special forms of (data, information and) knowledge formalization. The aim of knowledge map is storage, sharing and development of knowledge for decision-making among decision group members. The mathematical model and its solution also support information and knowledge formalization and sharing. GIS can be viewed in three ways - the database view, the map view, and the model view. GIS application

can be one of the three types - data sorting and storing, analysis and processing data, decision-making and knowledge creation. Our aim is to formalize correspondence between these items.

## 2 Data and Methodology

Geographic information system (GIS) provides essential marketing and customer intelligence solutions that lead to better business decisions. Geography is a framework for organizing our global knowledge and GIS are a technology for being able to create, manage, publish and disseminate this knowledge for whole society. GIS allows to store, visualize, analyze and interpret the data from many sources in many ways that are not possible in the rows and columns of spreadsheets. Many spatial problems are complex and require the use of analysis and models.

GIS can help your business saving time and money, while improving access to information and realizing a tangible return on your GIS investment. With GIS, it is possible to analyse:

- Site selection and location analysis
- Number of potential customers within market area
- Accessibility of the site
- Customer segmentation, profiling, and prospecting
- Demographics and customer spending trends
- Potential new markets
- Scenarios and strategy and so on.

On the other hand there are a lot of difficulties asking for more context information. Some of factors are difficult to evaluate or predict, new features have to be introduced, their relative importance can be changed to reflect differences of opinion, it can be necessary to generate a new set of alternatives with more precise structure [8].

Knowledge means the problem understanding and the ability to solve a problem. Knowledge can not be defined without its context, experience, interpretation, and reflection. Knowledge has the following aspects [5]:

- It represents solution of problem.
- It has a normative function.
- It is internally and externally networked.
- It is dynamic and contextual.
- It is or is not personal bounded.

GIS can be interpreted and used also as knowledge maps, because a knowledge maps can be regard as a progression of ideas, general conceptual relationships and a problem solving process. Knowledge maps are a visual interception of data, information and knowledge with the aim of its storage, sharing and development for decision-making [14], [15].

Gordon [4] also shows that knowledge maps may be referred to as the maps of acquiring knowledge. The knowledge maps are important as building knowledge tools as well as thinking tools [13], [11].

Different kinds of knowledge maps according to their content or application in thinking processes can be defined, for instance:

- *A mind map* [3].
- *A concept map* [12], [2].
- *Strategy maps and goal maps* [6].

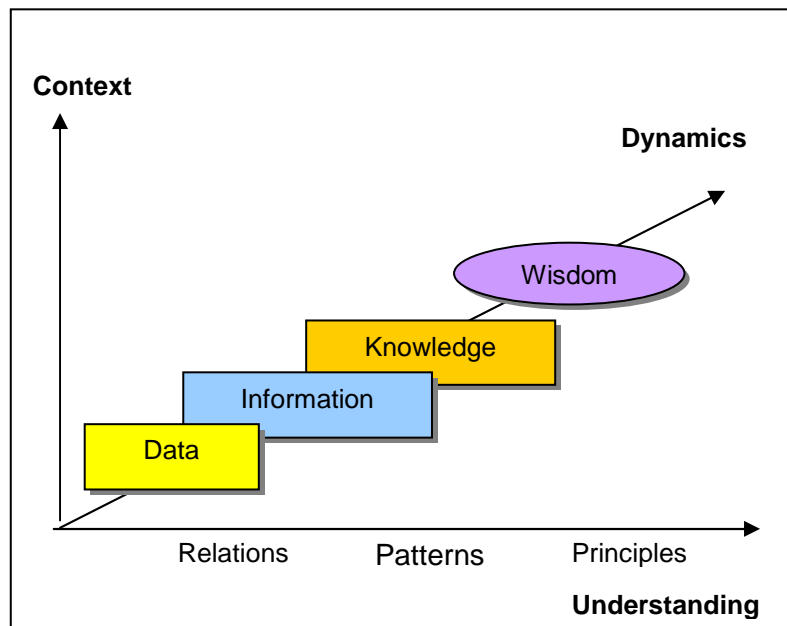


According to the knowledge creation and modelling process the following types and classification of knowledge maps can be set [16]:

- *Descriptive maps* describe the real situation as precisely as possible.
  - The mutual positions of elements in *weak descriptive maps* are unimportant, only the symbols themselves and the quality of their relationships are relevant.
  - In *strong descriptive knowledge maps* the items must use spatial relationships to elicit, share and codify knowledge [15].
- *Normative maps* contain an optimal solution or the best decision.
- *Prescriptive maps* [1] help to reach normative solutions.

### 3 Results - Knowledge maps in GIS

Geospatial decision-making needs the tools to analyze the relationships of proximity, connectivity, neighbourhood, overlay, to investigate the spread and seek of phenomenon and their combination in dependence on selected set of attributes and information layers. GIS and its functions are the kind of this tool. GIS shows relationships, patterns and trends in the form of maps, scenarios, reports and charts, and helps to solve problems using data which are quickly looked up, easily shared and internally and externally networked. Moreover, the selection of information layers can follow the local, temporal, thematic, spatial, and other types of context [7].



**Figure 1.** Data, information and knowledge in GIS approach

To solve the problem, GIS works with selected number of information layers (geometry and attributes) from the contextual space (real, artificial or virtual) and analyzes relationships, evaluates scenarios, creates partial results and verifies assumptions to prepare detailed task specification. The set of problem oriented layers (geometry and attributes) can be viewed as a weak descriptive map while the GIS layers themselves are a strong descriptive map. In GIS layers there is possible to investigate not only dependencies but also the location and distances among map elements, select the optimal path that fulfills given conditions including elevation, to solve the problem of scale and resolution of data from many sources and so on.

Context is very important in recognition and multi-criteria decision at multiple levels. Achieving the highest possible level of decision performance means the efficient use of all contextual information. Sources of contextual data can be also user and event models, environmental states and parameters acquired by various sensing methods, logical relationship between objects in physical spaces and in images, consistency between different instances of observation in time and views, and previously interpreted observations [9].

The three essential information structures are sequences, hierarchies and webs, which can be explained, described, and used as a special form of knowledge maps. The simplest way to organize information is to place it in a sequence. Sequential ordering may be chronological, a logical series of topics progressing from the general to the specific, or alphabetical, as in indexes and encyclopedias.

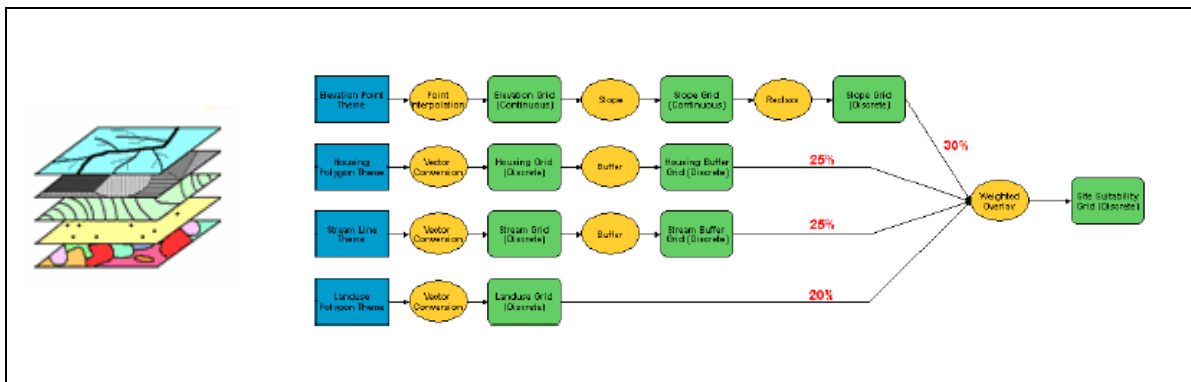


Figure 2. Sequences of knowledge maps in GIS approach

As an example of simple task see fig.2 that shows multi-criteria analyse model where four input information layers are sequentially preprocessed using operations like: selective search, creation of new spatial entities, reclassification, neighbourhood operations and buffering to obtain final overlay dataset that contains useful information for decision making.

The hierarchies are the best way to organize and simplify most complex packages of information. Hierarchies are a very suitable structure to incorporate a particular point of view into the system arrangement.

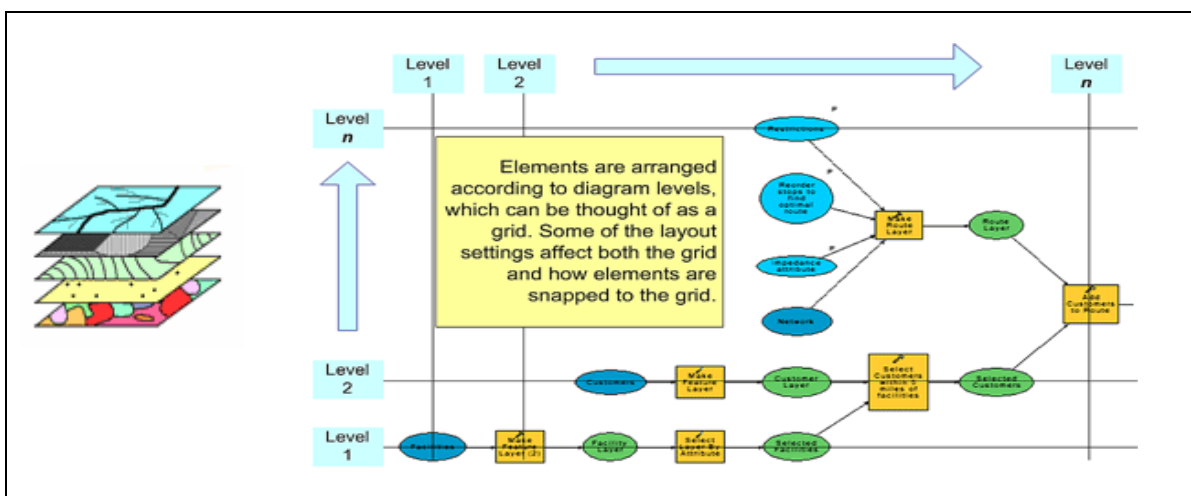


Figure 3. Hierarchie of knowledge maps in GIS approach

Web organizational structures contain only few restrictions on the pattern of information use. The goal is to follow associative thought and free flow of ideas, allowing users to keep their interests in a unique, heuristic pattern investigation.

This model contrary of the sequential is very sophisticated and complex. It makes possible to communicate between additional information sources and task models, can take into consideration partial evaluations and integrate accessible information layers to process and evaluate different scenarios.

The availability of different sensing modalities and the efforts in multi-modal information fusion, the importance of dynamic algorithms by employing prior information as context for better inference opens new space for the decision-making. The recent interest in adaptive applications based on user context oriented on activity and history, improved robustness, efficient use of information sources as well as adaptation to event and user behaviour models can be gained through the utilization of contextual information [10].

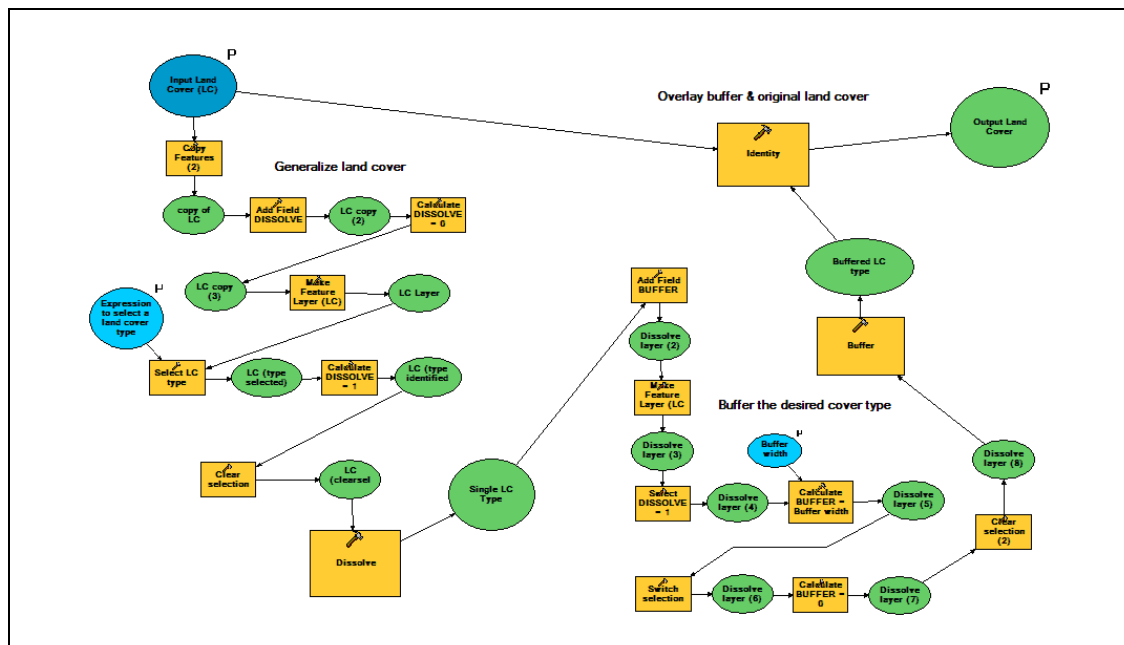


Figure 4. Web of knowledge maps in GIS approach

## 4 Conclusions

Decision-making process in contemporary decision problems often uses GIS. Data, information and knowledge sharing is supported by various forms of knowledge maps and models in GIS. We analyze selected examples of knowledge maps in essential GIS structures - sequences, hierarchies and webs, which can be explained, described, and used as a special form of knowledge maps.

## Acknowledgements

The paper is supported by the grant project of Ministry of Education Czech Republic No. MSM6046070904 Informační a znalostní podpora strategického řízení (Information and Knowledge Support of Strategic Management).

## References

1. Baron, J.: Normative Models Judgement and Decision making, In: Blackwell Handbook of Judgment and Decision Making, Koehler, D. J., Harvey, N. (Eds.), Blackwell Publishing, 2004. ISBN 1-4051-0746-4.
2. Brinkmann, A.: Knowledge Maps – Tools for Building Structure in Mathematics, International Journal for Mathematics Teaching and Learning, [online journal], 2005, available at: <http://www.cimt.plymouth.ac.uk/journal/brinkmann.pdf>, [cit. 2009-08-25].
3. Buzan, T.: The Ultimate Book of Mind Map, Thorsons, London, 2005.
4. Gordon, J. L.: Using Knowledge Structure Maps as a Foundation for Knowledge Management, Exploiting Information & Knowledge, In Defence Symposia, The Royal Military College of Science, 2002.
5. Gottschalk-Mazouz, N.: Internet and the flow of knowledge, In: Hrachovec, H.; Pichler, A. (Hg.): Philosophy of the Information Society. Proceedings of the 30. International Ludwig Wittgenstein Symposium, Volume 2, 2008, Kirchberg am Wechsel, Austria.
6. Kaplan, R. S., Norton, D. P.: Strategy Maps: Converting Intangible Assets into Tangible Outcomes, Harvard Business School Publishing Corporation, 2004.
7. Klimešová, D.: Study on geo-information modelling. WSEAS Transactions on Systems, 2006, 5, pp. 1108-1113.
8. Klimešová, D., Ocelíková, E.: Study of Uncertainty and Contextual Modelling. WSEAS International Journal of Circuits, Systems and Signal Processing, Issue 1, Volume 1, 2007, pp. 12-15.
9. Klimešová, D.: Study on Knowledge and Decision Making, In: Intelligent Engineering Systems and Computational Cybernetics, Eds: Machado, J. A. T., Pátkai, B., Rudas, I. J., Springer. 2008.
10. Kwak, D. W., Lee, S. J., Kim, J. W., Jung, E. J.: An Efficient LKH Tree Balancing Algorithm for Group Key Management, IEEE Communications Letters, 2006, Vol. 10, No. 3, pp. 222-224.
11. Levin, M. S.: Composite Systems Decisions, New York: Springer, 2006.
12. Novak, J.D., Govin, D.B.: Learning how to learn, Cambridge University Press, 1984.
13. Rogers, E.W.: Why We Do Need to See Our knowledge?, KnowMap, 2000, Vol. 1, No. 1, Stanford Solutions, [online journal], available at: [http://www.knowmap.com/0101/rogers\\_why\\_need.html](http://www.knowmap.com/0101/rogers_why_need.html), [cit. 2007-04-03].
14. Stanford, X.: What Is Knowledge Mapping?, KnowMap, 2000, Vol. 1, No. 1, Stanford Solutions, [online journal], available at: [http://www.knowmap.com/0101/stanford\\_what\\_knowledge.html](http://www.knowmap.com/0101/stanford_what_knowledge.html), [cit. 2007-04-03].
15. Stanford, X.: Map Your Knowledge Strategy, Information Outlook, 2001, Vol. 5, No. 6, Special Libraries Association, [online journal], available at: <http://www.sla.org/content/Shop/Information/infoonline/2001/jun01/stanford.cfm>, [cit. 2009-09-05].
16. Šubrt, T., Brožová, H.: Knowledge Maps and Mathematical Modelling, The Electronic Journal of Knowledge Management, 2007, Volume 5, Issue 4, pp. 497 - 504, ISSN 1479-441, [online journal], available at: <http://www.ejkm.com/>, [cit. 2009-10-02].

# Forecast of inflation rate by Box-Jenkins methodology

Julie Poláčková<sup>1</sup>

<sup>1</sup>Department of Statistics, Faculty of Economics and Management,  
Czech University of Life Sciences Prague  
Kamýcká 129, 165 21 Praha 6, Czech Republic  
polackova@pef.czu.cz

**Annotation:** A consideration of inflation, and its impact on agriculture and the general economy, is important to any realistic perspective on the setting for food and agriculture for several reasons. Inflation raises prices for farm inputs as well as for farm products, resulting in uncertain effect on current net income of farmers; but it greatly raises the value of farm assets. The aim of this paper is to analyze the trend of inflation rate and to estimate the expected forecast. The trend-seasonal Box-Jenkins methodology was chosen for decomposition of the monthly time series. The selected model works with a residual component, which is represented by correlated random variables. The resulting model of inflation expectations has been identified by the lowest value of selected information criteria. Pursuant to a significant trend and seasonal component contained in the data the SARIMA model was chosen. Based on the prediction in 2010 the inter-annual inflation rate is expected increase to 1.8%. This value indicates a slight increase in consumer prices compared with 2009. The values predicted by the model are different only at the level of tenths of a percent from the already published values (of inflation in 2010), which confirm that a relevant model was created. The estimated forecast of the inflation rate was compared with the predictions made by experts from the Czech National Bank. In comparison with the expert's model, the forecasts obtained from the SARIMA model are - in the first part of 2010 - overestimated. In the second part of 2010 the forecasts of inflation rate are not different markedly in comparison with expert's model, which means that the model is appropriate for the inter-annual inflation rate forecasting.

**Key words:** Time series analysis, Box-Jenkins methodology, Financial forecasting, Inflation rate.

**JEL classification:** G17

## 1 Introduction

The measuring of financial market inflation expectations, a standard analytical approach of central banks, occupies an important place in the inflation-targeting monetary policy scheme. The central bank's monetary policy decision-making is based on an analysis of current and predicted future developments in the economy and the factors affecting them. [4] The question of the role and effect of structural changes on inflation forecasts and inflation expectations is important as it can affect the effectiveness of monetary policy [7].

Schertz and Harrington [11] stands that inflation has four primary impacts on agriculture. It increases nominal prices of farm products as well as the nominal prices of inputs, but its effects on net farm income adjusted for inflation are uncertain. It stimulates purchases of capital inputs (machinery) and additional land by farmers with consequent effects on costs of production and pressures for higher commodity price support. It increases the wealth of those who own the land. And it also strengthens the relative economic position of wealthier and higher income people in buying additional land. Higher rates of inflation result in higher interest rates for borrowing money and interest rates affect prospective cash flows available to different bidders for farmland. Evaluation of inflation expectations holds an important position not only in the monetary policy, but also in public policies for agriculture.

Junttila [7] stands that the best possible approach to modeling the development of future inflation would be to try to find a detailed macroeconomic model with special emphasis on

the transmission mechanisms between the variables in the model. But the role and causality relations of inflation rate with respect to other macroeconomic, or perhaps financial, variables is not completely clear and depends on the structure of the economy. The trend-seasonal Box-Jenkins methodology represents a sophisticated approach to decomposing a time series of inflation rate and forecasting the coming months. The ARIMA model provides a valuable forecast especially in terms of shortrun forecasts. Valenzuela [14] states that the main advantage of ARMA model is that it only requires data of the time series in question.

The aim of this paper is to analyze a monthly time series of inflation expectation and to create the forecast of the inflation rate, represented by growth of consumer price index in comparison with the same month last year, which is one of the key indicators affecting the setting of future monetary policy. The forecast will be compare with the predictions made by analysts from the Czech National Bank and other financial experts.

## 2 Data and Methodology

A monthly time series of inflation rate from period between May 1999 and March 2010 was obtained from the Czech National Bank and Czech Statistical Office [4,5]. The statistical software SAS 9.2 (Statistical Analysis System) was used for producing the analysis. Used procedures are explicitly listed in the text. More information is possible to find in [10,14].

### 2.1 Time series analysis

Any analysis of the time series data required identifying of three components: trend ( $T_t$ ), seasonal ( $S_t$ ) and error ( $\varepsilon_t$ ). Trend usually refers to a deterministic function of time. The seasonal component of a time series represents the effects of seasonal variation. The irregular component of a time series is what remains when trend and seasonal effects are removed. The irregular component doesn't need to represent a random sequence of uncorrelated values. However, most models specify that this component must be stationary [1,3,15]. That means the time series has a constant mean and variance at all time points. A stationary time series cannot have any trend or seasonal components. This is a usual definition of a weakly stationarity. More information about stationarity is possible to find in [1,3,12,14].

### 2.2 Box-Jenkins methodology

When modeling linear and stationary time series is frequently chosen the class of autoregressive moving average (ARIMA) models because of its high performance and robustness [2]. Autoregression means that a series is regressed on its own past. The ARIMA methodology proposes the use of differencing operators to model trend and seasonality [15].

For an ARIMA(p, d, q) model, it is necessary to obtain the (p, d, q) parameters, where p is the number of autoregressive terms, d is the number of non-seasonal differences and q is the number of lagged forecast errors in the prediction equation. The first step is to identify the order of differencing needed to make the series stationary [3,14].

Serial dependency can be removed by differencing the series, which means converting each element of the series into its difference from the previous one. There are two major reasons for such transformations: First, the hidden nature of serial dependencies in the series can be thus identified and second, it is necessary for the Box-Jenkins methodology [14].

### 2.3 Identifying an appropriate model

The autocorrelation function (ACF) measures the dependence among observations in a time series. The time series models exploit the autocorrelation in the series to improve estimation of

model parameters and the forecast of future values of the series. The partial autocorrelation function (PACF) at lag  $k$  is the autocorrelation between observation  $k$  time units apart adjusted for all autocorrelation for observations less than  $k$  time units apart. The inverse autocorrelation function (IACF) is similar to the PACF, but is more sensitive for some features of autocorrelation. One of the primary purposes of the autocorrelation plots is to suggest candidate models to use for forecasting [1,8,14].

Different way of choosing between competing models is the information-theoretic approaches such as the Akaike's information criterion (AIC) or Schwarz-Bayes's criterion (SBC). The AIC was designed to be an approximately unbiased estimator of the expected Kullback-Liebler information of a fitted model. The minimum AIC produces a selected model, which is close to the best possible choice. The selection of a particular model have been proposed in [6,14].

It is assumed that the autoregressive and moving average parameters satisfy the conditions for stationarity and invertibility. The first step of modeling is to identify the order of differencing needed to make the series stationary. Whether the series contains a deterministic or a stochastic trend the transforming nonstationary into stationary time series is necessary. The Dickey-Fuller Unit Root Test provides a statistical test for first differencing. The null hypothesis is that first differencing is required. The alternative hypothesis has three forms: zero mean, single mean and trend. Variation of this test exists for seasonal differencing. More about the unit root test is possible find in [7,9].

A good model produces residuals that resemble white noise. Tseng [13] stands that the estimated residuals should be independently and identically distributed as normal random variables with mean = 0 and variance  $\sigma^2$ . A white noise process is a stationary process in which observation at different of time points are uncorrelated. A stationary time series with an autocorrelation function that is zero at all positive lags is a white noise time series. The null hypothesis of the Ljung-Box Chi-square test for white noise is that the series is white noise, and the alternative hypothesis is that one or more autocorrelations up to lag  $m$  are not zero [13,15].

### 3 Results

At the beginning of analysis process plot the ARIMA procedure was used for the creation of diagnostic plot and statistics, which help to identify an appropriate model. From the plot of time series it was evident that the series behaviour indicates an oscillation around the trend. This oscillation are mostly caused by economical situation. From the graph it is not obvious any noticeable seasonal component, but a trend component can occur within the series. For the ACF function, bars at lags 1 and 12 are statistically significant, implying that the memory of the series is dominated by values 1 and 12 month in the past. The first coefficient indicates the significant trend component and the 12<sup>th</sup> significant coefficient indicates that the seasonal component can occur in the time series. It is evident that the residuals are not random.

The Ljung-Box chi-square test of white noise confirms that the autocorrelation of residuals exists in the time series. Therefore the stationarity of time series was examined. The following ARIMA procedure produces a Dickey-Fuller test:

```
proc arima data=sasuser.fcr;  
  identify var=mzr_CPI nlags=24  
  stationarity=(adf=(0 1));  
run;
```

The Dickey-Fuller test did not reject the null hypothesis, which means the time series is not stationary and contains a significant trend component. The stationarity can be achieved by differencing of the series.

### 3.1 Selection of the best model

There are many methods or criteria for selection of the best model. The SAS system offers method of Smallest Canonical Correlation (SCAN) or Extended Sample Autocorrelation Function (ESACF). Using the arguments `ESACF` and `SCAN` in following ARIMA procedure are recommended models obtained.

```
proc arima data=sasuser.fcr;
  identify var=mzr_CPI nlags=24
  esacf scan minic p=(0:5) q=(0:5) perror=(3:12);
  forecast id=date interval=month out=arimaout2;
run;
```

On the basis of these methods were suggested following appropriate models: ARMA (2,1); ARIMA (1,1,1); ARIMA (0,2,1); ARMA (3,1); ARIMA (2,1,1); ARIMA (1,2,1); AR (3); ARIMA (2,1,0); ARIMA (3,1,1); ARIMA (2,2,1). The smallest value of Akaike's information criterion (AIC = 177) occurs for the ARMA (2,1) model. The estimated parameters of this model are significant at the 5% significance level. However, the Ljung-Box chi-square test confirms that this model is not appropriate for modeling the time series of inflation rate, because the residuals did not represent a white noise. The nonstationarity of I(1) process can be eliminated by forming first differences.

### 3.2 Differentiation of time series

The trend component, which caused a non-stationarity of time series, was eliminated by first differences. Suggested models – based on the SCAN and ESACF criteria – are: ARIMA (1,1,1); ARIMA (0,2,1); ARIMA (2,1,0); ARIMA (1,2,0); ARIMA (0,1,2). An ARIMA (2,1,0) model was selected on the basis of minimization of Akaike's information criterion (AIC = 181).

The Ljung-Box chi-square test was chosen for white noise testing. This test rejected the null hypothesis and confirmed an existence of autocorrelation. The correlogram, which shows that in the time series there is a significant seasonal component, confirmed this conclusion too. It means the seasonal ARIMA model should be created.

### 3.3 Seasonal ARIMA model

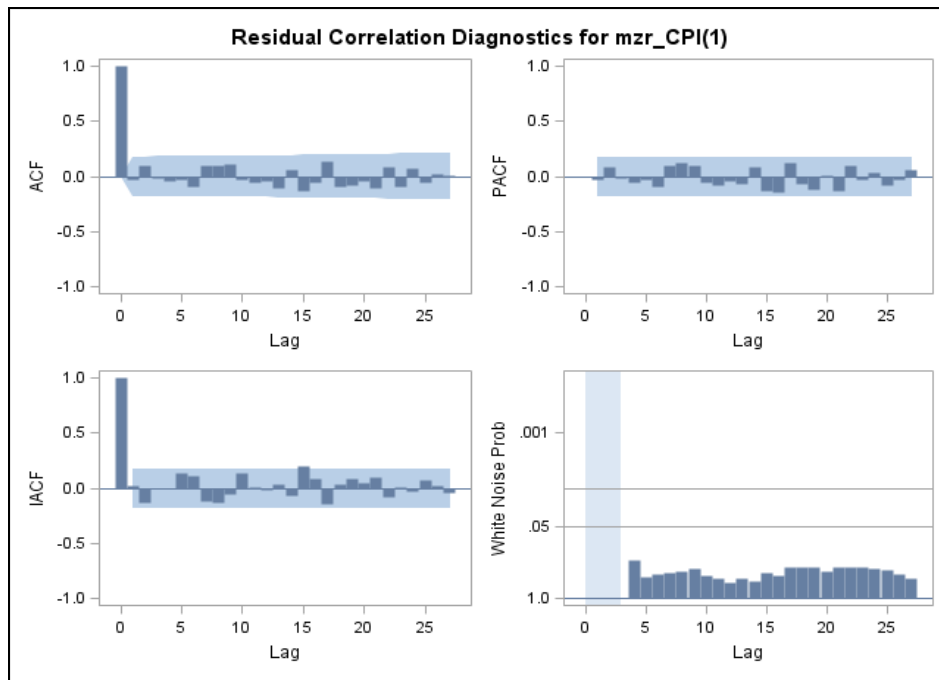
The SARIMA (1,1,1)(0,0,1)<sub>12</sub> model, which contains the seasonal moving average term, was chosen as the best seasonal model. The length of the seasonal period is 12. This model fills all expected assumptions and minimizes the value of Akaike's information criterion (AIC = 138). The estimated parameters of the SARIMA model are shown in table 1. Only the MU parameter, which represents the location of the time series, is not significantly different than zero. The remaining parameters are significant at the 5% significance level.

**Table 1.** The estimated parameters of SARIMA (1,1,1)(0,0,1)<sub>12</sub> model

Maximum Likelihood Estimation						
Parameter	Estimate	Standard Error	t Value	Approx Pr >  t	Lag	
MU	-0.0099616	0.02627	-0.38	0.7045	0	
MA1,1	0.56545	0.20846	2.71	0.0067	1	
MA2,1	0.68945	0.08886	7.76	<.0001	12	
AR1,1	0.77192	0.16291	4.74	<.0001	1	

Following are the diagnostic plots to help determine quality of the model. There are three statistical functions: ACF; PACF and IACF. Any of these plots of residuals do not reveal any memory as diagnosed by spikes at specific lags, implying that the residuals are random.





**Figure 1.** Diagnostic plots of the SARIMA (1,1,1)(1,0,0)<sub>12</sub> model

The Ljung-Box white noise test implies (Figure 1/4) that the residuals contain no systematic variation. The test confirms that autocorrelation of residuals do not exist in the time series, the observations are uncorrelated with mean zero, constant variance and they are normally distributed. This model is appropriate for modeling the series of inter-annual inflation rate.

### 3.4 Forecasting

After the model has been identified, forecast equations are derived to predict future values of the series. The following code produces forecasts.

```
proc arima data=sasuser.fcr;
  identify var=mzzr_CPI(1) nlags=27;
  estimate q=(1)(12) p=(1) method=ml;
  forecast id=date interval=month out=arimaout lead=12;
run;
```

The plot of time series with the 95% confidence limits was generated using the following procedure SGPLOT.

```
proc sgplot data=work.arimaout;
  band Upper=U95 Lower=L95 x=date/LegendLabel="95% Confidence Limits";
  scatter x=date y=mzzr_CPI;
  series x=date y=forecast;
run;
```

Seasonality and trend components will ensure accurate long term forecast.

The plot below forecasts the next 14 months (Nov 2009 – Dec 2010) of the time series. The forecasts did not continue in the falling direction the series appeared to be taking before the series ended. The SARIMA model predicts the inflation rate increase in 2010. The already published values of inflation rate (as an increase in CPI compared with the base period) taking the same direction as the forecast of the SARIMA model.

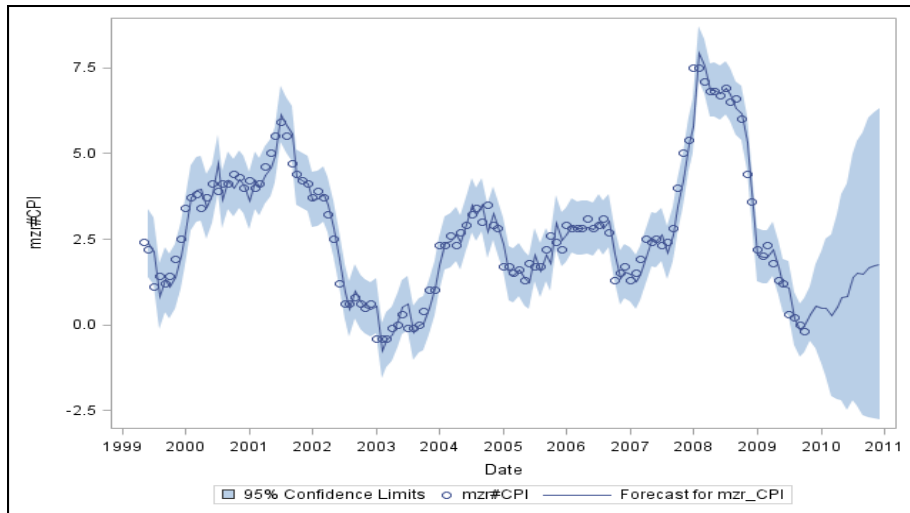


Figure 2. Forecast for the inter-annual inflation rate in 2010

### 3.5 Financial market inflation expectations

The SARIMA model forecast of year on year consumer price index (CPI) at the one-year horizons in 2010 was compared with expectations of the CNB's forecast and with the forecast of analysts from large banks and brokerage companies who are highly active on the money and capital markets and who assist the CNB. The following figure shows the real inflation time series, the forecast of analysts and the forecast of the SARIMA model. In the first part of 2010 the forecast of the SARIMA model is overestimated in comparison with the analyst's model. In the second half of 2010 the forecasts are not markedly different, which means that the created SARIMA model is appropriate for inter-annual inflation rate forecasting.

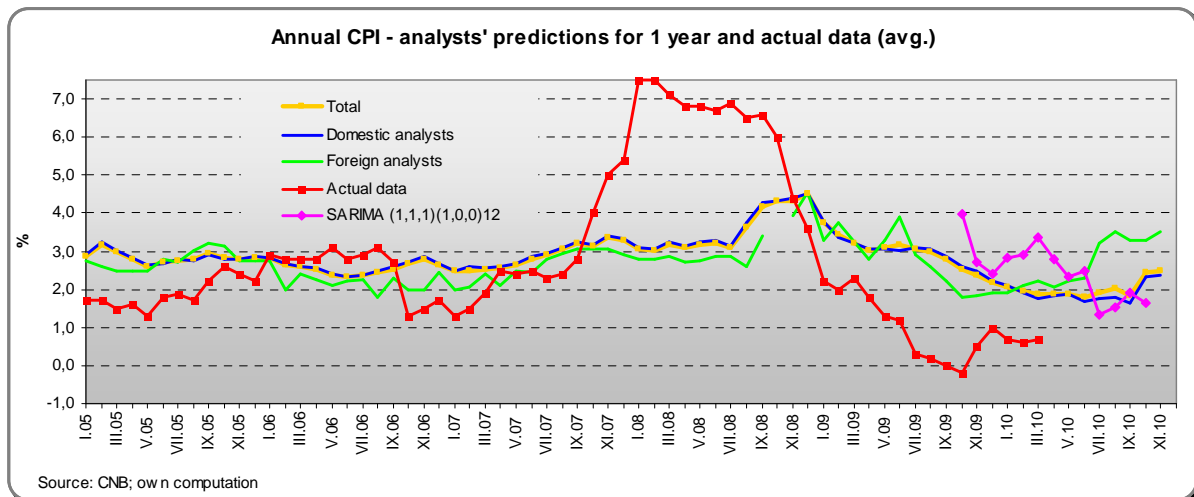


Figure 3. Year on year consumer price index at the one-year horizon

## 4 Conclusions

This paper was focused on an inflation rate time series, represented by growth of the consumer price index in comparison with the same month last year. The aim was to analyze the process of inflation rate and forecast the expected future values. The time series contains a significant trend and seasonal components, therefore the Box-Jenkins methodology was used. This methodology represents a useful forecasting technique for the periodic series.

The SARIMA (1,1,1)(0,0,1)<sub>12</sub> model was chosen as the best seasonal model. This model fills all expected assumptions to residuals and reaches the minimal value of Akaike's information criterion. The model forecasts the growth of inflation rate up to 1,8 percent, which means the growing of consumer's prices in comparison with 2009. The already published values of inflation rate taking the same direction as the forecast of the SARIMA model.

The forecast of year on year consumer price index (CPI) at the one-year horizons was compared with expectations of the CNB's forecast and with the forecast of analysts from large banks and brokerage companies. In comparison with the analyst's model, the forecast of the SARIMA model is - in the first part of 2010 - overestimated. In the second half of 2010 the forecasts are not markedly different, which means that the created model is appropriate for the forecasting of inflation rate.

This paper demonstrates that it is possible to use the SARIMA model for valuable forecast at the one-year horizon. The next step would be the detection of structural breaks in a univariate time series model, which would be done in future research in this area.

## References

1. Arlt J., Arltová M.: Ekonomické časové řady. Professional Publishing, 2009, Praha. ISBN 978-80-86946-85-6.
2. Box G.P., Jenkins G.: Time Series Analysis: Forecasting and Control. Holden-Day, 1990, New Jersey. ISBN:0816211043.
3. Cipra T.: Finanční ekonometrie. Ekopress s.r.o., 2008, Praha. ISBN: 978-80-86929-43-9.
4. Czech national bank. <http://www.cnb.cz/cs>.
5. Czech statistical organization. <http://www.czso.cz>.
6. Hurvich C.M., Tsai C. L.: Regression and time series model selection in small samples. *Biometrika*, 1989, Vol. 76, No. 2. ISSN 1464-3510.
7. Junttila J.: Structural breaks, ARIMA model and Finnish inflation forecasts. *International Journal of Forecasting*, 2001, No. 17. ISSN: 0169-2070.
8. Kirchgässner G., Wolters J.: Introduction to Modern Time Series Analysis. Springer, 2007, Gemany. ISBN 978-3-540-73290-7.
9. Morimune K., Miyazaki K.: ARIMA approach to the unit root analysis of macro economic time series. *Mathematics and Computers in Simulation*, 1997, Vol. 43. ISSN:0378-4754.
10. SAS 9.2 Help and Documentation, SAS Institute Inc. <http://support.sas.com>
11. Schertz L., Harrington D.: Inflation and Agriculture. *Agriculture - Food Policy*, 1981, Rev. 4. <http://www.ers.usda.gov/Publications/AFPR4/AFPR4c.pdf>.
12. Serinaldi, F.: Use and misuse of some Hurst parameter estimators applied to stationary and non-stationary financial time series. *Physica A: Statistical Mechanics and its Applications*, 2010, Vol. 389, No. 14. ISSN: 0378-4371.
13. Tseng F.-M. et al.: Combining neural network model with seasonal time series ARIMA model. *Technological Forecasting & Social Change*, 2002, Vol. 69. ISSN 0040-1625.
14. Valenzuela O. et al.: Hybridization of intelligent techniques and ARIMA models for time series prediction. *Fuzzy Sets and Systems*, 2008, Vol. 159. ISSN: 0165-0114.

15. Woodfield, T.: Forecasting Using SAS Software: A Programming Approach Course Notes. SAS Institute Inc. Cary, NC, USA, 2008. ISBN 978-1-59994-529-3.

# Unusual Statistical Views of the Household Expense Structure in the Czech Republic

Radka Procházková<sup>1</sup>

<sup>1</sup>Department of Statistics, Faculty of Economics and Management,  
Czech University of Life Sciences Prague,  
Kamýcká 129, 165 21 Prague 6 Suchbát, Czech Republic  
Prochazkova@pef.czu.cz

**Annotation:** Household incomes and expense correlate highly with the Czech economy development. Economic transformation changed distinctively economic and social environment in the Czech Republic. Great changes influenced citizen's living status and the way of living. Thanks to the statistical analysis of the household incomes, price changes and customer expenses it is possible to identify if the niveau improved (or how much it improved) and in which areas the way of living got worse. In recent statistical Analyses it is found that the household expense structure changed remarkably heading to the highly developed countries trends, when lowering the food expenses share is compensated by the non-food and service expenses. The goal of this contribution is a detail analysis and detecting the validity and uniqueness of these statements. Analysis is carried out using common as well as not so common structural changes indicators, thus mutual changes of the structure components in the sense of divergence from homogeneous and uniform development of all areas. These changes can basically get two forms. Firstly there are quantitative changes in proportions; secondly there are qualitative changes as a result of the qualitative time changes. It is necessary to note, that evaluation of the acquired characteristics according to the mathematical approach on one side and their substantial meaning on the other side is not the same. The same change value can be found to be high or low depending on the aggregation level. This contribution is aimed to sketch changes in macro economical scale, while total household incomes and expenses are examined on the national accounts level.

**Key words:** Expense Structure, Food Expenses, Structural Changes, Households

**JEL classification:** D 10

## 1 Introduction

The primary target of agricultural production is to provide the nutrition for the population, e.g. its nutrition need. Thus a great deal of the agricultural production serves this purpose. The nutrition of the population is closely related to the production function of the agricultural industry. Based upon this fact is a system of the population nutrition, which is a complex of economic effects (agricultural production, food industry, food market and food consumption) with the central element- the nutrition need.

The nutrition need is a significant social and economic issue, because it co-determinates the health state of the population and a reproduction of the work force, both individual and entire work potential of the society in everyday and long-term view. In this sense, the significance of nutrition in this concept is acknowledged all round the world, which is, among others, expressed in the need for a definition of nutrition and food policy.

Data about the development in the consumption of basic food are a summed up reflection of series of factors, some of which affect consumer behavior of the population in the long-or short-term cycle. [7]

The transition of Czech national economy from the system of centralized planning to a free market economy showed a marked impact also on the Czech households. The incoming of foreign supermarket chains, a widening of assortment of consumer goods and also an increase in the purchasing power of people resulted in marked and rapid changes in the buying behavior of the Czech people. [2]

The Czech economy is largely pulled by the private consumption (around one half of gross domestic product on a long-term basis). The key factors affecting the growth of the private consumption are mainly the amount and trend of real disposable income of households, changing propensity to consume, and development of consumer loans. Starting from approximately 2002, the consumption increases are also affected by the household credits, the growth of which is associated with the privatization of banks as well as their active policy towards households, low interest rates, and positive expectations of the future developments. Credit conditions have a significant impact on household consumption, and consumption is acutely sensitive to disposable income. [10]

The monitoring and analyses of household income and expenditure offer one of the socially significant views of the standard of living of households and its shifts in time. [3] Aggregate consumption plays an important role in macroeconomic fluctuations and in the transmission mechanism. [10] The household income and expenditure substantially correlate with the development of the Czech economy.

The period of 1995 – 2008 may be divided, on theoretical basis, into several stages, during which the household income had similar dynamics, mainly in respect to the overall economic situation. Household income and expenditure were rising steeply until 1996, together with the rapid increase in price inflation and gross wages of the national economy. The economy, supported by a low unemployment rate (at mere 3.9 % in 1996), thus provided space for increase of both nominal and real household income and expenditure. In 1997 – 1998, the economy experienced a slowdown (gross domestic product in real terms decreased during the period on year-on-year basis) and real year-on-year household income either stagnated or decreased. Increasing real gross domestic product (from 1.3 % in 1993 to 4.5 % in 2004), relatively high unemployment rate (around 8 %), and low growth rate of household wages, income and expenditure are typical of the period of 1999 – 2004. The period of 2005 – 2008 brings significant acceleration of the economic growth. The declining unemployment rate (at 4.4 % in 2008) together with a rapid growth of gross domestic product resulted then in a swift development of the household income and expenditure. Furthermore, the structure of the household expenditure changes during the period of 1995 – 2008.

There are a lot of factors influencing consumer by decision-making process. The literature classifies and structures these factors in various ways. For example division into inner and out factors [9], distinguishing three basic categories: personal, psychological and social factors, to which Kotler [8] adds the cultural factors as the independent category. The next group of factors can be labeled as situational factors; it means factors forming the environmental of the concrete decision-making situation. [13]

The article is therefore aimed at analyzing, in detail, the structure of household expenditure and at capturing the changes in the macroeconomic profile, with the overall household income and expenditure tracked at the national account level. The analysis targets the beginning of the new millennium.

## **2 Data and Methodology**

The Keynes's theory says that at the macroeconomic level, the final consumption firstly depends on the gross disposable income ( $Y_d$ ):  $C = f(Y_d)$ . [4] The main indicator for the behavioral analysis of the household sector is the disposable income in terms of its generation as well as in terms of its utilization. The amount of individual consumption is, at the national economy level, largely determined by the volume of the gross disposable income, i.e. the amount, which the households could allocate to final consumption without actually decreasing their assets.

Therefore, the first part of the article analyzes disposable income of households. The household sector includes individuals and groups of individuals, i.e. consumers, manufacturers of products and services for their own final consumption, and small entrepreneurs (tradesmen, farmers, private doctors, tax advisors, attorneys, etc.) producing products and services for the market. The data is based on annual national accounts for the period of 2000 - 2008.

The second part of the article deals with the analysis of structural changes of income and their impact on the individual consumption of households. Consumption patterns, although extremely elusive, are just as important to track as prices on the stock exchange. [1] In compliance with the provisions of § 19, section 1 of Act no. 89/1995 Coll., on the State statistical service, the Czech Statistical Office implemented the Classification of Individual Consumption According to Purpose (CZ-COICOP) with effect as of January 1, 1997. The classification CZ-COICOP has been prepared on the basis of an international standard Classification of Individual Consumption by Purpose - COICOP, which is used within the System of National Accounts (SNA). The objective of the CZ-COICOP classification is to classify all types of individual consumption (goods, services, etc.) according to their purpose. The CZ-COICOP classification is used to identify expenditures allocated to individual consumption on the part of three institutional sectors: households, NPISH (non-profit institutions serving households), and government institutions (public entities). Expenditures allocated to individual consumption are those, which are incurred in favor of an individual or a household.

Structural changes are changes in the proportions between the components making up the structure and the variations from homogenous and even development of all components. These changes may take two forms. It partly concerns quantitative changes apparent in the proportions, and partly qualitative changes, which result from the activity of quantitative changes in time. [12] The following characteristics were used in the article to evaluate the given changes:

a) *Total structural change:*

- *between two years:*

$$P^t = \sum_{i=1}^n |w_i^t - w_i^{t-m}| = \sum_{i=1}^n P_i \quad (1)$$

- *average change:*

$$\bar{P}_t = \frac{1}{T} \sum |w_i^t - w_i^{t-m}| \quad (2)$$

- *change for the entire period:*

$$S^t = \sum_{i=1}^n |w_i^t - w_i^o| \quad (3)$$

Where  $w_i^t$  is the proportion of indicator “ $i$ ” to the total sum for  $i = 1, 2, \dots, n$  in the period “ $t$ ”.

All these characteristics represent a sum of absolute differences between the proportions of individual components of the total in the corresponding period, and they express by how many points (absolute value) the structure of an analyzed phenomenon changed. Since the structures are shown as percentages in the article, the specified characteristics assume values from 0 to 200; the lower limit means that no structural changes took place and, to the contrary, the more the calculated characteristic approximates the upper limit the greater changes in time and/or space the structure under review recorded. [12]

It is necessary to note that the assessment of characteristics obtained according to mathematical limits and according to their factual content is not identical. The change of the same magnitude may be considered either high or low, depending on the level of aggregation.

Since this article deals with structural assessments on the national economy level of aggregation, the characteristics of structural changes of around 10.0 and more may be considered high.

b) *Monotonicity ratio*:

$$M^t = \frac{C^t}{P^t} \quad (4)$$

Where  $C^t$  represents the sum of those structural changes of each component of the structure, which did not change the trend in the analyzed year (period) in comparison with the previous year (period).

The  $M^t$  ratio assumes values within the interval from 0 to 1. If  $M^t = 0$ , then the development was absolutely non-monotonous (all components of the structure changed their trend); if  $M^t = 1$ , then all components retained their trend from the previous year (period) – i.e. the development may be characterized as absolutely monotonous.

Other characteristics of the description are relative increments, which include growth rates (chain indexes), determined as a proportion between the given and preceding component of a time series. A growth index shown as a percentage is called a growth ratio and it states by how many percent the value of a time series increased within an instant of time  $t$  compared to the previous period.

c) *Growth index*:

$$k_i = \frac{y_i}{y_{i-1}} = 1 + r_i \quad (5)$$

The average growth ratio, which is a geometrical average of individual growth ratios, is used as the aggregate characteristic of relative changes for the entire time series. It also serves as the basic instrument for the prediction of future value of monotonous time series. [5]

d) *Average growth ratio*:

$$\bar{k} = \sqrt[n-1]{k_2 k_3 \cdots k_n} = \sqrt[n-1]{\frac{y_n}{y_1}} \quad (6)$$

Other characteristics used herein do not require any special description and/or definition.

## 3 Results

### 3.1 Disposable income of the household sector

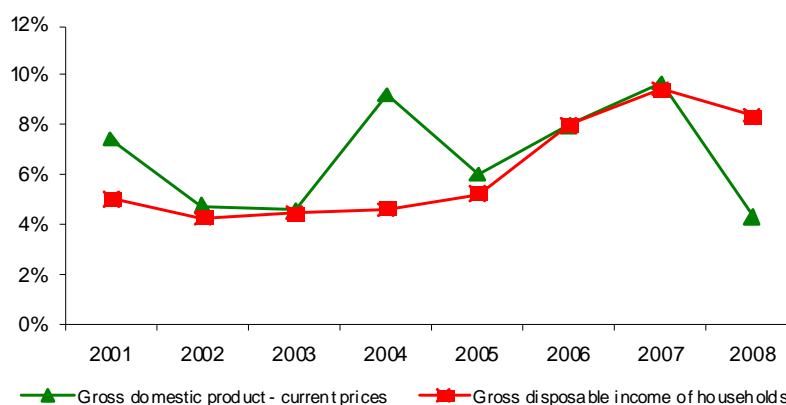
The analysis aimed at changes in the area of disposal of money within the household sector on the part of their generation and utilization is based on the disposable income indicator in the system of national accounts. In 2008, the gross disposable income of households in the Czech Republic came close to CZK 2 trillion (CZK 1 986.6 bn.), which represented an increase by almost two thirds (+61.4 %) compared to 2000 (CZK 1 231.1 bn.). The nominal gross domestic product for the period increased by 68.5 % and was therefore driven faster by other types of components than the dynamics of the household consumption.

The share of the disposable income of households in the economic performance of the Czech Republic measured according to gross domestic product in current prices decreased from 56.2 % in 2000 to 53.9 % in 2008. This share decreased by 4.3 percentage points in the period of 2000 - 2007 (all the way to 51.9 % in 2007). The main reason for the recovery in 2008 was the significant slowdown of the nominal gross domestic product (+4.3 %) in comparison with the growth of the gross disposable income of households (+8.4 %). [6]



This surpassed other years of the period, which were generally represented by a higher growth rate of gross domestic product compared to the gross disposable income of households (see fig.1). In 2004, gross domestic product even doubled the gross disposable income of households (due to an extreme dynamics of other growth components, especially the foreign trade in the year of entry of the Czech Republic to the EU). On an average, the dynamics of the disposable income of households was stronger in the second part of the period under review. [6]

The boom of the Czech economy was therefore significantly reflected in the volumes and dynamics of the disposable income of Czech households, which amounted to almost CZK 120 thousand in 2000 upon a per-capita conversion (based on the population mean), with an increase to CZK 144 thousand in 2004, and to more than CZK 190 thousand per one inhabitant of the Czech Republic in 2008. It therefore increased 1.6 times in comparison with 2000.



**Figure 1.** Development of gross domestic product and gross disposable income of households in the Czech Republic in the period of 2000 – 2008.

Source: Czech Statistical Office

In 2008, the largest part of the disposable income of households was represented by wages and salaries as employment income – their share was increasing from 2000 to 2006, followed by stagnation at a level slightly above 62 % of the total volume of the disposable income of households. The income from business activities had an opposite trend, as the share of such income (expressed as the sum of the operational surplus and gross miscellaneous income) decreased to 27.3 % in 2008.

### 3.2 Structural changes in the expenditure of the household sector

The households use the generated disposable income (adjusted for changes concerning the share of households in the pension funds reserves) to mainly cover the expenditure associated with their final consumption, i.e. products and services necessary to meet their individual needs. Such expenditure may be realized both inland and abroad. Any part not spent is expressed as savings. [11]

The expenditure for the final consumption of households represents the largest item of the total volume of the final consumption in the Czech economy. The share of the expenditure was slightly declining till 2005 (to 68 % from 70.5 % in 2000), with a minor increase thereafter (to 69.7 % in 2008).

In terms of volume, the largest items in 2000 according to the data shown in current prices were as follows: expenditure for food and nonalcoholic beverages followed by the expenditure for rent, and expenditure for recreation, culture, and sport.

In 2008, the Czech households spent CZK 1 803.7 bn. on individual consumption in nominal terms, i.e. by CZK 667 bn. or 59 % more than in 2000. The largest nominal increment was recorded in the area of rent (+92 bn. CZK) together with transportation expenditure (+91.1 bn. CZK) and food (+87.3 bn. CZK).

The household expenditure in terms of percentage according to the data in current prices increased in the area of healthcare (+217 %), Postal services and telecommunications (+174 %), and education (+157 %). A lower than average growth for the period of 2000 – 2008 was recorded with regard to the expenditure for catering, recreation, alcohol, food, and household fittings. The lowest increment was recorded in the area of expenditure for clothing and footwear (+18 %).

Structural change in the final household consumption for the period from 2000 to 2008 occurred – overall change  $S^t = 12.7$  points is significant, and also the average changes of the shares of individual items are not negligible. The greatest average structural changes for the entire analyzed period show the items (01) Food and non-alcoholic beverages and (07) Transport. The share of the expenditures on food changed the most (drop of 2.2 points), and this group has moved from first to second place within the overall expenditures. Expenditures on food and non-alcoholic beverages dominated the overall structure of expenditures until midway through the 1990's. Gradually with time, the share of expenditures on housing, water, fuels and energies increased, primarily due to the above-average increase in the prices in comparison to the overall prices. These two items of expenditures account for 39.6 % of the overall structure in 2008.

The average dynamics of changes in the consumption structure can be evaluated based on the average coefficient of growth that can be used in forecasting future values of monotonous time sequences. Based on the average coefficient of growth, the most significant dynamics within the monitored period were shown in items (06) Health and (08) Postal services and telecommunications.

Characteristics of year-to-year structural changes point to the fact that the most significant changes during the analyzed period occurred between the years 2006 and 2007. During those years, significant dynamics of changes occurred primarily in the expenditures on housing, food and non-alcoholic beverages, health, postal services and telecommunications. On the other hand, the monotonousness coefficient between the years 2004 and 2005 is nearing the value of „1“ ( $M^t = 0.87$ ) which means that the development from the previous year (period) was almost maintained.

The first position in the structure of consumption expenditures is steadily occupied by the expenditures on housing, water, energies, and fuels. The second position is occupied by food and non-alcoholic beverages, in the third position are expenditures on transport, and in the fourth position expenditures on recreation, culture and sport settled from 2006. Fifth place belongs to miscellaneous goods and services, and sixth place belongs to expenditures on alcoholic beverages, tobacco, and narcotics. Expenditures on furnishings and household equipment occupy seventh place. Eighth and ninth places are shared by expenditures on clothing and footwear and expenditures on restaurants and hotels. Stable order since 2000 is maintained in the last three spots of the structure of overall final household consumption expenditures. Tenth place is occupied by the expenditures on postal services and telecommunications, followed by the expenditures on health care. Last place is steadily occupied by expenditures on education.

## 4 Conclusions

The analysis of household consumption expenditures in the Czech Republic monitors the main changes that occurred in its parameters and primarily in its structure for the period from

2000 to 2008. Approximately the second half of this period was characterized by the robust growth of the Czech economy that influenced the behavior of Czech households in respect to the allocation of money, on both the revenue (disposable income) and consumption sides. The development of prices during most of the period monitored by this analysis did not have an inflationary effect. Disposable resources of Czech households in the form of wages and salaries, property and business incomes, and from secondary incomes coming from the redistribution of income, collectively called the gross disposable income, grew due to the economic boom in the second half of the monitored period faster than the nominal gross domestic product. But in the period from 2000 to 2004, the dynamics of disposable incomes compared to the gross domestic product was significantly slower. Standards of living in Czech households, measured primarily by material parameters (if it is possible to call the development of standards of living according to the growth of disposable income and its prevalent use), due to this factor increased from not even 120 000 CZK per one citizen of the Czech Republic in 2000, to 190 000 CZK in 2008. Even if the average annual rate of growth in final household consumption didn't reach the rate of growth of the gross domestic product, household consumption grew annually in reality by the average rate of 3.6 %.

The household expenditures on final consumption in common prices increased from 2000 to 2008 by 667 billion CZK and annually grew on average by 6 %. The dynamics of changes gradually increased, the highest increase in recent years was during the analyzed period, specifically between 2007 and 2008. In 2008, expenditures increased by 144.8 billion CZK, which is double the change between 2000 and 2001. Expenditures on food in 2008 increased by 33.2 billion CZK, housing expenditures, including rentals by 35.5 billion, and expenditures on transportation increased by 12.7 billion CZK. Households spent 12.3 billion more on recreation compared to the previous year. During the period from 2000 to 2008, households spent 62.4 % of overall expenditures on housing, food, recreation, and transport. The share of expenditures on food and non-alcoholic beverages accounted for 16.8 % of overall expenditures on final household consumption in the Czech Republic in 2008. In this manner, the Czech Republic is approximating to the most developed European countries (so called Euro zone 16), where the average household spends approximately 13 % of its expenditures on this item.

The hypothesis that „the decrease in the share of expenditures on food is allocated in favor of the share of expenditures on non-food goods and services“ can be confirmed because the increase in the share of expenditures on housing was almost the same. Based on the value of the monotonousness coefficient, it is possible to declare that after 2000, with certain objections, the stabilization of the structure of household expenditures is occurring. The Czech Republic is joining the development trend of developed countries.

## References

1. Akpınar F.: Sociohospital and consumption profile of Ankara in the context of globalization. Middle East Technical University Journal of the Faculty of Architecture, 26, 1. Ankara, Turkey, 2009. ISSN 02585316.
2. Foret M., Procházka P.: Buying behavior of households in the Czech Republic. Agricultural Economics – Czech, 53,7. Prague, Czech Republic, 2007. ISSN 0139-570X.
3. Gan J.: Housing wealth and consumption growth: Evidence from a large panel of households. Review of Financial Studies, 23, 6. Oxford, UK, 2010. ISSN 08939454.
4. Herman E.: The influence of final consumption on employment in Romania. Annals of the University of Oradea: Economics Science, 2008, 1. Oradea, Romania, 2008. ISSN 1222569X.

5. Hindls R., Seger J.: Statistical methods in economics. Publisher and Press H&H, Prague, Czech Republic, 1993. ISBN 80-85787-26-1.
6. Jileček A. and team: Development of Prices, Incomes and Household Consumption Expenditures in the period from 2000 to 2008. <http://www.czso.cz/csu/2009edicniplan.nsf/p/1155-09>.
7. Kollár Z.: Income and income Redistribution in 1996. Economic Analysis Working Papers, 1, 11. La Coruña, España, 2002. ISSN 15791475.
8. Kotler P.: Marketing management. Grada, Prague, 10<sup>th</sup> edition, Czech Republic, 2001. ISBN 80-247-0016-6.
9. Koudelka J.: Consumer behaviour and marketing. Grada, Prague, Czech Republic, 1997. ISBN 80-7169-372-3.
10. Pasalicova R., Stiller V.: Credit and household consumption. Czech journal of Economics and Finance, 54, 11-12. Prague, Czech Republic, 2004. ISSN 0015-1920.
11. Pilková J. and team: Analysis of Price Development, Income Development and the Development of Consumption Expenditures in the period from 1993 to 2003. Czech Statistical Office, Prague, Czech Republic, 2004. ISBN 80-250-0911-4.
12. Pozdniaková, I., Bezděková, Z.: Analysis of Structural Changes, Methodical Manual No.1. VÚSEI-AŘ, Prague, Czech Republic, 1984.
13. Stávková J., Stejskal L., Toufarová Z.: Factors influencing consumer behavior. Agricultural Economics – Czech, 54, 6. Prague, Czech Republic, 2008. ISSN 0139-570X.

# Instruments of methodology for assessment of the levels of living of the population

Libuše Svatošová<sup>1</sup>

<sup>1</sup>Department of Statistics, Faculty of Economics and Management,  
Czech University of Life Sciences Prague,  
Kamýcká 129, 165 21 Prague 6 Suchbát, Czech Republic  
svatosova@pef.czu.cz

**Annotation:** The conditions of life and the levels of living of the population present one of the most important indicators of the overall economic development of a given geographic area. The levels of living are understood to be summary of all the material, cultural, social and moral values available to the population over the given time and space as well as all the conditions necessary for satisfaction of the needs connected and or creating the ways of life. From this viewpoint, the levels of living constitute a multidimensional quantity, containing a very broad system of indicators of both the quantitative and qualitative nature. Assessment of the state of levels of living then presents a comparatively complex task. The official statistics are aimed at quantifying and univariate analysis of some selected components of the levels of living, particularly from the areas of population incomes and consumption. Such an analysis offers very important information on the levels of living but it is only partial information. The levels of living are a socio-economic category in principle which cannot be reduced into the purely economic factors, anyway. Besides those indicators, also some other factors- the subjective opinion of the population concerning their levels of living and the state of the conditions of life -have to be included into the levels of living. The indicators do not function at equal levels, anyway, some of them are fundamental and their effect materializes very strongly, the effect of some others can be weaker, but still very important), of the indicators can function marginally, only. The paper provides information on the use of multivariate statistical methods and on the use of the aggregate indicators.

**Key words:** conditions of life, population levels of living, multivariate statistical analyses, aggregation, statistical methods

**JEL classification :** C1

## 1 Introduction

The evaluation of quality of life of a population of a certain territory represents a very important and at the same time a very complicated development indicator of the given area. If we concentrate on an evaluation of the state of level of living and living conditions of the population, it is dealt with a very wide complex of indicators. Official statistics focus on the assessment of quantitative indicators as GDP, incomes and population consumptions. The attention is paid less to information which will enable to assess satisfaction of the population. Nevertheless, just these pieces of information can be highly needed because they form attitudes and influence the people behaviour.

## 2 Data and Methodology

A level of living is usually defined as a degree of meeting of necessities of life of population (material and spiritual) and at the same time as a summary of all utility material, social and moral values which the population keeps at its disposal in the given space and at the given time, and also a summary of conditions under which these necessities are met and which create the life [4]. As it is obvious from the definition, the term level of living represents a very complicated and internally structured category composed of many components. An influence of many factors shows itself here, so, it is not easy to evaluate the state of level of living and it is not possible to describe it in one natural unit [8].

The official statistics approach to the evaluation of level of living by the help of the evaluation of quantitative objectively ascertained indicators. In this way, incomes and expenditures of the populations, consumption of goods and services, property, an amount of means expended on public services, indicators characterizing the atmosphere pollution, criminality and others are observed [7].

This evaluation represents only one side which only partially implicates the given term. If a definition speaks about meeting of needs, it is also necessary to know how the population evaluates this satisfaction. It is necessary to evaluate also subjective people feelings, to know their opinions, in what rate their needs are met [1]. Many authors, above all from the area of sociological and psychological research differentiate the subjective quality of life, which arises from an individual judgement of evaluation, and an objective quality of life, which is described by above mentioned quantitative characteristics [2]. Then, the investigations reflecting the subjective quality of life represent a suitable addition to the official statistic indicators and together they provide a base for a complex evaluation of the level of living and living conditions of population of the given territory [5].

The importance of such complex judgement of quality of life of a population was confirmed even by conclusions of the Commission on the Measurement of Economic Performance and Social Progress (CMEPSP) of the United Nations Development program (UNDP). Its aim should be a proposal of indicators by means of which it is possible to carry out the necessary measures. It proves that measurement of economy production is not a sufficient indicator and that it is necessary to come up to measurement of satisfaction of the population [9]. It is dealt with creation of a multidimensional statistic system in which following dimensions should be included:

- Material level of living (incomes, consumption, property)
- Health
- Education
- Personal activities including the work
- Participation in government and policy
- Social relations and connection
- Environment (contemporary and future conditions)
- Uncertainty ( both the economic and the personal)

This represents a very demanding task, both in the area of data finding and especially the area of evaluation. There are mutual relations among indicators in multidimensional databases and all indicators do not take effect in the same weight. It is difficult to find a way to carry out the evaluation expertly in regard to be able to evaluate the state of quality of life and to compare the quality of life of a population living in various areas (countries, regions etc.). A possible

starting point is a creation of aggregated indicators. However, they are already used for some areas of quality of life – for example Wellbeing-index (WI) which aggregates 36 indicators covering areas of health, demographical development, economic efficiency, education, telecommunication development, and others in a sub-index of quality of human life, and 51 indicators in a sub-index of eco-system health [6].

The creation of aggregated indicators is not easy and if such an indicator is about to have a wider use, it should meet several basic requirements:

- Intelligibility
- Simplicity
- Real detection of its determination
- Involve complexity of the given problem
- Ability to represent

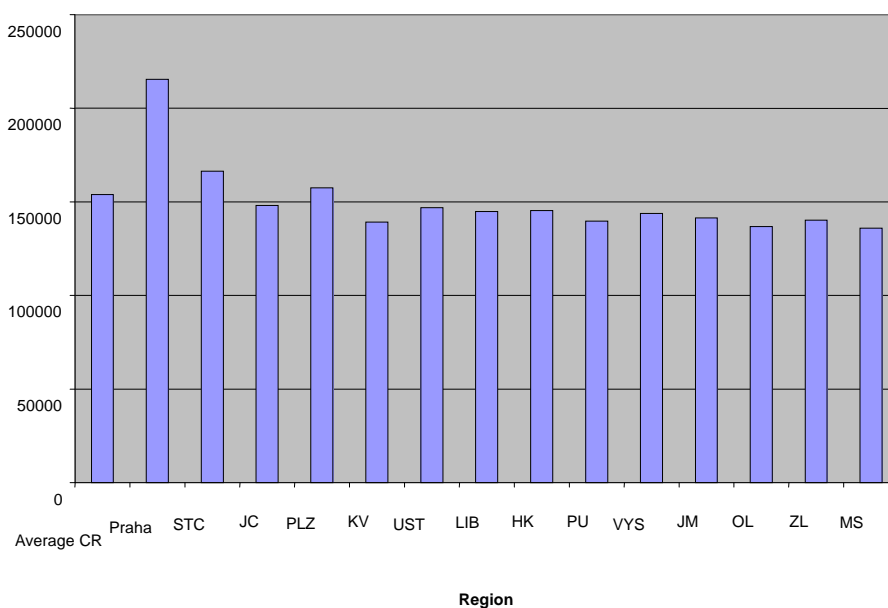
The submitted paper represents possibilities of evaluation of quality of the level of living and living conditions of the population of the Czech Republic regions. It results from the present research of the Czech Statistic Office “Incomes and living conditions of households of the CR” and it is applied especially to evaluation of subjective opinions of respondents. Here, the respondents evaluated the level of housing and problems connected included cost for housing, how the household manages with incomes, what makes the biggest problems, what it cannot afford. Even this not-too-wide collection (25 items) of subjective opinions is difficult to be processed in a simple way. However, each of these items does not work in the same weight; some indicators in the given period are of principle and their influence shows itself very significantly, an influence of other indicators can be weaker but in spite of that very important; some indicators can work only marginally. From this point of view, a method of main component analysis was used at first [3] which serves for processing of multidimensional data and on base of which it is possible to make reduction of indicators and to determine indicators which are pivotal for the solve tasks. Then, results of this method can be a starting point for determination of an aggregated indicator which would enable a mutual comparison of particular regions or groups.

### **3 Results**

The analysis has been made from accessible data over the year 2008. In the first part, basic quantitative indicators of population incomes in particular regions were evaluated.

Gross financial incomes of households per person and year amounted at average to 153 829 CZK. The city Prague is strongly above the average, the region Central Bohemia and Pilsen are slightly above it. Other regions are below the CR average, the most the region Karlovy Vary (139 160 CZK), Olomouc (136 816 CZK) and Moravian-Silesian region (135 913 CZK).

If we assess the composition of incomes, then the highest share is incomes from depended activity. They amount at average to 59.9 %. The second component in sequence is the social incomes with 22.6 %; a share of enterprise revenues is 14.5 %. There are slight differences in particular regions. The more significant is a higher share of social incomes in Moravian regions.



**Figure 1.** Gross money income (per capita) in year 2008

We record relatively big differences, if assess a share of households with net incomes below minimum wage. The lowest share of these households is in Pilsen region (1.7 %) and South Bohemian (1.3 %). A relatively high share of these households is recorded in the region Ústí (6 %), Moravian-Silesian region (5.6 %), Zlín (5 %) and Karlovy Vary (4.6 %).

The second part of analysis is applied to a subjective assessment of respondents. Here, the respondents expressed their opinion about the quality of living (a dark flat, humidity in a flat, a small flat, a noise from a street, dirty surrounding environment, vandalism, criminality), costs for housing, a repayment of loans, how the household manages with the income, what the household cannot afford. In total it was dealt with 23 data.

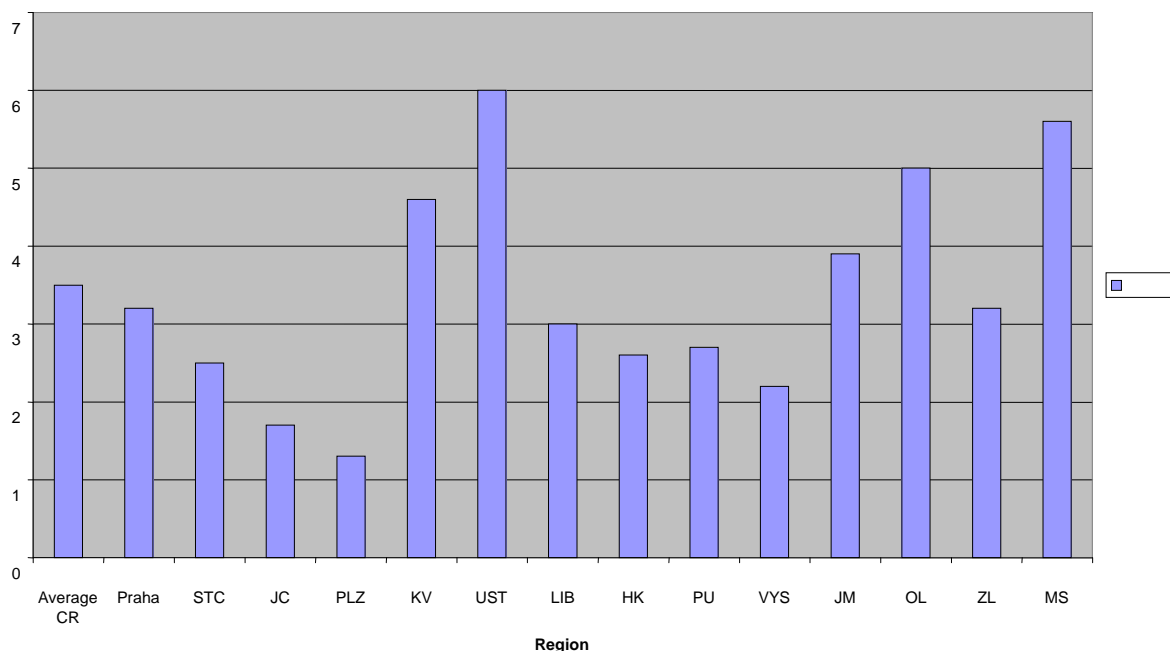
To the question, how the household managed with the income, the biggest share of respondents mentions smaller difficulties (38 %), 24 % manages with the income quite easy, 21 % with difficulties, and 8 % with big difficulties. There are some differences manifested in particular regions; the biggest share of respondents evaluating the management with income as very difficult is in the region Ústí, Liberec, and Olomouc, the easiest in Vysočina.

The costs for housing represent for the majority of respondents (67 %) a certain burden, for 23 % a high burden. It was assessed as the highest burden by respondents from the region Karlovy Vary and Olomouc.

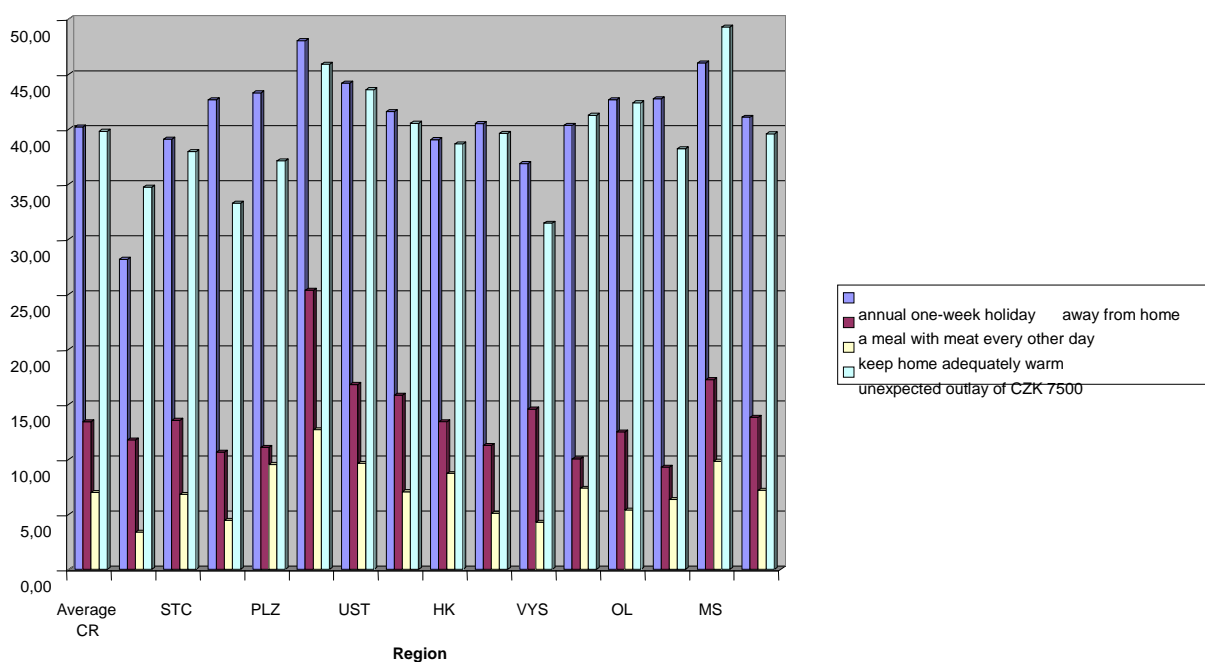
In answering the question, what the household could not afford, the higher rate is represented by the weekly holiday outside home (40 %) and a payment of unexpected expenditure 7500 CZK (40 %). The situation is more pronounced in the region Karlovy Vary, Ústí and Moravian-Silesian region.

To be able to assess which data have the biggest influence on satisfaction of the respondents, a method of analysis of main components was used with an aim to reduce the model and to define indicators whose influence in the given period shows itself the most significantly. The main component analysis was made for the model of quantitative indicators and further for the model of subjective evaluation.





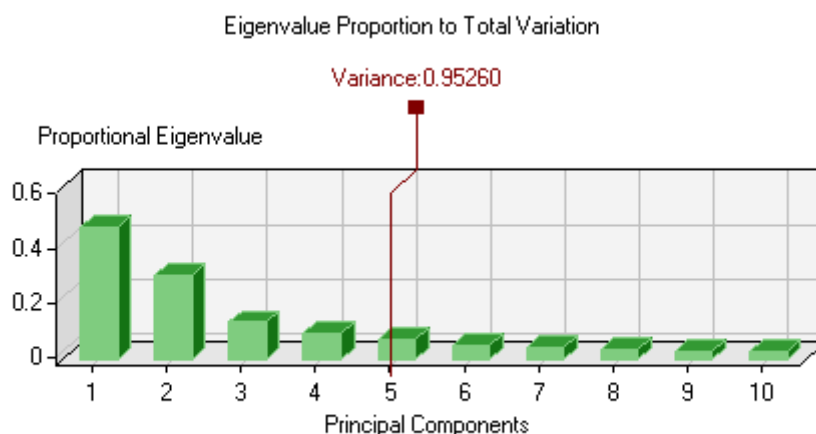
**Figure 2.** Household with net income below subsistence minimum - %



**Figure 3.** Household cold not afford in year 2008 (share)

The model with quantitative indicators was explained from 98 % by the help of four components. With the first component, which shared in the explanation of variance with 51.6 %, the variables the share of total net incomes and the share of social incomes correlated the most significantly. With the second component explaining 29 % of the total variance, the share of households with net incomes below minimum wage correlated most strongly; then in the third (11 %) the share of costs for housing, and in the fourth (6 %) the share of other incomes. These variables can be considered as pivotal for the evaluation.

The model arising from the subject assessment was explained from 95 % by the help of five components.



**Figure 4.** Results of the main component analysis for the model including the subjective assessment in 2008

With the first component, which shared in explanation of the total variation by 45 %, the variables a certain burden of costs for housing and smaller difficulties in management with income correlated the most. In the second component explaining 28 % of the total variance, variables concerning the quality of housing (dirty surrounding, vandalism, criminality) and the variability – the household could not afford a weekly holiday outside home correlated significantly; in the third and fourth then difficulties and slight difficulties in management with income; the fifth (4 %) correlated the most with indicators characterizing big difficulties in management with income and a big burden of cost for housing. The mentioned variable work the strongest in the given period and it is possible to proceed from them in further detailed analyses.

The mentioned variable can be also ranked in a comprehensive evaluation of the level of living in particular regions. Here, only a simple aggregation was made when a weighted order according to the size of particular indicators was considered. The weights of particular variables started from the model of main component analysis (the share of component in explanation of the total variance). If we assess at first the level of living in regions according to relevant quantitative indicators (table 1 – order 1) and subsequently according to relevant indicators of the subjective assessment (table 1 – order 2), we obtain different results from which it is obvious that the subjective feeling and the assessment of the level of living is different from the simple income and expenditure measurement and it brings other very substantial information to the total evaluation.

**Table 1.** Order of regions in evaluation of living conditions and level of living of population

Region	Prague	STC	JC	PLZ	KV	UST	LIB
Order 1	1	8	2	3	4	13	5
Order 2	8	12	2	7	14	13	10
Region	HK	PU	VYS	JM	OL	ZL	MS
Order 1	7	6	9	10	12	11	14
Order 2	6	4	1	5	11	3	9

## 4 Conclusion

The monitoring and evaluation of state of the level of living and living conditions of population represents quite complicated multidimensional task. It includes both the quantitative indicators – objectively measurable and the indicators reflecting the subjective view of a respondent. As it resulted from the above mentioned analysis, each group of indicators assesses the level of living from a different point of view and can bring also different evaluations. The connection of these approaches will provide a more coherent description of the surveyed problems. In order to be this true, it will be necessary to pay an appropriate attention to a selection of monitored indicators. They should be chosen so that they would perfectly covered the entire observed area both in the area of measurable quantitative data, which should include besides incomes and non-expenses also the areas of environment, health care, education, leisure time, infrastructure etc., and especially in the area of subjective assessment, which should include questions from all connected areas.

The second no less demanding task is a quality realization of the analyses and a correct interpretation of results which in a large amount of monitored indicators is not a simple question. Here, some of the above presented procedures can be applied (the multidimensional analysis, the creation of aggregated indicators).

## Acknowledgements

*The paper was elaborated in frame of solution of the research intention MŠMT-MSM 6046070906.*

## References

1. Červenka, J.: How to measure level of living? (in Czech), Socioweb.cz , Sociologický ústav AV ČR, 2009.
2. Džuka, J.: Psychological dimensions of quality of life (in Slovak), Prešov Univerzity, ISBN 80-8068-282-8, Prešov, 2004.
3. Hebák, P. et al: Multidimensional statistic methods (3) (in Czech), Informatorium, ISBN 80-7333-039-3, Prague 2004.
4. Jílek et al.: Introduction on social-economic statistics (in Czech), VŠE Prague, 2001.
5. Pospěch, P., Delín, M., Spěšná, D. : Quality of life in Czech rural areas, Agricultural Economics – Czech, 55, (6), s. 284-295, ISSN 01339/570X, Prague 2009.
6. Prescott-Allen, R.: The Wellbeing of Nations. A country by Country index of Quality of Life and the Environment, ISBN 9781559638302, Island Press, 2001.
7. Stejskal, L., Stávková, J.: Living conditions of Czech farmers according to the EU statistics on income, Agricultural Economics – Czech, 56, (7), s. 31-316, ISSN 01339/570X, Prague 2010.
8. Živělová, I., Jánský, J.: Analysis of life quality development in the administrative districts of South Moravia, Agricultural Economics – Czech, 54, č.9, s. 431-439, ISSN 01339-570X, Praha 2008.
9. Report of Commission on the Measurement of Economic Performance and Social Progress (UNDP), OECD, 2009.



# Applying Principles of Service Science

Tomáš Rain<sup>1</sup>, Ivana Švarcová<sup>1</sup>

<sup>1</sup>Department of Information Technologies, Faculty of Economics and Management,  
Czech University of Life Sciences Prague,  
Kamýcká 129, 165 21 Prague 6 Suchbát, Czech Republic  
{rain, svarcova}@pef.czu.cz

**Annotation:** Service Science, Management, and Engineering (SSME) is a term introduced by IBM to describe Service Science, an interdisciplinary approach to understand, design, and implementation of services systems. These systems represent complex systems in which specific arrangements of people and technologies take actions that provide value for others. More precisely, SSME has been defined as the application of science, management, and engineering disciplines to tasks that one organization beneficially performs for and with another.

The objective of this article is to summarize basic fact about SSME. This short review represents base for creating added value of this article. Authors use deduction and synthesize the SSME knowledge to formulate particular suggestions for changes in education process on the Faculty of Economics and Management, Czech University of Life Sciences, Prague.

Employees for service sector need more than one basic specialization. Enterprises need “T-shaped professionals”. “T-shaped professional” has three knowledge areas which create letter T. The base is being created by comprehensive knowledge of one specialization (usually excellent technological knowledge). Shoulders of letter T are being created by two additional specializations (usually management and soft skills). Modern studying specializations contain all these three components.

There is a long history of academic and industrial interest in the service sector – starting with Adam Smith and continuing right up to the present day. Yet most such interest in service has focused narrowly on marketing or management or economics. With the rise of technology-enabled services, many traditionally manufacturing-based companies have begun to see more and more revenue generated by service operations. Authors of this article suggest ways how to prepare students on this market situation.

**Key words:** Service Science, T-shaped professional, knowledge

**JEL classification:** L86

## 1 Introduction

Service Science, Management, and Engineering (SSME) is a term introduced by IBM to describe Service Science, an interdisciplinary approach to understand, design, and implementation of services systems. These systems represent complex systems in which specific arrangements of people and technologies take actions that provide value for others. More precisely, SSME has been defined as the application of science, management, and engineering disciplines to tasks that one organization beneficially performs for and with another.

Service science is a big umbrella under which many new and traditional results can find their comfortable places [2]. However, as a creditable scientific field, it has to provide the premium that comes from the coalescence of the parts: the uniquely service science results that come from, e.g., the intersection of science, management and engineering.

Connected, interdependent value concretion is networking: the dynamic multiple connections of people, organizations, resources, and institutions as service systems which may scale down

to persons, up to the whole economy, and transformational to new production functions and value chains. If we understand this networking, then we may be able to see through the business strategies and system design laws that optimize connected new value.

The Taylor organizational model, which originated in the industrial world, no longer has a place in today's service sector. In fact, the modern service sector is actually less standardized, and has begun to incorporate specific expertise and skills more and more heavily [2]. This evolution supposes a different organizational model that relies more on creativity and on "implicit knowledge," which is the essence of expertise. This new organizational model, which is starting to be sketched out in certain larger service enterprises, has yet to be fully created.

Service enterprises have largely based their organizational models on those from the manufacturing and industrial sectors (e.g., incorporating hierarchy, task repetition, and standardization of procedures). However, these types of models are no longer relevant in today's service economy, which is undergoing radical change [2].

Some service-related fields, e.g., Information Systems, have joined network science to study social networking and other economic activities [2]. However, by and large, service science has not yet fully engaged this new field to further our understanding on connected value concretion. One reason may be the fact that service systems and networks are artificial in nature and hence subscribing more to design than to discover. But more fundamentally, the state of the art may be such that network science has not yet considered the full scale of complexity of service networks, and hence hindered its application to service design. That is, relatively small scale service systems may not require network scientific results, which deal with large number of (un-regulated) nodes; and this category includes many traditional organization-bounded systems and supply chains [2]. On the other hand, scaling of value using pervasive digital connections, such as the cases with e-commerce, are characterized with myriad of multi-layered networks, or hyper-networks; while previous network science features a scope of single layer networks.

Services constitute the majority of most developed countries' GDPs [3]. Physics products represent actually only 20% of USA GDP, services creates the rest (80% of USA GDP). Rapid growth of service sector influences global economic. The past decade has seen, in response to the growth in service industries, increasing interest in what has been termed services science and innovation [4]. Sustainable growth is based upon identifying, supporting and nurturing meaningful service exchanges that exploit, develop and embody value added knowledge transfer within and across industry. It is time to broaden the services innovation debate in an effort to reach the many practitioners, academics and policy makers not as yet engaged with this exciting now field.

Author of [1] consider about services in anthropocentric viewpoint. Anthropocentric approaches are values which adopt organizing social life and save people health. Non-anthropocentric approaches (one of them is ecocentrism) are values which adopt people as a part of ecosystems and save ecosystems' health. While the anthropocentric approach places the human at the center of the ethical universe, non-anthropocentric approaches take radically different positions. Anthropocentric viewpoint contains links between good and service, because satisfaction of demand is in these days combination of delivering product and services.

Author of [2] consider that any case, it is humble conviction that service science and network science are interdependent. When combined, the network scientific understanding of connected value cocreation may help characterize the unique nature of service science, and transform some of the previous understanding in the field. In particular, with value chains. In fact, many such stores (e.g., buffalo chicken wings and cheese cakes) have been selling globally, buying globally, and networking customers globally. This scaling indeed defies

some of the premises of, for example, traditional business strategies such as Michael Porter’s low costs and product differentiation. Instead of their being mutually exclusive, the hyper-networks may actually make them supporting each other. Similarly, the broad scope and narrow scope of his 2x2 matrix may coexist, for the same company. That is, comprehensively networking with their external constituencies and of their internal production factors may blend low cost and differentiation in simultaneously broad and narrow scopes. Pervasive digitization of resources and connection of all persons and all organizations to these resources becoming public cyber-infrastructure, a mom and pop store may equalize to a Google: It can afford to flexibly scale its use of the connections up to the population, down to personal needs, and transformational to switch, combine, and redesign.

It is possible to say, service systems have been defined as value-co-creation configurations of people, technology, value propositions connecting internal and external service systems and shared information (language, measures and method) [7]. Compare with theory of new economy there are growing services dominant in new economy, in fact the services can develop economy. Secondary data consistently show business services as the major contributors to growth within the service sector and of entire economies [8]. We can show in figure 1. The Rise of Value Added by Business Services a Inputs for Manufactured Goods adapted from [8],p.137.that the traditionally economy research has been changing by influence of sector services.Many activities,so call,in-house, are now sourced by external service, in fact started a large scale in IT-outsourcing for the management of data and information operation.

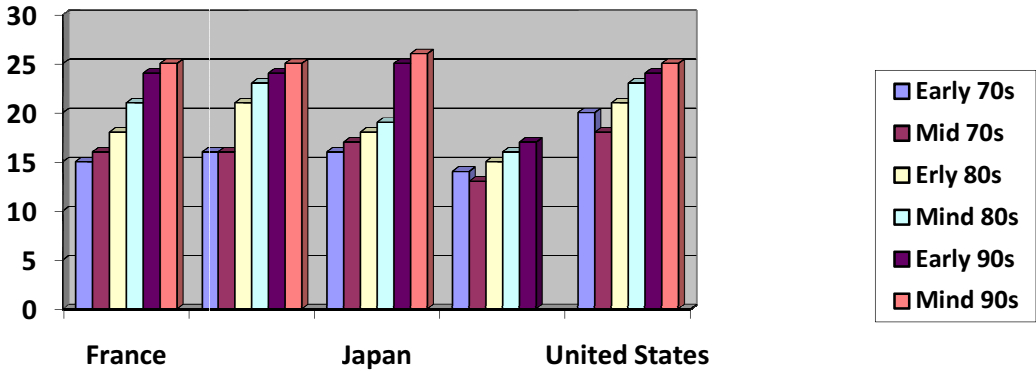


Figure 1. The Rise of Value Added by Business Services a Inputs for Manufactured Goods [8],p.137

## 2 Data and Methodology

The objective of this article is to summarize basic fact about SSME. This short review represents base for creating added value of this article. Authors use deduction and synthesize the SSME knowledge to formulate particular suggestions for changes in education process on the Faculty of Economics and Management, Czech University of Life Sciences, Prague. Authors apply own pedagogical skill and experiences from commercial sphere.

Service Science Management is very import topic not only for informatics and engineering. This theory is also helpful for agriculture. Agriculture studying programs prepare students to specific position in production, management, marketing, accounting or logistic in agriculture enterprise. Service Science Management combines all these subjects together and gives students links between them.

### 3 Results

Increasingly, academic and industrial leaders are recognizing that college graduates need new skills to address business and technical issues in a service business environment. Because services depend critically on people working together and with technology to provide value for others, these new skills include the ability to integrate across traditional disciplinary areas to obtain globally effective solutions. Service Science, Management and Engineering (SSME) is one such approach to properly focusing education and research on services, and to preparing tomorrow's graduates to work in an expanding services economy.

Authors of this article identically that [5] means that services are intangible in nature, only appearing when required by the consumer, which makes the nature of a service business very different from that of other types of businesses. Some examples of service businesses include the hospitality sector, consulting, appliance repair, computer support, health care, utilities, business services, real estate, legal services, and education. In all of these cases, people are being provided with a service, not a product, whether they are receiving treatment for a medical problem or learning in an elementary school classroom.

Marketing a service business can be tricky, because people are selling an intangible idea, rather than a product. Marketing often focuses on showcasing results, and on pushing customer service values to suggest that people will have a positive experience when they work with the business. A lawyer, for example, might demonstrate a high success rate with particular types of cases to attract customers, while a restaurant might pride itself on providing customer service of very high quality which makes diners feel like honored guests.

Starting a service business can be less costly than starting up a business which makes and sells products. Depending on the type of business, much less capital investment may be required. For example, a computer support technician could easily work out of a personal vehicle, traveling to clients to provide support services. Conversely, capital is needed to start a restaurant in order to secure and equip a facility.

Running a service business is also appealing to many people who are interested in working independently. Such businesses can often be operated by a single person, who may expand the business later as needed, and they allow people to put skills to work in a variety of ways. Someone who has knowledge and skills which may be valuable to others can turn them into a livelihood with a service business that allows other people to hire him for his skills, or hire him for the purpose of teaching skills. It is also possible to blend service elements into another type of business. For example, a skilled weaver could teach weaving classes in addition to selling finished woven products.

Authors agree with [6], that in education the result is that we are not educating young generations looking the best ICT (Information and Communication Technology) an OR (Operations Research) by integrating them. An interdisciplinary initiative SSME, coming from outsider the academy may be of great impact in promoting disciplinary education and integration.

### 4 Conclusions

Applying principles of service science to teaching on our university creates new possibility for creating graduates on the labor market. We suggest:

1. To establish new studying specialization "Applied Service Science in Information Management." This studying specialization can contains combinations of subjects which creates T-shaped profile of graduates. The main specialization can be information management (technological base), than we can add management subject (project management, managerial accounting), last part can be compose of soft skills subjects.



2. To establish contacts with enterprises / organizations which operate on the service market. These enterprises can help us in process of finding topics for diploma thesis and bachelor thesis. There is also possibility for creating internship program to train relevant skills in real business environment.
3. To prepare new research projects in cooperation with serviced oriented enterprises.
4. To establish new studying subject "Service Science" to profess service science theory and exercise practical applications of Service Science.
5. To include in others subjects relevant information about services.
6. To use multidisciplinary approach. It's suitable to teach about service topics in relevant context. Lectures can present link between profit, cost and customer satisfactions.
7. This master studying specialization can contain following subjects: IT Service Management, Competency Management, Service Theory (Systems, Modeling and Supporting), Modeling for ICT, Project Management, Team Management, Communication and Soft Skills, Information Society Services, Database Technology, Computer Networks, System Integration and Management of IS, Testing, Information Technology Security, ERP and EIS, Law for ICT, Marketing for ICT Services, Presentations Skills and Cognitive Science.

Graduates of this program will have a good knowledge of marketing, management, and practical skills in areas of sociology, psychology and law. This studying program can prepare specialist for position in software project management. Knowledge of Service Science Management creates good base for position of IT consultant, IT analytic, service system designer or system engineer.

## References

1. Çobanoğlu, E.O., Karakaya, C.: The viewpoints of primary education pre-service science teachers about the environment according to anthropocentric and non-anthropocentric approaches. *Procedia - Social and Behavioral Sciences*, Volume 1, Issue 1. 2009, Pages 2513-2518. ISSN 1877-0428
2. Hsu, C.: Service Science and Network Science. *Service Science*, 1-2, 2009. ISSN 978-1-4276-2090. [Online]. [cit. 2010-07-27]. URL: [http://www.sersci.com/ServiceScience/paper\\_details.php?id=19](http://www.sersci.com/ServiceScience/paper_details.php?id=19)
3. Macbeth, D.K., De Opacua, A. I.: Review of Services Science and possible application in rail maintenance. *European Management Journal*, Volume 28, Issue 1., February 2010, Pages 1-13. ISSN 0263-2373
4. Paton, R.A., McLaughlin, S.: Services innovation: Knowledge transfer and the supply chain. *European Management Journal*, Volume 26, Issue 2. April 2008, Pages 77-83. ISSN 0263-2373
5. Smith, S.E.: What Is a Service Business? [Online]. [cit. 2010-07-27]. URL <http://www.wisegeek.com/what-is-a-service-business.htm>.
6. Righini G.: Operation Research and Education. In: *Service Science, Management and Engineering, Education of 21st Century*. Springer, 2009. p.19-25. ISSN 978-0-387-76578-5
7. Stanicek, Z., Winkler, M.: Service Systems Through The Prism of Conceptual Modeling. *Service Science*, 2010, 2, pp. 112-125. ISSN 978-1-4276-2090

8. Ehret, M., Wirtz, J.: Division of labor between Firms: Business Services, Non-Owership-Value and the Rise of Service Economy. *Service Service*, 2010, 2, pp.136-145. ISSN 978-1-4276-2090

# Geographical analysis of the current agricultural threats

Václav Vostrovský<sup>1</sup>, Dana Klimešová<sup>1</sup>

<sup>1</sup>Department of Informatin Engineering, Faculty of Economics and Management,  
Czech University of Life Sciences Prague,  
Kamýcká 129, 165 21 Prague 6 Suchdol, Czech Republic  
{vostrovsky, klimesova}@pef.czu.cz

**Annotation:** The paper deals with the ability of geographic information system (GIS) to analyze and effectively process agricultural data using specialized functional tools like connectivity, neighbourhood evaluation, contiguity or buffering. GIS integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information. GIS can help us better understand the needs of soil, monitor the plant growing minimize the losses and prepare the different risk scenarios for agricultural activities and problems like SARS, swine fever, American fowlbrood, fowl pest, avian influenza, varroasis, Creutzfeld-Jacob disease etc. The regular monitoring can be us to solve the tasks connected with the elimination of illness dissemination, the elimination of infestations and weed prevention in the regions and also to plan differential and targeted actions.

Moreover, GIS allows the incorporation of diverse models for trends estimation, spread of diseases and so on. This way of complex solving and problem understanding is very important for losses minimization. The outcome is the emergence of the Geographic Approach - a new way of thinking and problem solving. This approach allows producing of new geographic knowledge that can be consequently used to model and analyze various processes and their relationships.

**Key words:** GIS, GIS technology, decision support, integrated pest management, SQL

**JEL classification:** D80

## 1 Introduction

Agricultural plants and farms animal breeding can suffer from bacterial, viral, fungal and pest attacks. These attacks contemporary request the great financial expenses. It is the reason why it is necessary effectively to protect them before. The plant pests and disease monitoring and location can be the important part of the actual integrated pest management (IPM). IPM is the use of multiple techniques to prevent or suppress pests in a given situation. Pest management is long term problem for farmers worldwide and new techniques are continually being developed to reduce the adverse effects of pest populations. Information requirement increases, namely information that is related to previously obtained results and their interpretation, the type of used context and trends evaluation, project-related experiences and know-how [8].

## 2 Data and Methodology

The growing crops and bred animals have to be protected from weeds, diseases and pests. It is necessary to identify, analyze and appropriately file these attacks. A geo-information technology is the great opportunity for this purpose. This technology of data processing and spatial analysis, together with modern decision analysis techniques promote new styles of knowledge communication and utilization. This requires complex communication and collaboration of many people with different educational backgrounds.

GIS technology is becoming an integral part of the information infrastructure in many organizations. The unique integration capabilities of GIS allow using of information layers to create a complete picture of the situation. GIS illustrates relationships, connections, and

patterns that are not necessarily obvious in any one data set, enabling organizations to make better decisions based on all relevant factors. GIS technology is also being used via the Internet and Web services, open new possibilities to manage the business of government. GIS is demonstrating real business value.

GIS provides essential marketing and customer intelligence solutions that lead to better pest control decisions. An important component of the GIS is its ability to produce graphics to convey the results of analyses to the people who make decisions about resources. Wall maps, Internet-ready maps, interactive maps, and other graphics can be generated, allowing the decision makers to visualize and thereby understand the results of analyses or simulations of potential events. Very roughly speaking, we can determine, considering the range of tasks [3], [4] three basic levels of GIS utilization:

- *inventory GIS,*
- *control GIS and*
- *analytical GIS.*

To the inventory GIS fits the imagination of the cadastre. Usually large and masterly managed database where it is possible to find and also provide all information for touched sides and we can do it with comparatively simple function tools and with context corresponding to the reasonable number of information layers. Main worry is to update and manage the database.

The integral part of control GIS is the modelling where the information layers from real, artificial and virtual world are composed together to select optimal scenario or verify given hypothesis. The contextual design of spatial data and further development of geo-information technologies, image processing techniques and the possibilities of object history modelling together with the geographical networks environment will provide quite new and considerably wider possibilities of using GIS. GIS architecture is open to incorporate new requirements of knowledge-based analysis and modelling, namely in connection with web designed spatial databases and temporal oriented approaches. This type of geo-information processing it is the resource, tool and means. It is modelling in most common sense.

GIS applications are frequently used in producing new information by combining information from different sources (multi-source data) and by spatial analysis of existing data. Spatial modelling is an integral part of spatial data processing approaches.

For the analytical GIS it is typical, without accounting of the range of database, in some sense permanently growing and very changeable amount of information layers that cover the different extent of changeable area of interest and call for the application of sequences of whole scale of functions named before. The top level of GIS usage it is control GIS, where as touch information layers hold true the same as in case of analytical GIS and the large ability is aided to implement knowledge models from different branches of scientific investigation of around world for wide context of evident as well as less evident connections, models of trends, objects and expected or predicted relations [1]. GIS offers for agronomical and veterinary practice the tools enable to analyse:

- *pest focus and location analysis,*
- *protective zones,*
- *spread of diseases or pest trends and*
- *targeted protection scenarios.*

The integral part of control GIS is the modelling where the information layers from real, artificial and virtual world are composed together to select optimal scenario or verify given hypothesis or assumptions.

The contextual design of spatial data and further development of geo-information technologies, image processing techniques and the possibilities of object history modelling together with the geographical networks environment will provide quite new and considerably

wider possibilities of using GIS. GIS architecture is open to incorporate new requirements of knowledge-based analysis and modelling, namely in connection with web designed spatial databases and temporal oriented approaches. It is modelling in most common sense.

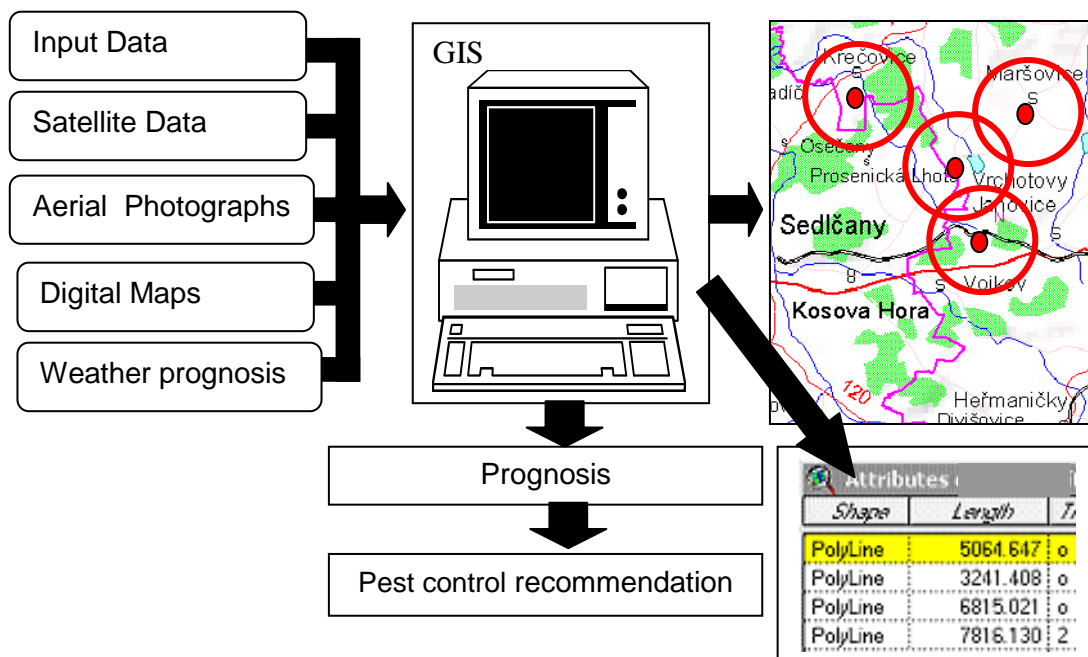
If we understand the standard geographical database as a digital model of the real world than control GIS can handle the DB, which is the result of temporal interface of standard DB with virtual and artificial models of real world.

GIS products offer a bewildering array of report types. Reports can consist of paper maps, tables, charts, graphs, or computer images. Selecting which report type is the most useful will depend on particular application. For viewing an overlay consisting of vegetation type, land use, rivers, and roads, you would likely choose a simple paper map presentation.

### 3 Results

The access to the selected information (even in form of model) about exact place and location, in defined time, verified information and coming from the credible source it is the main difficulty of decision support systems.

One possibility for dealing with this problem is to use expert knowledge when models based on objective information are not available or are not full-range. This approach combines accessible information with information that is estimated on the basis of expert judgements instead of empirical measurement data. In order to enable the use of expert knowledge the methods for transforming expert knowledge into a numerical form, as well as appropriate tools for handling and producing data about stand conditions, are needed.



**Figure 1.** Data integration is the linking of information in different forms through GIS.

For the acquisition of the usable results must be kept the next procedure:

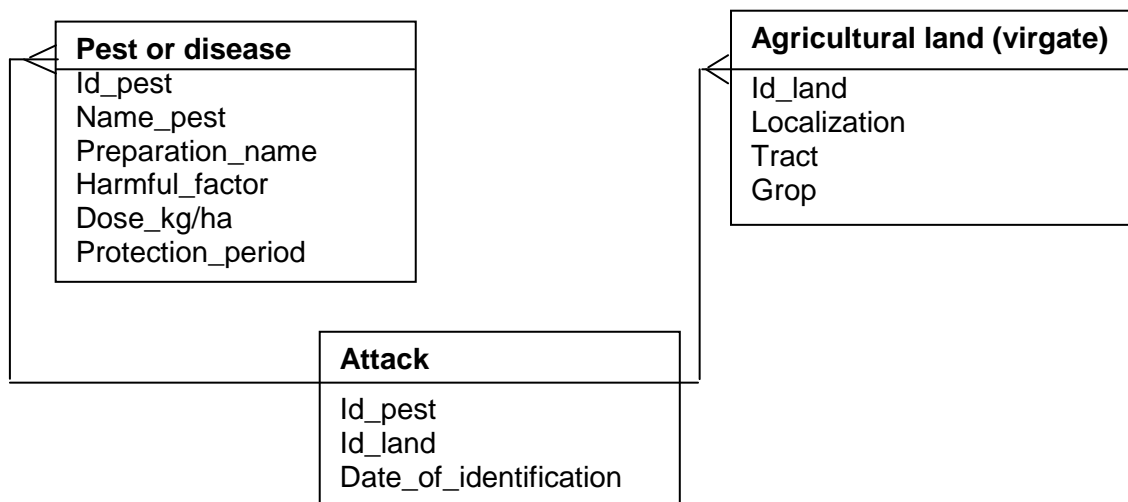
- *identification and localization pest or disease focus,*
- *specification of focus attribute,*
- *localization of corresponding protection zones,*
- *analysis of the current state by means of the layers and query builder,*
- *output: final results (data) in the form of a database, graphs and maps,*
- *output: prognosis of future stat and*

- *final specification of pest control recommendation.*

The different requirements can be described by the set of factors and coefficients, but these factors are often connected to the critical characteristics coming from the selected area and surrounding objects that can influence the estimation quality. The great part of parameters can be successfully put more precisely with the aid of expert knowledge.

GIS applications are frequently used in producing new information by combining information from different sources, by spatial analysis of existing data and by implementation of additional information coming from previously processing and analysis, expert knowledge, objects dynamics and trends. Usually the objective in applications involving contextual modelling is to locate the area or areas where the given criteria apply and eventually calculate the measure of exposure to hazard in case of infections, diseases and pests, find the optimal routes and produce different complex scenarios. The powerful tool is the way of buffering where the expert knowledge can help us to set the ranges and find the areas with defined ways of protection.

The crucial aspect of the proposed GIS utilization is the possibility of the problem situation analysis. GIS offers the SQL component for this purposes. This tool enables to record and consequently analyze all the attributes of the current problem situations. The use of GIS analytical approach enables to interconnect the possibilities of rule of type IF A THAN H. IF (features, conditions) THAN (consequential identification, methods, techniques)] with the analysis of type WHAT IF, accounting all advantages of spatial data analysis. The final outcome of these applications is usually a map depicting area simultaneously fulfilling all requested conditions and evaluated in context of related information layers. The evaluation procedure consists of the two steps: to set up parameters and determine their importance at first and provide the sensitivity analysis to demonstrate the effect of selected parameters and define weighting measures eventually [10].



**Figure 2.** Proposed data logical schema of the GIS analysis of the bacterial, viral, fungal and pest attacks

To set up special conditions we can use GIS to support solving of different problems connected with:

- *the elimination of illness dissemination (swine fever, fowl pest, varroasis, American fowl brood etc.),*
- *the elimination of infestations,*
- *the weed prevention in the regions and so on.*

The above mentioned GIS technology utilization facilitates to answer the following questions:

- *Where are the areas with the increased incidence of pests?*

- *How far is the pest focus?*
- *How large is the protective zone?*
- *What is the distance to the nearest pest focus?*

GIS can help us understand current state, trends, and define optimal localization. We can integrate census statistics with data to identify geographic characteristics. The data on crops, insect occurrences, farm practices, natural resources are obtained in the form of a database, charts and maps. The final results will give the indication about the correlation of soil, weather characteristics for the emergence of insect pests in field.

GIS and related technology will help analyze large datasets, allowing a better understanding of terrestrial processes and human activities to improve economic vitality and environmental quality.

## 4 Conclusions

In this paper, the problem of knowledge integration is addressed and the use of wide spatial context and expert knowledge is discussed. The running development of information technologies, image processing techniques and knowledge-based databases, together with the geographical networks environment, will provide quite new and considerably wider possibilities of using GIS. Our decisions are becoming increasingly dependent on understanding of complex relations and phenomena in the world around and GIS technology is able to incorporate new requirements. The main goal has been to show selected aspects of this process and compare the increasing possibilities of the sources with the difficulties of data contextual structuring and the expert knowledge incorporation.

## Acknowledgements

The paper is supported by the grant project of the Ministry of Education of the Czech Republic No. MSM6046070904 "Information and Knowledge Support for Strategic Management.

## References

1. Benedikt J., Reinberg S., Riedl L.: GIS application to enhance cell-based information modelling. *Information Sciences* 142(2002): 151-160, 2002.
2. ESRI.GIS.com. The Guide to Geographic Information System. [online]. ESRI, c2002. <http://gis.com/index.html/>.
3. Klimešová D.: Geo-information management. *International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, 35 (2004), 1, pp. 101-106
4. Klimešová D.: Study on geo-information modelling. *WSEAS Transactions on Systems*, 5 (2006), 5, pp. 1108-1113.
5. Klimešová, D., Ocelíková, E.: Study of Uncertainty and Contextual Modelling. *WSEAS International Journal of Circuits, Systems and Signal Processing*, Issue 1, Volume 1, 2007, pp. 12-15.
6. Klimešová, D.: Study on Knowledge and Decision Making, In: *Intelligent Engineering Systems and Computational Cybernetics*, Eds: Machado, J. A. T., Pátkai, B., Rudas, I. J., Springer.
7. Pequet D. J.: *Representations of Space and Time*. The Guilford Press.
8. Studer R., Decker S., Fensel D., Saab S.: Situation and Prospective of Knowledge Engineering In: J. Cuenca, Y. Demazeau, A. Garcia, J. Treur (Eds.), *Knowledge*

Engineering and Agent Technology. IOS Series on Frontiers in Artificial Intelligence and Applications. IOS Press. 2000.

9. van Heijst G. G., Schreiber A. T., Wielinga B. J.: Using Explicit Ontologies in Knowledge-Based System Development, International Journal of Human-Computer Studies (IJHCS), 46(6).
10. Vostrovský V.: The knowledge presentation by means of GIS. Firm and competitive environment 2008. MZLU BRNO. pp 263-267. ISBN 978-80-7392-022-7.